Oriental motor

HM-60551

αSTEP

AZ Series DC power input Multi-Axis Driver Slim Type

EtherCAT Compatible

USER MANUAL

Hardware Edition

Communication Specifiations 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.

1 Hardware Edition

2 Communication Specifiations Edition

3 Object lists

1 Hardware Edition

This part explains safety precautions, product overview, names and functions of each part, and installation and connection methods.

◆Table of contents

1 Introduction

■ Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product.
Use the product correctly after thoroughly reading the section "2 Safety precautions" on p.9. 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 into general industrial equipment. Do not use it for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

■ 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 Compatible Slim Type USER MANUAL (This document)
- **AZ** Series / Motorized Actuator equipped with **AZ** Series OPERATING MANUAL Function Edition

Read the following operating manuals for motors and motorized actuators.

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

Note

- 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 information on the following.
  - LED of the driver axis
  - Driver objects not described in this manual
  - Details of the driver objects in the 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 a "driver axis," and the EtherCAT communication axis is described as a "controller axis." Note them in advance.

Note	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.
memo	The items under this heading contain contents to deepen understanding of the main text, or related information.

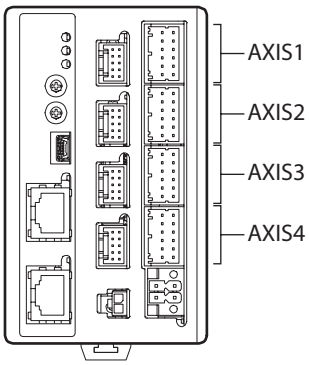
● About notation of objects

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

■ Overview of the product

The **AZ** Series DC input multi-axis driver slim type is the dedicated driver for the **AZ** Series DC input types.
Compared to existing single-axis and multi-axis drivers, this product can save space significantly.
This product is compatible with EtherCAT, which allows for a direct connection to the network without using a converter (gateway).
Up to four motors and/or motorized actuators can be connected with a single driver.

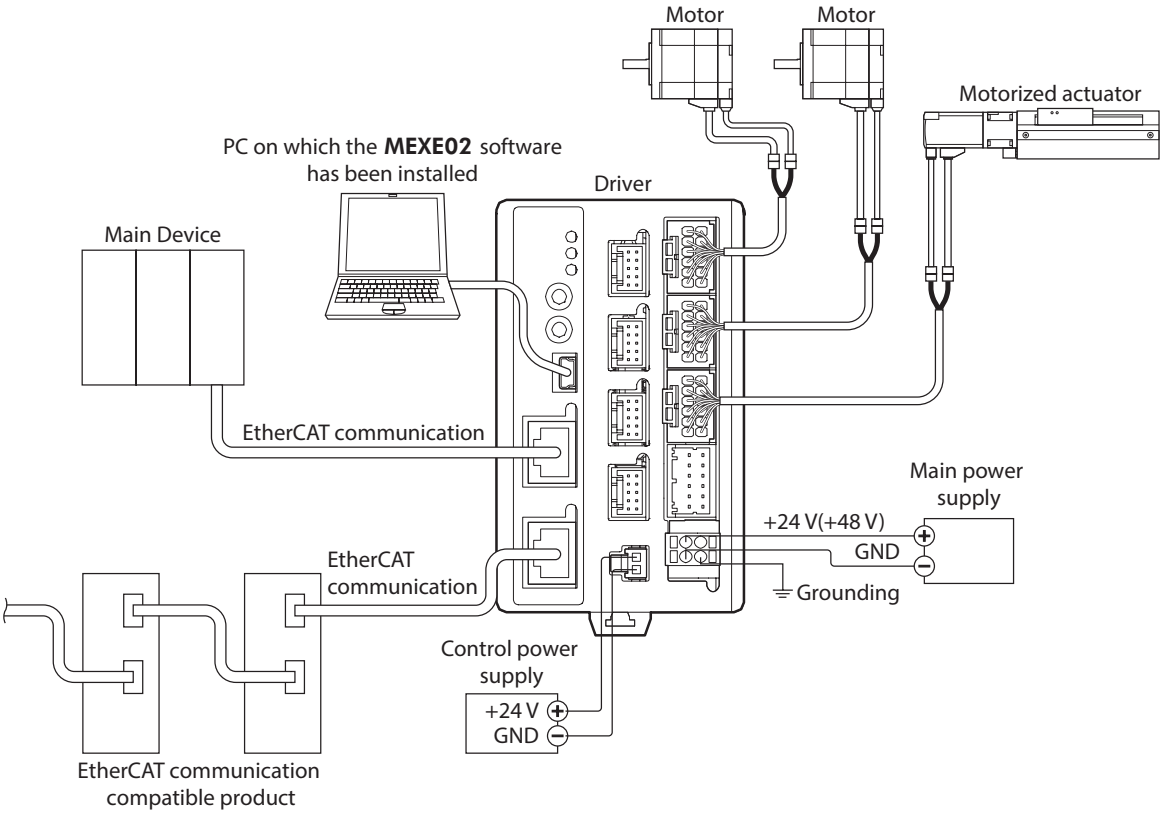
- **AZD4C-KED**



■ System configuration

The figure shows the **AZD4C-KED**.

When using a motorized actuator, first create the recovery data file without fail. Refer to the AZ Series / Motorized Actuator equipped with AZ Series OPERATING MANUAL Function Edition for information on how to create it.



■ General specifications

Degree of protection	IP20	
Operating environment	Ambient temperature	0 to +50 °C [+32 to +122 °F] (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 1,000 m (3,300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. No exposure to water or oil.
Storage environment Shipping environment	Ambient temperature	−25 to +70 °C [−13 to +158 °F] (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 3,000 m (10,000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. No exposure to water or oil.
Insulation resistance	100 MΩ or more when 500 VDC megger is applied between the following place. • FG terminal - Power supply terminal*	

* 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 about EtherCAT subordinate devices in XML format. Importing the ESI file into the EtherCAT Configuration Tool on a PLC (programmable logic controller) allows you to configure the settings of EtherCAT communication before the driver is delivered.
For information about the ESI file, contact your nearest Oriental Motor sales office.

2 Safety precautions

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

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 bodily injury or property damage.

Explanation 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 areas subjected to splashing water, or near combustible materials. Doing so may result in fire, electric shock, or injury. • Do not transport, install, connect, or inspect the product while the power is supplied. Doing so may result in electric shock. • Do not touch the driver while the power is supplied. Doing so may result in fire or electric shock. • Do not 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 driver. Doing so may result in injury or damage to equipment.
	• Assign qualified personnel to the task of installing, wiring, operating, inspecting, and troubleshooting the product. Handling by unqualified personnel may result in fire, electric shock, injury, or damage to equipment. • If the product is used in an application of vertical drive, such as elevating equipment, take measures to keep the moving part in position. Failure to do so may result in injury or damage to equipment. • When an alarm of the driver is generated (any of the driver's protective functions are triggered), remove the cause before resetting the alarm (protective function). Continuing the operation without removing the cause of the problem may cause the motor and the driver to malfunction, resulting in injury or damage to equipment. • Install the driver in an enclosure. Failure to do so may result in electric shock or injury. • Keep the input power voltage of the driver within the specified range. Failure to do so may result in fire or electric shock. • Connect the product securely according to the connection diagram. Failure to do so may result in fire or electric shock. • Turn off the main power supply and the control power supply in the event of a power failure. Failure to do so may result in injury or damage to equipment.

⚠CAUTION	
	• Do not use the driver beyond the specifications. Doing so may result in electric shock, injury, or damage to equipment. • Keep your fingers and objects out of the openings in the driver. Failure to do so may result in fire, electrical shock, or injury. • Do not touch the driver during operation or immediately after stopping. The surface is hot, and this may cause a skin burn(s). • Keep the area around the driver free of combustible materials. Failure to do so may result in fire or a skin burn(s). • Do not forcibly bend or pull the cable that is connected to the driver. Doing so may result in damage to the product. • Do not touch the terminals when conducting the insulation resistance measurement. Accidental contact may result in electric shock. • Do not leave anything around the driver that would obstruct ventilation. Doing so may result in damage to equipment.
	• Use a motor and a 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 the control power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. Failure to do so may result in electric shock. • Before turning on the main power supply and control power supply, 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 system will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury. • When moving the moving part manually, put the motor in a non-excitation state. Performing work while the motor is in an excitation state may result in injury. • If an abnormal condition has occurred, immediately stop the operation and turn off the main power supply and the control power supply. Failure to do so may result in fire, electrical shock, or injury.

3 Precautions for use

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

- **Use this driver in combination with the AZ Series DC input type motors (motorized actuators).**

  Combining it with a motor (motorized actuator) other than the **AZ** Series DC input type will cause an alarm of Motor combination error to generate. For the products that can be combined, refer to p.13.

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

  Refer to p.34 for the cable models.

- **When conducting the insulation resistance measurement, be sure to disconnect the connection between the motor and the driver.**

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

- **Noise elimination measures**

  Refer to p.29 for noise elimination measures.

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

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

- **Note when connecting a power supply whose positive terminal is grounded**

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

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 directives/regulations.

- **EU EMC Directive / UK EMC Regulations**
  Refer to "7-8 Compliance with the EMC Directive/Regulations" on p.30 for details on compliance.
- **EU RoHS Directive / UK RoHS Regulations**
  This product does not contain the substances exceeding the restriction values.

5 Preparation

This chapter explains the items you should check and 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	**AZD4C-KED**
Driver	1 unit
CN1 connector	1 piece
Housing for CN2	1 piece
Contact for CN2	2 pieces
Housing for CN6	4 pieces
Contact for CN6	32 pieces
Instructions and Precautions for Safe Use	1 copy

5-2 Products that can be combined

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

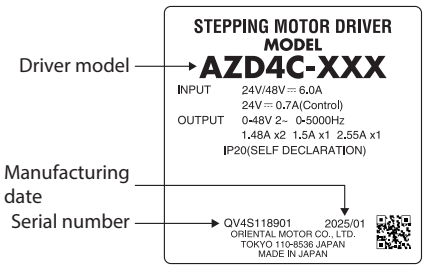
Power supply type	Product type	Applicable Series	Model name representing Series name *1	Example of model name
DC power input	Stepping motor	**AZ** Series	**AZM***2	**AZM14AK** **AZM46AKH**
	Motorized actuator	**EAC** Series	**EACM***2*3	**EACM2E05AZAK**
		EZS Series	**EZSM***2*3	**EZSM3D005AZAK**
		DR Series	**DR**	**DR28G2.5B03-AZAKU** **DR28T1B03-AZAKD-F**
		DRS2 Series	**DRSM***2	**DRSM42-04A2AZAK**
		DGII Series	**DGM***2 **DGB***2 **DGR***2	**DGM85R-AZAK** **DGB85R12-AZAKR** **DGR85R36-AZAKHR**

*1 The driver described in this manual can be combined with products that begin with these model names.
*2 The **AZM48**, the motors with a 60 mm(2.36 in.) frame size, and the actuators equipped with a motor with a 60 mm(2.36 in.) frame size are excluded.
*3 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.

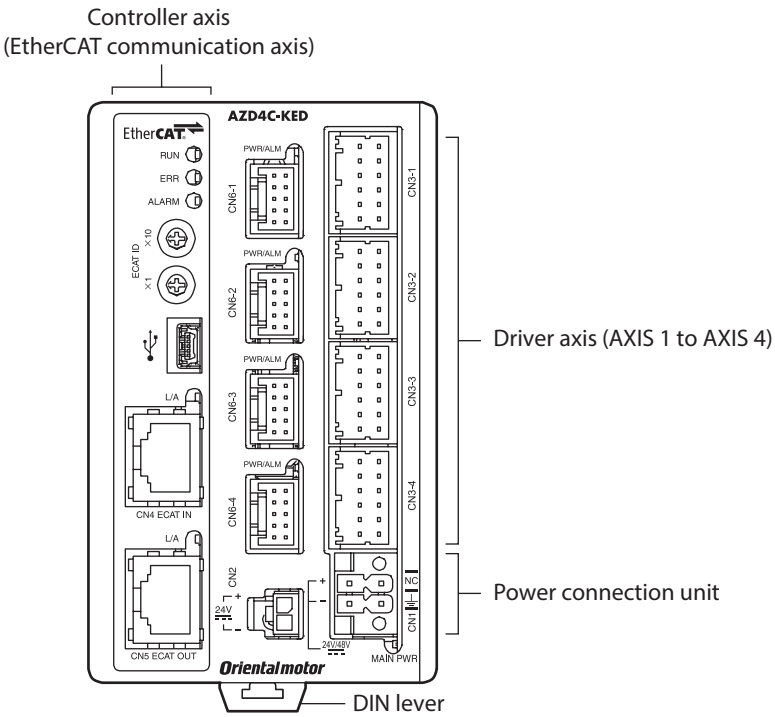
5-3 Information about nameplate

The figure shows an example.

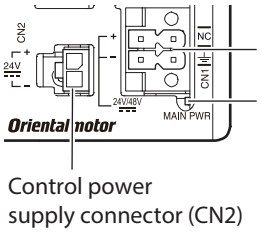
memo The position describing the information may vary depending on the product.



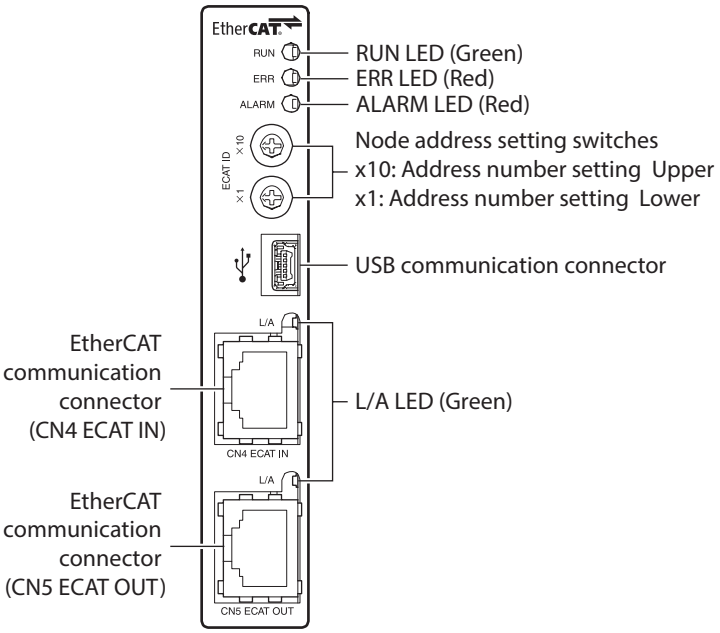
5-4 Names and functions of parts



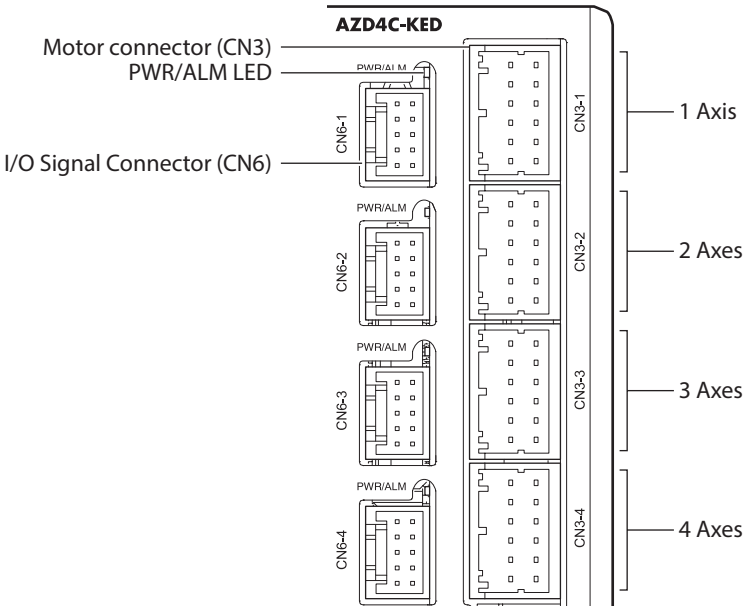
- **Power connection unit**



- **Controller axis (EtherCAT communication axis)**



● **Driver axis**



* The sign is common to each driver axis.

■ Functions of each part

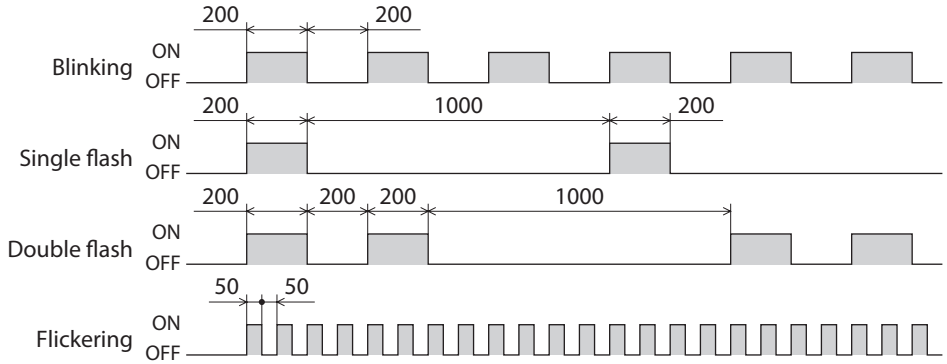
Arrangement	Type	Name	Sign	Description
Power connection unit	LED	MAIN PWR LED (Green)	MAIN PWR	This LED is lit while the main power supply is on.
	Connector	Main power supply connector	CN1	Connects a main power supply. (24 VDC / 48 VDC)
		Control power supply connector	CN2	Connects a control power supply. (24 VDC)
Controller axis (EtherCAT communication axis)	LED	RUN LED (Green)	RUN	This LED indicates the status of EtherCAT communication.
		ERR LED (Red)	ERR	This LED blinks when an error occurs via EtherCAT communication.
		ALARM LED (Red)	ALARM	This LED blinks or is lit when an alarm is generated in the controller axis.
		L/A LED (Green)	L/A	This LED indicates 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 on which the **MEXE02** software has been installed. (USB2.0 mini-B port)
		EtherCAT communication connector	CN4 ECAT IN	Connects the EtherCAT communication-compatible product on the host side.
			CN5 ECAT OUT	Connects the EtherCAT communication-compatible product of the next address number.
Driver axis	LED	PWR/ALM LED (Green)	PWR/ALM	This LED is lit while the internal control power supply is properly operated.
		PWR/ALM LED (Red)	PWR/ALM	This LED blinks when an alarm is generated in the driver axis.
	Connector	Motor connector	CN3	Connects the motor, the encoder, and the electromagnetic brake.
		I/O signal connector	CN6	Connects the I/O signals.
Others	–	DIN lever	–	This is used for mounting the driver to a DIN rail.

memo The power ground (GND) of the CN1 and that of the CN2 on the power connection unit are common internally.

■ LED indication of the controller axis (EtherCAT communication axis)

LED indicator	LED status*	Description
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 the communication axis
	Blinking	Alarm generated in the communication axis
	Light	CPU error
L/A (Green)	No light	No link
	Light	Link establishment
	Flickering	In operation after link establishment

* The blinking state of the LED is as follows. (Unit: ms)



■ LED indicator of driver axis

PWR/ALM LED (Green)	PWR/ALM LED (Red)	Driver status
Light	No light	The control power supply is ON, and the driver operates properly.
No light	Blinking	An alarm is being generated.
Blinking twice simultaneously		• Information is being generated. • Remote operation is being executed with the **MEXE02** software.
Repeating "PWR/ALM LED (green) light → PWR/ALM LED (red) light → Simultaneously lit → No light"		During simulation of the driver operation *

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

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 into equipment. Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

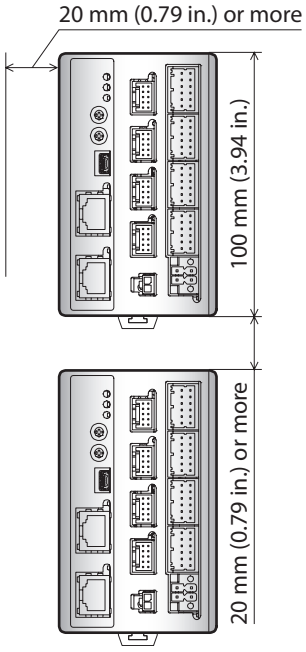
- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature: 0 to +50 °C [+32 to +122 °F] (non-freezing)
- Operating ambient humidity: 85 % or less (non-condensing)
- Area free of explosive atmosphere, toxic gas (such as sulfuric gas), or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles, or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets), or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields, or vacuum
- Up to 1,000 m (3,300 ft.) above sea level

6-2 Installation method

Use a DIN rail when installing the driver.
There must be at least 20 mm (0.79 in.) of horizontal and vertical clearance between the driver and the enclosure or other equipment inside the enclosure.

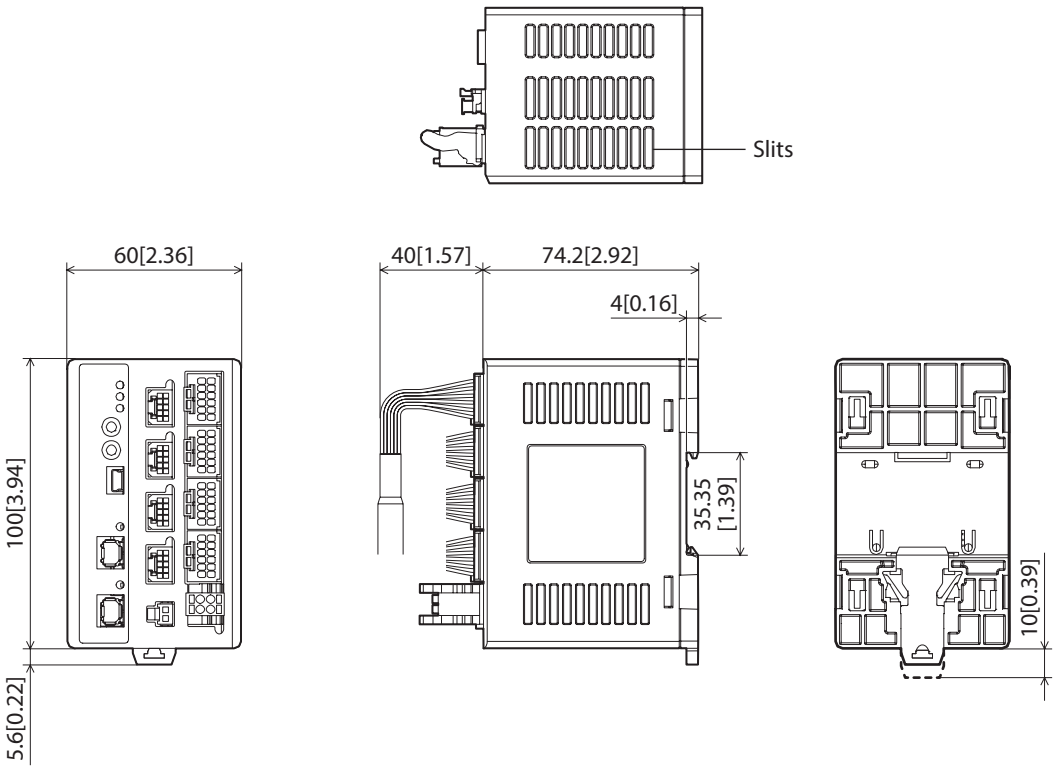
memo

- 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), improve the ventilation condition by providing forced cooling with fans or creating spaces between the drivers.
- Install the driver vertically (in a vertical position). The heat radiation effect of the driver will deteriorate if it is installed in a direction other than vertical.



■ Dimensions [Unit: mm (in.)]

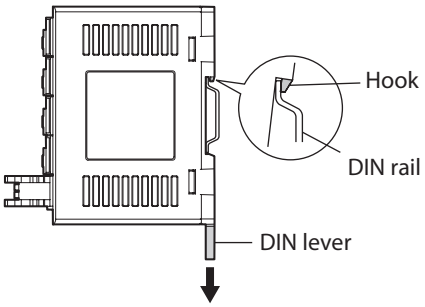
Mass: 0.21 kg (0.46 lb.)



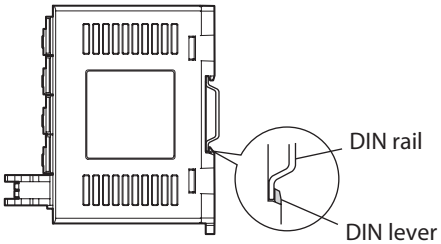
■ Mounting to DIN rail

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

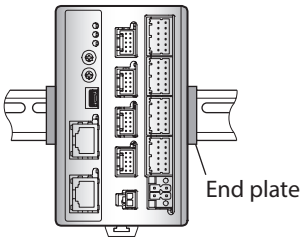
1. Pull down the DIN lever of the driver and lock it. Hang the hook at the rear to the DIN rail.



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

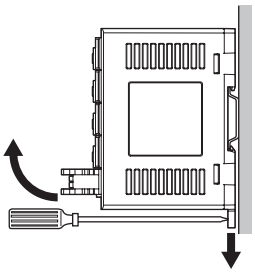


3. Secure both sides using end plates.



Removing from DIN rail

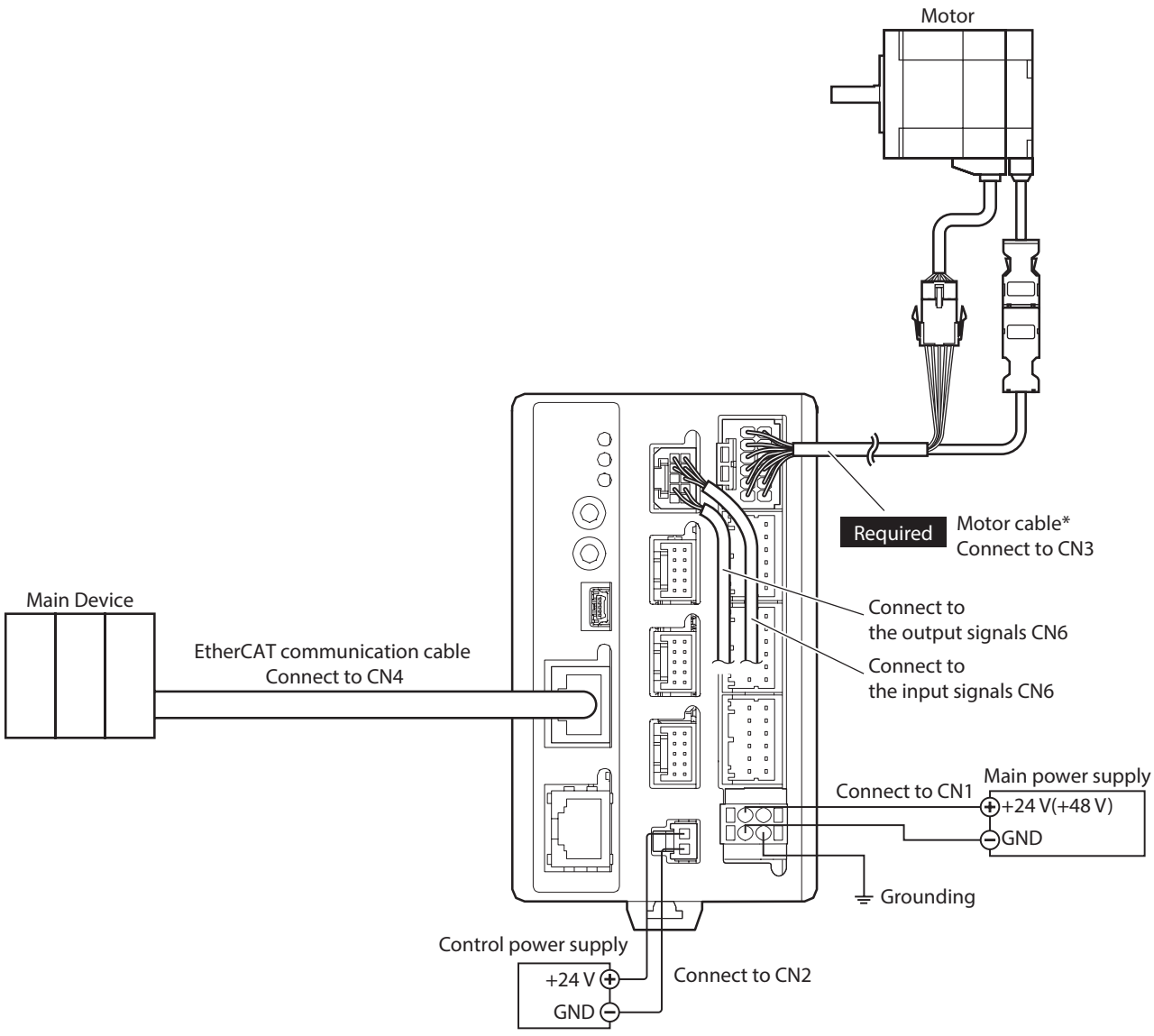
Pull the DIN lever down until it locks using a slotted screwdriver, and lift the bottom of the driver to remove it from the rail. Apply a force of about 10 to 20 N (2.2 to 4.5 lb.) to pull the DIN lever down to lock it. Excessive force may damage the DIN lever.



7 Connection

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

7-1 Connection example



* It is provided in Oriental Motor products. Purchase is required separately.

Note

- 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 the wiring distance between the motor and the driver equal to or less than the following values. Extending the wiring distance beyond these values may cause the driver to generate heat or increase the electrical noise emitted by the products, including the motor and cable.
  • When using a cable type motor: 20 m (65.6 ft.)
  • When using a connector type motor: 10 m (32.8 ft.)
- Before connecting or disconnecting the connector, turn off the main power supply and control power supply, and check the MAIN PWR LED has been turned off. Residual voltage may cause electric shock.
- Insecure connections may cause malfunction or damage to the motor or the driver. Connect the connector securely.
- Before turning on the power supplies again, make sure to turn them off and wait the following amount of time. Turning on the power supplies again immediately after turning them off 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 connector, do so while pressing the latches on the connector.
- It is recommended that the control power supply be separated from the main power supply. Even if the main power supply is shut off due to an emergency stop or other reason, the motor position (travel amount) or alarm can be checked as long as the control power supply is being supplied.

7-2 Applicable connector

Type	Application	Part number
Housing	CN1 connector (4 pins)	DFMC1,5/2-ST-3,5-LR (PHOENIX CONTACT GmbH & Co. KG)
Housing	CN2 connector (2 pins)	1445022-2 (TE Connectivity)
Contact		794610-1 (TE Connectivity)
Hand crimping tool		91501-1 (TE Connectivity)
Housing	CN6 connector (10 pins)	501646-1000 (Molex Japan LLC)
Contact		501647-1100 (Molex Japan LLC)
Hand crimping tool		63819-2300 (Molex Japan LLC)

7-3 Connecting the power supply and grounding

memo It is recommended that the control power supply be separated from the main power supply. Even if the main power supply is shut off due to an emergency stop or other reason, the motor position (travel amount) or alarm can be checked as long as the control power supply is being supplied.

■ Capacitance of power supply circuit

Although a large-capacity capacitor is built into the main power supply circuit inside the driver, an excessive inrush current can easily flow when the power is turned on because there is no circuit to prevent it. 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.

Applicable	Capacitance
Main power supply circuit	204µF
Control power supply circuit	60µF

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.

■ Power supply current capacity for main power supply

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

The main power input current and the motor output current per a single axis are shown below.

Motor/equipped motor	Driver		
	Input voltage	Input current [A]	Output current [A/phase]
AZM14	24 VDC±10 %	0.4	0.5
AZM15		0.5	0.6
AZM24, **AZM26**		1.4	1.5
DGM60, **DGR60**			
DR20		0.4	0.35
DR28		1.3	1.5
AZM46	24 VDC±10 % / 48 VDC±10 %	1.5	1.48
DRSM42			
DGM85, **DGR85**, **DGB85**			

Note If a 24 VDC product is connected to any of the driver axes, use 24 VDC as the main power supply of the driver. If 48 VDC is used, an alarm of Motor combination error will be generated. Refer to the table below for the products with 24 VDC specifications.

Applicable Series	Product model*1
AZ Series	**AZM14**, **AZM15** **AZM24**, **AZM26**
EAC Series*2	**AZM24**
DR Series	**DR20**, **DR28**
DGII Series	**DGM60**, **DGR60**

*1 Product models describe part of the whole name of the products.
*2 Check the model mane of the equipped motor for the **EAC** Series.

■ Power supply current capacity for control power supply

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

Power supply current capacity	Input power supply voltage
0.7 A	24 VDC±10 %*1*2

*1 It is 24 VDC±5 % for the electromagnetic brake motor.
*2 When an electromagnetic brake motor is used, it is 24 VDC±3 % if the wiring distance between a motor and driver is extended to 10 m (32.8 ft.) or more using an Oriental Motor cable.

■ Wiring method of CN1 and CN2 connectors

● CN1 connector

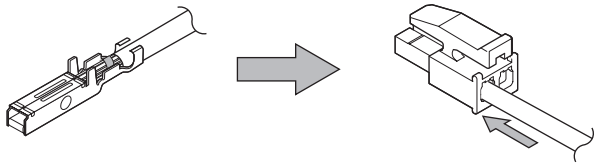
- Applicable lead wire: AWG24 to AWG16 (0.20 to 1.25 mm^2)
- Stripping length of wire insulation: 10 mm (0.39 in.)

1. Strip the insulation of the lead wires.
2. Insert the lead wire while pushing the button of the orange color on the connector with a slotted screwdriver.
3. After having inserted, release the button to secure the lead wire.

● CN2 connector

- Applicable lead wire: AWG24 to AWG20 (0.20 to 0.50 mm^2)
- Outer diameter of wire insulation: φ0.89 to 1.52 mm (0.04 to 0.06 in.)

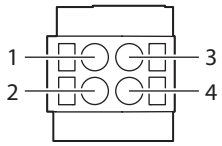
1. Strip the insulation of the lead wires.
2. Crimp the lead wires and contacts using the designated crimp tool.
3. Insert the lead wires that have crimped contacts into the CN2 connector.



■ Pin assignments

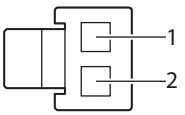
● **CN1 connector (main power supply)**

Pin number	Name	Description
1	+	Main power supply input (24 VDC / 48 VDC)
2	–	Power supply ground
3	N.C.	–
4	⏚	Frame ground



● **CN2 connector (control power supply)**

Pin number	Name	Description
1	+	Control power supply input (24 VDC)
2	–	Power supply ground



memo The power ground (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, use a round terminal and secure the grounding point near the driver.

7-4 Connecting the I/O signals

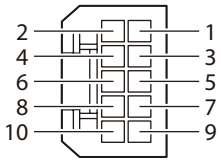
■ Wiring method of CN6 connector

- Applicable lead wire: AWG26 to AWG22 (0.14 to 0.30 mm^2)
- Outer diameter of wire insulation: φ0.95 to 1.5 mm (0.04 to 0.06 in.)

1. Strip the insulation of the lead wires.
2. Crimp the lead wires and contacts using the designated crimp tool.
3. Insert the lead wires that have crimped contacts into the CN6 connector.

■ Pin assignments

Pin number	Name	Description*
1	IN-COM	Input common
2	IN0	Control input 0 (FW-LS)
3	IN1	Control input 1 (RV-LS)
4	IN2	Control input 2 (HOMES)
5	IN3	Control input 3 (FREE)
6	NC	-
7	OUT0+	Control output 0+ (ALM-B)
8	OUT0-	Control output 0- (ALM-B)
9	NC	-
10	NC	-

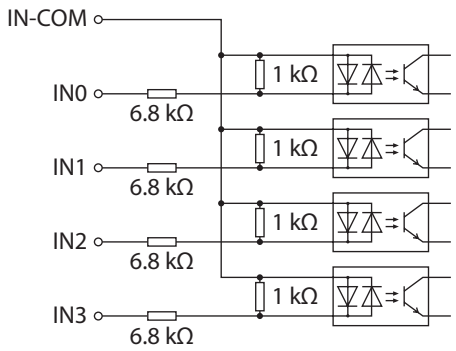


* Values in parentheses ( ) are initial values.

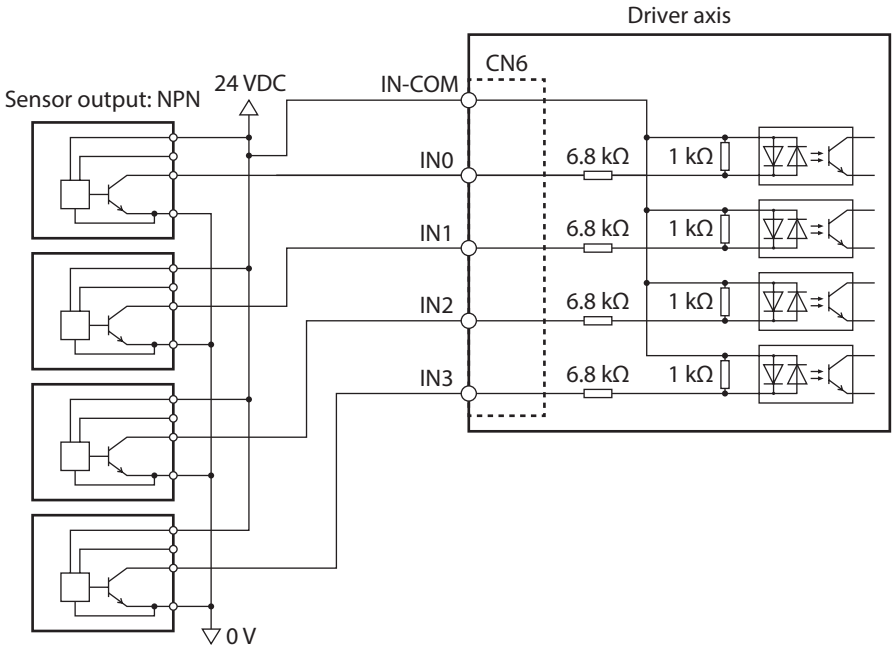
■ Input signals

- Photocoupler inputs
- Input resistance: 6.8 kΩ
- Input voltage: 24 VDC±10%

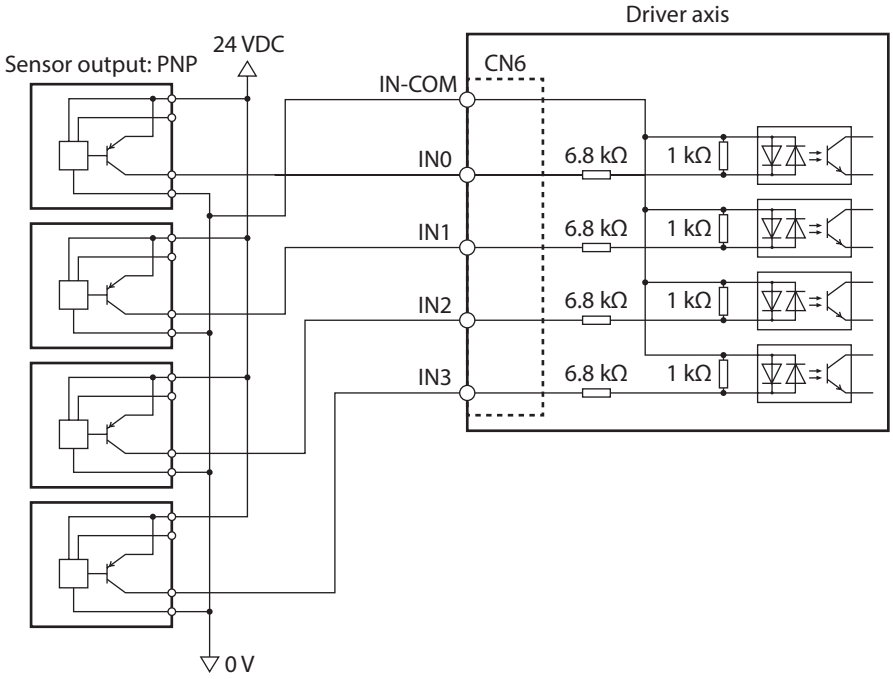
● **Internal circuit**



● **Example of a connection with current sink output circuit type sensors**



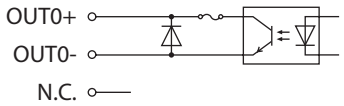
● **Example of a connection with current source output circuit type sensors**



■ Output signals

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

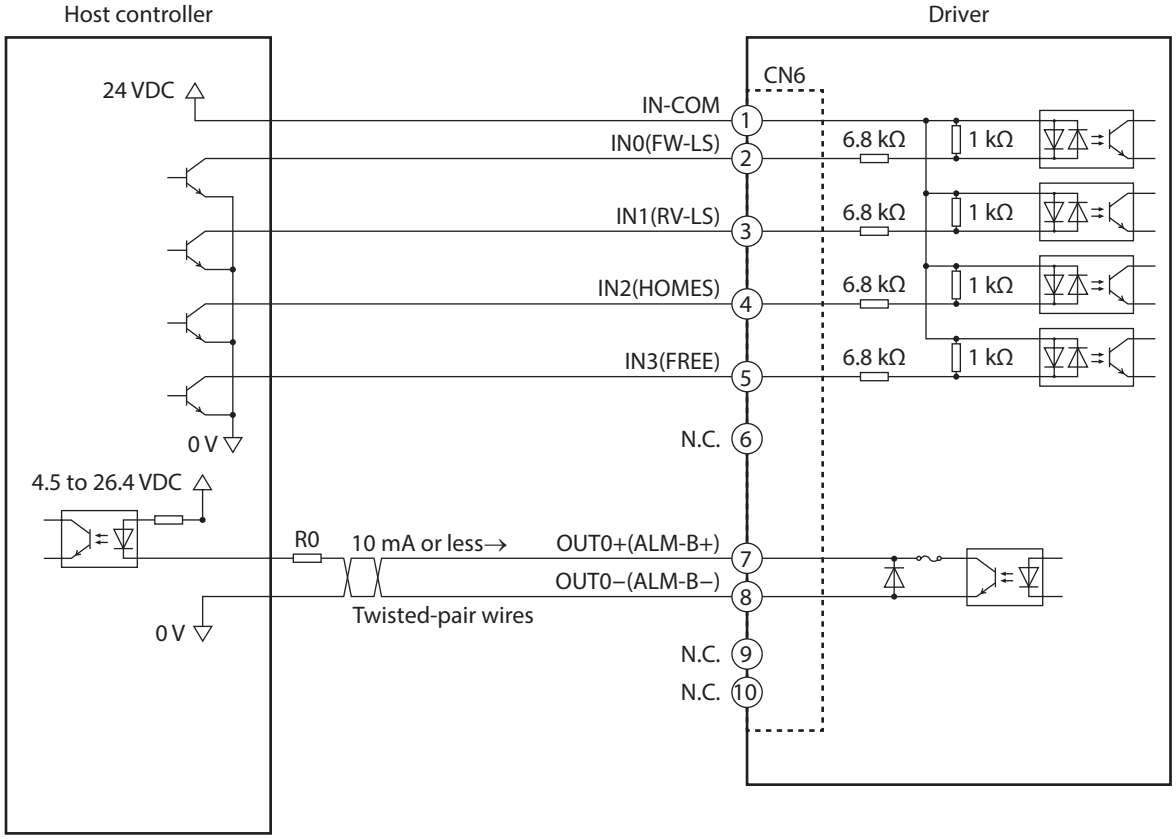
● **Internal circuit**



7-5 Connection diagram

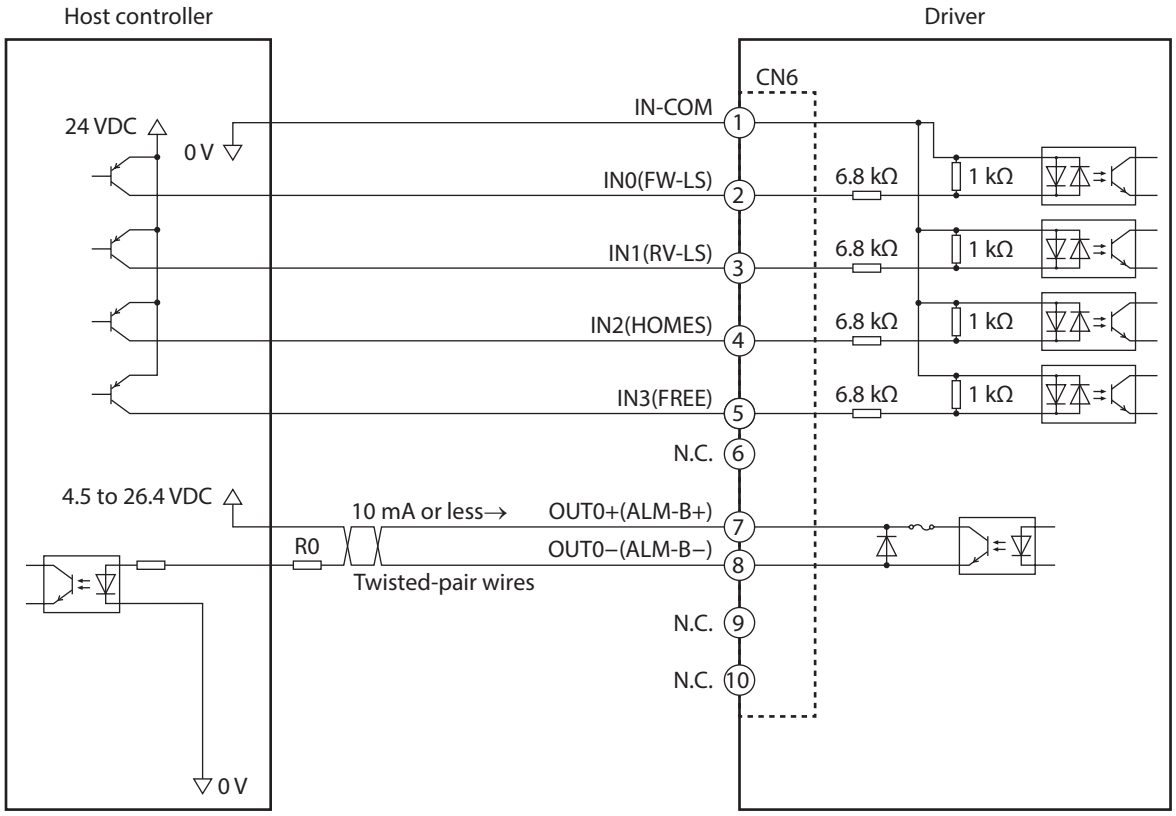
memo
- Use input signals at 24 VDC.
- Use output signals at 4.5 to 26.4 VDC with a current of 10 mA or less. If the current exceeds 10 mA, connect an external resistor R0 to keep it to 10 mA or less.

■ Connection example with a current sink output circuit



* Values in parentheses ( ) are initial values.

■ Connection example with a current source output circuit



* Values in parentheses ( ) are initial values.

7-6 Connecting the USB cable

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

Specifications	USB2.0 (Full speed)
Cable	Length: 3 m (9.8 ft.) or less Shape: 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 on the USB cable.

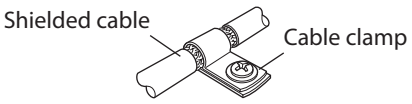
7-7 Noise elimination measures

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

■ Measures against electrical noise

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

- **Noise suppression**
  - When relays or electromagnetic switches are used, use a noise filter or CR circuit to suppress the surge generated by these devices.
  - Use Oriental Motor connection cables when extending the wiring distance between a motor and a driver. Refer to p.34 for the model. This is effective in suppressing the electrical noise emitted from the motor.
  - Cover the driver with a metal plate, such as aluminum. This effectively shields the electrical noise emitted from the driver.
- **Prevention of noise propagation**
  - Connect a noise filter on the input side of the DC power supply.
  - Keep power lines, such as motor and power supply cables, at least 200 mm (7.87 in.) away from signal lines, and do not bundle or parallel them. If a power cable and a signal cable must cross, cross them at right angles.
  - Use shielded cables for a power cable and a signal cable.
  - Keep the cables as short as possible without coiling or bundling extra lengths.
  - Grounding multiple points will increase the effectiveness of blocking electrical noise because the impedance at the grounding points will be reduced. 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 can maintain contact with the entire circumference of the shielded cable, and ground as close to the product as possible.



- **Suppression of effect by noise propagation**

  Wrap the noise propagating cable around a ferrite core. This will prevent the propagated noise from entering into the driver or from being emitted from the driver. The frequency band in which an effect of the ferrite core can be seen is generally 1 MHz or more. Check the frequency characteristics of the ferrite core used. To increase the noise attenuation effect of the ferrite core, wrap the cable several more times.

■ Noise suppression product

● Noise filter

- Connect a noise filter (or equivalent) in the table below on the input side of the DC power supply. When using a power transformer, be sure to connect a noise filter to the AC input side of the power transformer. This will prevent noise from propagating through the power supply line. Install the noise filter as close as possible to the input terminals of the DC power supply.

Manufacturer	Part number
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 them firmly using a cable clamp or other means to prevent the cable from coming loose from the enclosure.
- Place the input cable as far away from the output cable as possible and do not wire the cables in parallel. If the input and output cables are placed at a close distance or wired in parallel, the noise in the enclosure will affect the power cable through stray capacitance, and the noise suppression effect will be reduced.
- Connect the ground terminal of the noise filter to the grounding point using a wire that is as thick and short as possible.
- When connecting a noise filter in an enclosure, wire the input cable of the noise filter as short as possible. Wiring over a long distance may reduce the noise suppressing effect.

■ Oriental Motor noise suppression products

Refer to p.36 for the model.

● Surge suppressors

These are effective in suppressing the surge that occurs in a contact part of the relay. Connect when using a relay or electromagnetic switch. A CR circuit for surge suppression and a CR circuit module are provided.

7-8 Compliance with the EMC Directive/Regulations

Effective measures must be taken against EMI that the motor and driver may give to adjacent control-system equipment, as well as EMS of the motor and driver themselves, 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 measurements on its motors and drivers in accordance with "Example of installation and wiring" shown on the next page.
The user is responsible for ensuring the machine's compliance with EMC based on the installation and wiring described 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. For details, refer to the "Noise filter" section above.

● Connecting a power supply

Use a DC power supply that complies with the EMC Directive/Regulations for the power supply.
Use shielded cables to wire and ground as short as possible.
Refer to "Prevention of noise propagation" on p.29 for information on how to ground the shielded cable.

● Ferrite core

Install the following ferrite core (or equivalent) to the place shown in "Example of installation and wiring" on p.31.
Part No.: ZCAT3035-1330 (TDK Corporation)

● Connecting the motor cable

Use Oriental Motor connection cables when extending the wiring distance between a motor and a driver. Refer to p.34 for the model.

Connecting the signal cable

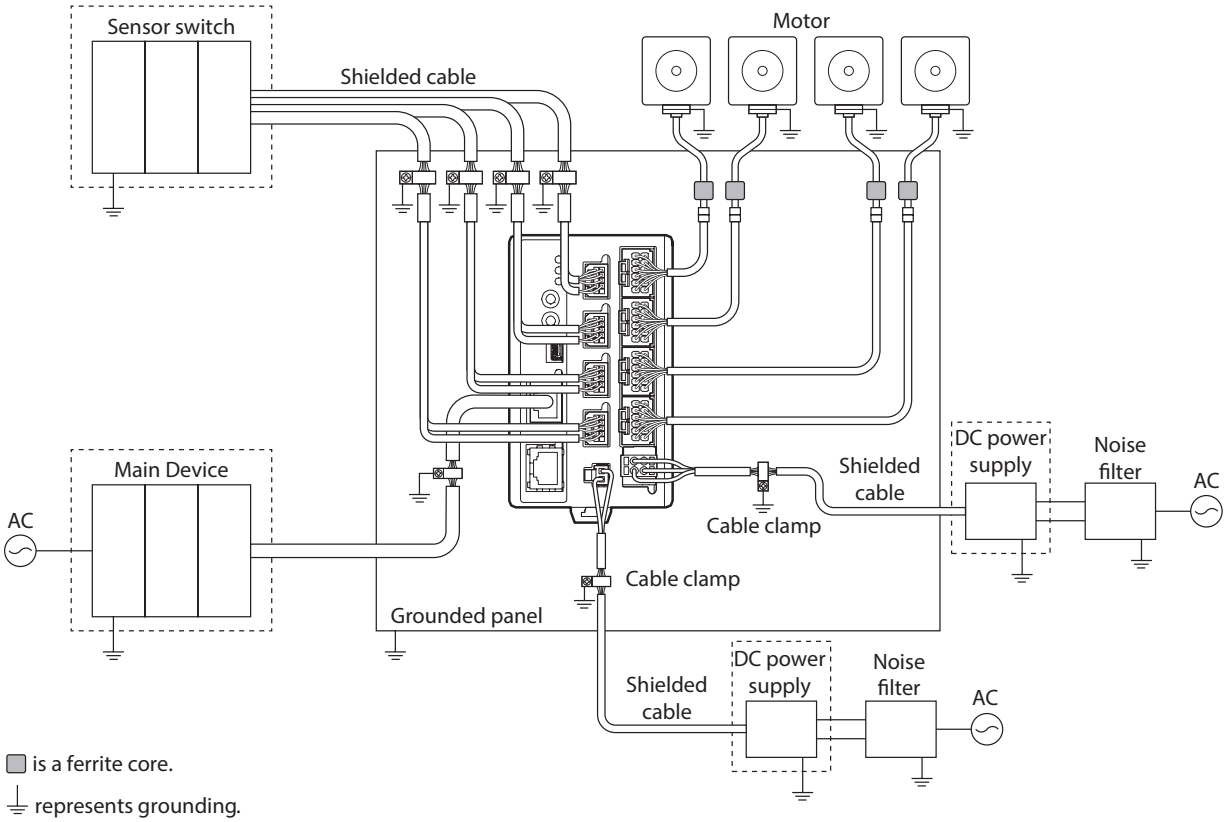
Refer to "Prevention of noise propagation" on p.29.

Grounding method

- The grounding cables for the motor, driver, and noise filter should be as thick and short as possible to prevent potential differences among the grounding points.
- Choose a large, thick, and uniformly conductive surface for the grounding point.

Example of installation and wiring

Use an Oriental Motor connection cable to connect the motor. Refer to p.34 for the model.



□ is a ferrite core.

⏚ represents grounding.

--- is a shielding box.

Note

- The driver uses components that are sensitive to static electricity. Take measures against static electricity, as it may cause the driver to malfunction or be damaged.
- When connecting the following products, cover the motor cable with a shielded braided sleeving. Furthermore, EMC tests are performed with a shielded braided sleeving grounded at both ends with cable clamps.
  AZ Series: **AZM14**, **AZM15**, **AZM24**, **AZM26**
  EAC Series: **EACM2**
  DR Series: **DR20**, **DR28**
  DGII Series: **DGM60**, **DGR60**

8 Setting

This chapter explains how to set the functions of the driver.

8-1 Node address

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

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. Setting the switches while the control power supply is on will not enable the new setting.

9 Inspection and maintenance

9-1 Inspection

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

■ Inspection items

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

Note The driver uses semiconductor elements. Since static electricity may damage semiconductor components, be extremely careful when handling it.

9-2 Warranty

Check on the Oriental Motor Website for the product warranty.

9-3 Disposal

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

10 Cables

Note

- Be sure to purchase a cable.
- Keep the wiring distance between the motor and the driver equal to or less than the following values. Extending the wiring distance beyond these values may cause the driver to generate heat or increase the electrical noise emitted by the products, including the motor and cable.
  - When using a cable type motor: 20 m (65.6 ft.)
  - When using a connector type motor: 10 m (32.8 ft.)

■ Connection cables / Flexible connection cables

- When installing the motor on a moving part, use a flexible cable.
- When extending the wiring distance by connecting an extension cable to the connection cable, make the total cable length 20 m (65.6 ft.) or less.

● When using a cable type motor (For AZM14, AZM15, AZM24, AZM26)

[Connection cables]

• For motor/encoder

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

[Flexible connection cables]

• For motor/encoder

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

● When using a cable type motor (For AZM46)

[Connection cables]

• For motor/encoder

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

• For motor/encoder/electromagnetic brake

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

[Flexible connection cables]

• For motor/encoder

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

• For motor/encoder/electromagnetic brake

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

● **When using a connector type motor (For AZM46)**

[Connection cables]

• For motor/encoder, for motor/encoder/ electromagnetic brake

Cable outlet direction	Length [m (ft.)]	Model
Output shaft direction	0.2 (0.7)	**CCM002Z1EFF**
	0.5 (1.6)	**CCM005Z1EFF**
	1 (3.3)	**CCM010Z1EFF**
	2 (6.6)	**CCM020Z1EFF**
	3 (9.8)	**CCM030Z1EFF**
	5 (16.4)	**CCM050Z1EFF**
	7 (23.0)	**CCM070Z1EFF**
	10 (32.8)	**CCM100Z1EFF**

[Flexible connection cables]

• For motor/encoder, for motor/encoder/ electromagnetic brake

Cable outlet direction	Length [m (ft.)]	Model
Output shaft direction	0.5 (1.6)	**CCM005Z1EFR**
	1 (3.3)	**CCM010Z1EFR**
	2 (6.6)	**CCM020Z1EFR**
	3 (9.8)	**CCM030Z1EFR**
	5 (16.4)	**CCM050Z1EFR**
	7 (23.0)	**CCM070Z1EFR**
	10 (32.8)	**CCM100Z1EFR**

Cable outlet direction	Length [m (ft.)]	Model
Vertical direction	0.2 (0.7)	**CCM002Z1EVF**
	0.5 (1.6)	**CCM005Z1EVF**
	1 (3.3)	**CCM010Z1EVF**
	2 (6.6)	**CCM020Z1EVF**
	3 (9.8)	**CCM030Z1EVF**
	5 (16.4)	**CCM050Z1EVF**
	7 (23.0)	**CCM070Z1EVF**
	10 (32.8)	**CCM100Z1EVF**

Cable outlet direction	Length [m (ft.)]	Model
Vertical direction	0.5 (1.6)	**CCM005Z1EVR**
	1 (3.3)	**CCM010Z1EVR**
	2 (6.6)	**CCM020Z1EVR**
	3 (9.8)	**CCM030Z1EVR**
	5 (16.4)	**CCM050Z1EVR**
	7 (23.0)	**CCM070Z1EVR**
	10 (32.8)	**CCM100Z1EVR**

Cable outlet direction	Length [m (ft.)]	Model
Opposite to output shaft direction	0.2 (0.7)	**CCM002Z1EBF**
	0.5 (1.6)	**CCM005Z1EBF**
	1 (3.3)	**CCM010Z1EBF**
	2 (6.6)	**CCM020Z1EBF**
	3 (9.8)	**CCM030Z1EBF**
	5 (16.4)	**CCM050Z1EBF**
	7 (23.0)	**CCM070Z1EBF**
	10 (32.8)	**CCM100Z1EBF**

Cable outlet direction	Length [m (ft.)]	Model
Opposite to output shaft direction	0.5 (1.6)	**CCM005Z1EBR**
	1 (3.3)	**CCM010Z1EBR**
	2 (6.6)	**CCM020Z1EBR**
	3 (9.8)	**CCM030Z1EBR**
	5 (16.4)	**CCM050Z1EBR**
	7 (23.0)	**CCM070Z1EBR**
	10 (32.8)	**CCM100Z1EBR**

■ Extension Cables / Flexible Extension Cables

[Extension cable]

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

[Flexible extension cables]

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

■ Power supply cable

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

Type	Length [m (ft.)]	Model
For control power supply	0.3 (1)	**LH003C1**
	1 (3.3)	**LH010C1**

11 Accessories

■ CR circuit for surge suppression

This product is effective in suppressing the surge that occurs in a contact part of the relay. Use it to protect the contacts of the relay or switch.

Model: **EPCR1201-2**

■ CR circuit module

This product is effective in suppressing the surge that occurs in a contact part of the relay. Use it 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 a DIN rail. This product can make the wiring easy and reliable as it also allows terminal block connection.

Model: **VCS02**

2 Communication Specifiations Edition

This part explains the EtherCAT communication specifications and the corresponding objects.

◆Table of contents

■ Setting of data and parameters

Data and parameters described in this "Communication Specifiations Edition" can be set using the **MEXE02** software 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

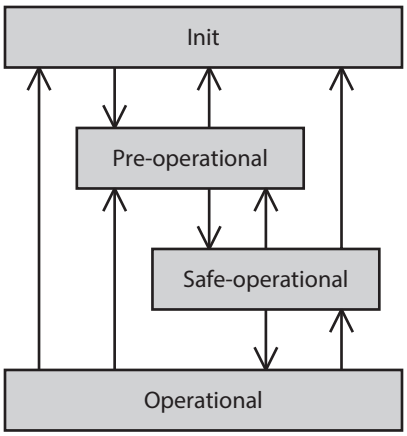
Item	Description
Communication standards	IEC 61158 Type12
Physical layer / Protocol	100 BASE-TX (IEEE 802.3)
Transmission rate	100 Mbps
Communication cycle	• Free Run mode: 1 ms or more • Sync Manager 2 event synchronization mode: 1 ms or more • DC mode: 0.5 ms, 1 ms, 2 ms, 3 ms, 4 ms, 5 ms, 6 ms, 7 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) • Sync Manager 2 event synchronization mode • DC mode (SYNC0 event synchronization)
Device profile	IEC 61800-7 CiA402 drive profile

1-2 CiA402 drive profile

Item	Description
Modes of operation	• Profile position mode (PP) • Profile velocity mode (PV) • Homing mode (HM) • Cyclic synchronous position mode (CSP) • Cyclic synchronous velocity mode (CSV)

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 cannot be performed.
Pre-Operational	Possible	Not possible	Not possible	The mailbox communication (SDO) can be performed. The process data communication (PDO) cannot be performed.
Safe-Operational	Possible	Possible	Not possible	The mailbox communication and transmit PDO can be performed. The status of the driver can be sent to the MainDevice in transmit PDO.
Operational	Possible	Possible	Possible	The mailbox communication, transmit PDO, and receive PDO can be performed. Commands can be sent from the MainDevice to the driver in PDO communication.

1-4 Process data objects (PDO)

Process data object (PDO) is used in real-time data communication of EtherCAT communication.
There are two types of PDOs, transmit PDO (TxPDO) and receive PDO (RxPDO). Transmit PDO (TxPDO) is the data transmission from the driver to the MainDevice.
Receive PDO (RxPDO) is the data reception from the MainDevice to the driver.

Contents, which are sent and received using PDO, are set by the PDO mapping object and the Sync Manager 2/Sync Manager 3 PDO assignment objects.
PDO mapping is to set the PDO mapping object in each driver axis or 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 four bytes that are Index, Sub-index, and Length of assigned object. 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 objects of driver axis

The driver axis has different PDO mapping objects for each axis. Refer to the table below.
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

Check the table below for the objects to be mapped to the PDO of each driver axis.

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 In this manual, the index of the driver axis 1 is described for the objects in the profile area (*). The objects of the driver axis 2 to axis 4 are indexes offset by 800h from the object on the previous axis.
*Objects are configured 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 an axis number (1 to 4) to the Sub-Index of the driver objects.
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 the controller axis

The controller axis has a single mapping object.

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

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

Axis	Objects of profile area	Objects of manufacturer-specific area
Controller axis	– (This cannot be assigned)	2000h to 2FFFh

■ Sync Manager 2/Sync Manager 3 PDO assignment objects

The SM (Sync Manager Channel) PDO assignment objects set the relationship between 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.

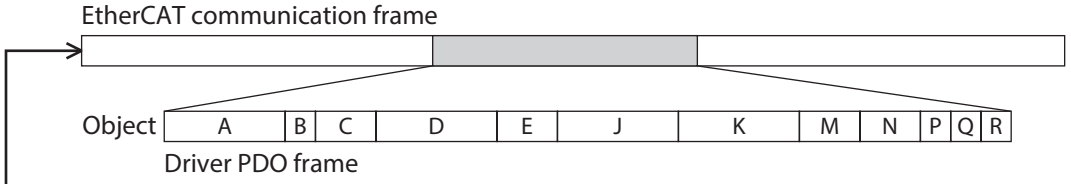
■ Setting of PDO mapping object

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 objects 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 objects.
6. Change the number of entries of the Sync Manager 2/Sync Manager 3 PDO assignment objects 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.
In EtherCAT communication with the MainDevice, data for all axes is sent and received simultaneously.



Sync Manager 2 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 Objects (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. SDO is not synchronized to EtherCAT communication cycles, but it is sent and received at an arbitrary time. The setting of PDO mapping is also performed using SDO.

■ SDO abort code

If an error occurs while SDO is sent and received, an abort code is sent back. The abort codes are listed in the table.

Abort code	Description
0503 0000h	Toggle bit did not inverted.
0504 0000h	SDO protocol timeout
0504 0001h	The 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 PDO.
0604 0042h	The number of PDO mappings or the data length exceeded the limit.
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 saved to the application.
0800 0021h	Data cannot be transferred or saved to the application because of local control.
0800 0022h	Data cannot be transferred or saved 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 with EtherCAT communication.
  The communication cycle of the Free Run mode is 1 ms or more.

- **Sync Manager 2 event synchronization mode**

  The driver operates in synchronization with EtherCAT communication. An application is synchronized with the Sync Manager 2 event.
  Whenever the driver receives the process data output (RxPDO), the Sync Manager 2 event is generated.
  The communication cycle of the Sync Manager 2 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 increments).

1-7 Distributed Clocks

The term Distributed Clocks (DC) is a method to synchronize operation by sharing the same clock between the MainDevice and the driver.
The interruption signal (SYNC0) is output at a precise interval based on the DC. In the DC mode, an application is executed synchronously 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 eight bytes.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
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.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
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.
Byte 2 is the same value as the error register object.
Byte 3 is the driver axis number that an alarm was generated.
Byte 4 is an alarm code. Refer to p.154 for alarm codes.

■ 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.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Emergency error code (A000h)		Channel (02h)	Diagnosis data				
			0Ah	0			

If the transition from Pre-Operational to Safe-Operational was requested during the following state, 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 cannot be mapped 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 with a different driver axis is mapped.

2 Drive profile

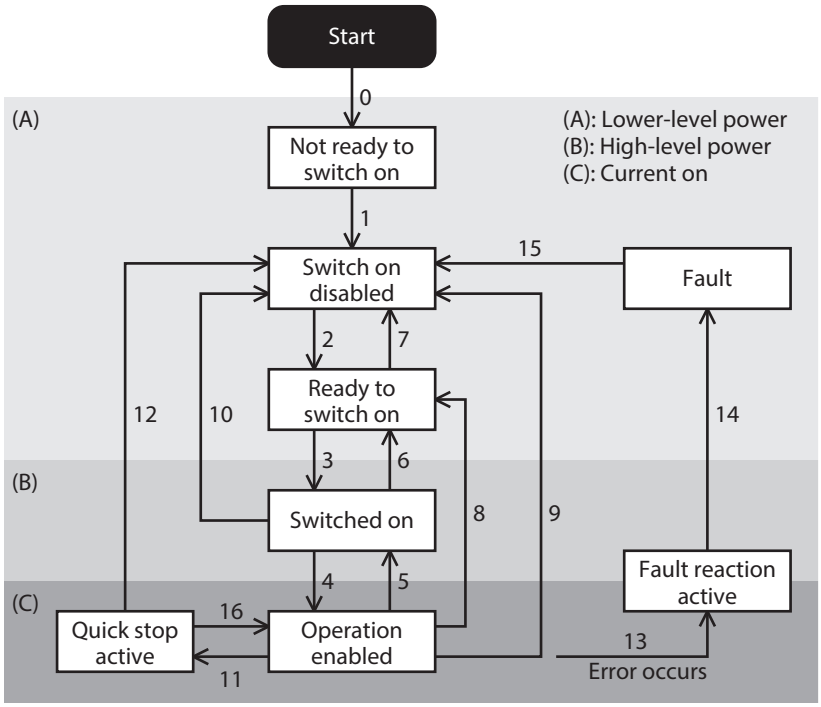
memo In this manual, the index of the driver axis 1 is described for the objects in the profile area. The objects of the driver axis 2 to axis 4 are indexes offset by 800h from the object on the previous axis. Refer to the table below.

Example of the first Index of driver axis 1 to axis 4

AXIS	Index	Sub	Name	Type	R/W	PDO	Save	Range	Update
AXIS1	603Fh	00h	Error code	U16	RO	TxPDO	–	–2,147,483,648 to 2,147,483,647 (Initial value: 0)	–
AXIS2	683Fh	00h							
AXIS3	703Fh	00h							
AXIS4	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 with the Statusword object (6041h).



Control power	Main power	ESM	Motor
ON	ON or OFF	–	Non-excitation
ON	ON	Operational	Non-excitation
ON	ON	Operational	Excitation

State	Signal state	Motor status	Setting of parameters
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 is completed.	Non-excitation	Possible to set
Ready to switch on	A state where the main power supply can be turned on.	Non-excitation	Possible to set
Switched on	A state where 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
Fault reaction active	The driver generates an alarm, and the operation stop is processing.	Excitation	Possible to set
Fault	An alarm of the driver is being generated.	Non-excitation	Possible to set

■ State transition of drive state machine

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

● Controlword object (6040h)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific (ms)					Reserved	oms	Halt
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on

● State transition commands by Controlword

State control command	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0	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 → 1	–	–	–	–	15

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

Note After transitioning to "Operation enabled," 250 ms are required for the motor to be excited and for the preparation for operation to be completed. The motor does not start rotating 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 since the transition to "Operation enabled" or after the DCMD-RDY output is turned ON.

● State transition other than 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 completed.
12	If the Quick stop option code (605Ah) is 1 to 3, then when the Quick stop command is send, the state transitions to "Switch on disabled" after the motor stops.
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 transitions when an event in the table next is generated.

State	Motor operation	Event	Action
Switched on	During stop	• ESM transitions to other than Operational. • The main power is shut off. • The FREE input is ON.	Transitions to "Ready to switch on." (Transition number 6)

State	Motor operation	Event	Action
Operation enabled	During stop	• ESM transitions to other than Operational. • The main power is shut off. • The FREE input is ON.	Transitions to "Ready to switch on." (Transition number 8) The motor goes into a non-excitation state.
	During operation	ESM transitions to other than Operational.	An alarm of Network bus error is generated (alarm code 81h). After transitioning from "Fault reaction active" to "Fault," the motor goes into a non-excitation state. (Transition number 13, 14)
		The main power is shut off.	An alarm of Main power supply off is generated (alarm code 23h). After transitioning from "Fault reaction active" to "Fault," the motor goes into a non-excitation state. (Transition number 13, 14)
Operation enabled	During operation	The FREE input is ON.	Transitions to "Ready to switch on." (Transition number 8) The motor goes into a non-excitation state.
Quick stop active	During stop	• ESM transitions to other than Operational. • The main power is shut off. • The FREE input is ON.	Transitions to "Switch on disabled." (Transition number 12) The motor goes into a non-excitation state.
	During operation	ESM transitions to other than Operational.	An alarm of Network bus error is generated (alarm code 81h). After transitioning from "Fault reaction active" to "Fault," the motor goes into a non-excitation state. (Transition number 13, 14)
		The main power is shut off.	An alarm of Main power supply off is generated (alarm code 23h). After transitioning from "Fault reaction active" to "Fault," the motor goes into a non-excitation state. (Transition number 13, 14)
		The FREE input is ON.	Transitions to "Switch on disabled." (Transition number 12) The motor goes into a non-excitation state.

■ Status output of drive state machine

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

● Statusword object (6041h)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific (ms)		Operation mode specific (oms)		Internal limit active	Target reached	Remote	ms
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

● Status output of Statusword

State	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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" changes to 1 while the main power is supplied.

2-2 Modes of operation

The driver supports the Modes of operation 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 the operation mode

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

Setting value of the Mode of operation	Modes of operation
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 operation is stopped. When it is switched during operation, the new operation mode will be enabled after the operation is stopped.
The operation mode that is enabled can be checked in the Modes of operation display (6061h).

2-3 Cyclic synchronous position mode (CSP)

In the Cyclic synchronous position mode, 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 control.
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 Sync Manager 2 event synchronization mode, the speed fluctuation or vibration may increase.

Note

- Since the position is managed by the MainDevice in the Cyclic synchronous position mode, if the operation is stopped by an I/O signal without using the MainDevice, the position deviation may occur. When inputting the stop signal such as the STOP input or the FREE input, be sure to perform the following operations to clear the position deviation. If the stop signal is turned OFF while the position deviation is remained, the motor may start rotating suddenly.
  · Execute the operation stop by the MainDevice.
  · Clear the position deviation between the MainDevice and the driver.
- Since the position is managed by the MainDevice in the Cyclic synchronous position mode, executing the position preset (P-PRESET) in the driver while the motor is excited may cause the motor to start suddenly or an alarm of Command pulse error to generate. Put the motor in a non-excitation state 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 (Initial value), 1, 3, 6, 8, 9 (⇨ "Switching of operation modes")	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

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
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 Cyclic synchronous position mode

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific (ms)					Reserved	oms	Halt
–	–	–	–	–		–	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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 is allowed.
		1	Stop operation. The stopping method is “Immediate stop.”

For Bit 7 and Bit 3 to Bit 0, refer to "State transition of drive state machine" on p.47.

■ Statusword of Cyclic synchronous position mode

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific		Operation mode specific		Internal limit active	–	Remote	ms
TLC	–	Following error	Target position ignored				–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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	The position deviation error does not occur.
		1	The position deviation error occurs. The position deviation exceeded the value set in the Following error window (6065h). The value changes to 0 if an alarm of Excessive position deviation (alarm code 10h) or an alarm of Overload (alarm code 30h) is reset.
12	Target position ignored	0	The target position command is disabled. When the state is any of the following, the value changes to 0 and the target position is disabled. • The drive state machine is other than “Operation enabled.” • The motor is in a non-excitation state. • The Halt (6040h: Bit8) has been set to 1. • The STOP input is being ON. • The internal limit is in an active state.
		1	The target position command is enabled.

Bit	Name	Value	Description
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 changes to 1 while any of the internal limit functions listed below are active. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanism limit
9	Remote	1	The value changes to 1 when the initialization is completed.
7	Warning	0	Information is not generated. When the cause of information is cleared, the Warning is automatically cleared to 0.
		1	Information is being generated.

For Bit 6 to Bit 0, refer to "Status output of drive state machine" on p.48.

2-4 Profile position mode (PP)

The Profile position mode operates in the internal profile of the driver. Path generation (profile generation) is performed with the driver. The target position, speed, acceleration and others are set with 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 (Initial value), 1, 3, 6, 8, 9 (⇨ p.49)	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/s^2]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B
6084h	00h	Profile deceleration [step/s^2]	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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

■ Controlword of Profile position mode

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific (ms)					Reserved	oms	Halt
–	Wrap	Push	Base position of Rel	–		Change on set point	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	Abs/Rel	Change set immediately	New set point				

Details of Controlword

Bit	Name	Value	Description
14	Wrap	1	Wrap absolute positioning operation After the Wrap is set to 1, when the New set point (6040h: Bit4) is set to 1 to start operation, 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 the New set point (6040h: Bit4) is set to 1 to start operation, push-motion positioning operation is performed. The Push current (4121h) is applied to the motor current. If the Halt (6040h: Bit 8) is set to 1 or the STOP input is turned ON, the operation will be 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 with 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 with the set travel amount is performed from the present feedback 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 is allowed.
		1	Stop operation. The stopping method is based on the setting of the Halt option code (605Dh).
6	Abs/Rel	0	Absolute positioning operation The Target position (607Ah) is applied to the target position of absolute positioning operation.
		1	Incremental positioning operation The Target position (607Ah) is applied to the target position of incremental positioning operation.
5	Change set immediately	0	When the New set point (6040h: Bit 4) is set from 0 to 1 during operation, the new operation command is saved. When the present operation is completed, the stored new operation command is started.
		1	When the New set point (6040h: Bit 4) is set from 0 to 1 during operation, the new operation command is immediately applied. 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.

Bit	Name	Value	Description
4	New set point	0 → 1	Start of positioning operation Before starting operation, select the Wrap (6040h: Bit 14), Push (6040h: Bit 13), Base position of Rel (6040h: Bit 12), and Abs/Rel (6040h: Bit 6). When positioning operation is started in a state where the operation is stopped by setting the Halt (6040h: Bit 8) to 1, set the Halt (6040h: Bit 8) from 1 to 0 first and leave an interval at more than double of the communication cycle before setting the New set point (6040h: Bit 4) from 0 to 1. The operation may not be started unless an interval of more than twice the communication cycle has elapsed. The command cannot be received in the following state, and the operation is not started. • The Halt (6040h: Bit 8) has been set to 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 Bit 7 and Bit 3 to Bit 0, refer to "State transition of drive state machine" on p.47.

■ Statusword of Profile position mode

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific		Operation mode specific		Internal limit active	Target reached	Remote	ms
TLC	–	Following error	Set point acknowledge				–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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	The position deviation error does not occur.
		1	The position deviation error occurs. The position deviation exceeded the value set in the Following error window (6065h). The value changes to 0 if an alarm of Excessive position deviation (alarm code 10h) or an alarm of Overload (alarm code 30h) is reset.
12	Set point acknowledge	0	The operation start by the New set point (6040h: Bit 4) has not been received.
		1	The operation start by the New set point (6040h: Bit 4) was received. When the New set point (6040h: Bit 4) is set to 1 to receive the operation start, the "Set point acknowledge" changes to 1. When the New set point (6040h: Bit 4) 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 changes to 1 while any of the internal limit functions listed below are active. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanism limit

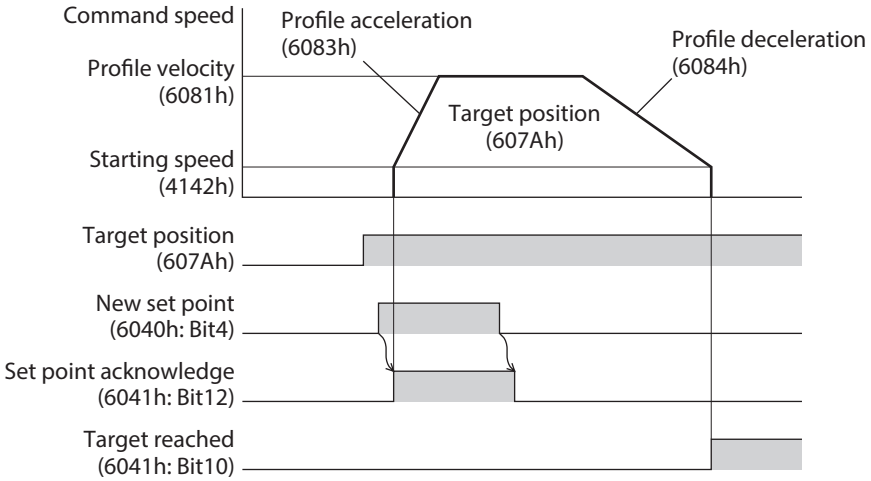
Bit	Name	Value	Description
10	Target reached	0	• When the Halt (6040h: Bit 8) is 0: Positioning operation is not completed. • When the Halt (6040h: Bit 8) is 1: During deceleration stop.
		1	• When the Halt (6040h: Bit 8) is 0: After positioning operation is properly completed, the value changes to 1 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 along the way. It changes to 0 if operation is started from a state where the positioning was completed. • When the Halt (6040h: Bit 8) is 1: The value changes to 1 when the operation command speed becomes 0.
9	Remote	1	The value changes to 1 when the initialization is completed.
7	Warning	0	Information is not generated. When the cause of information is cleared, the Warning is automatically cleared to 0.
		1	Information is being generated.

For Bit 6 to Bit 0, refer to "Status output of drive state machine" on p.48.

■ Operation in Profile position mode

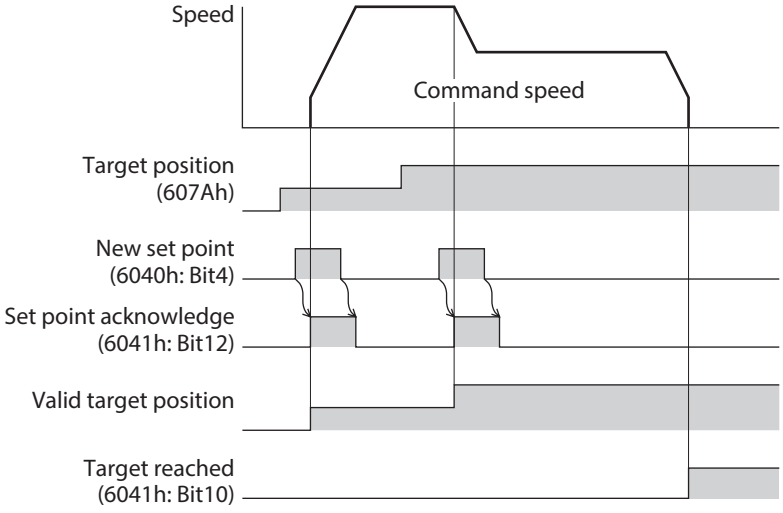
● Positioning operation

Positioning operation is started when the Target position (607Ah) is set and the New set point (6040h: Bit 4) is set to 1.



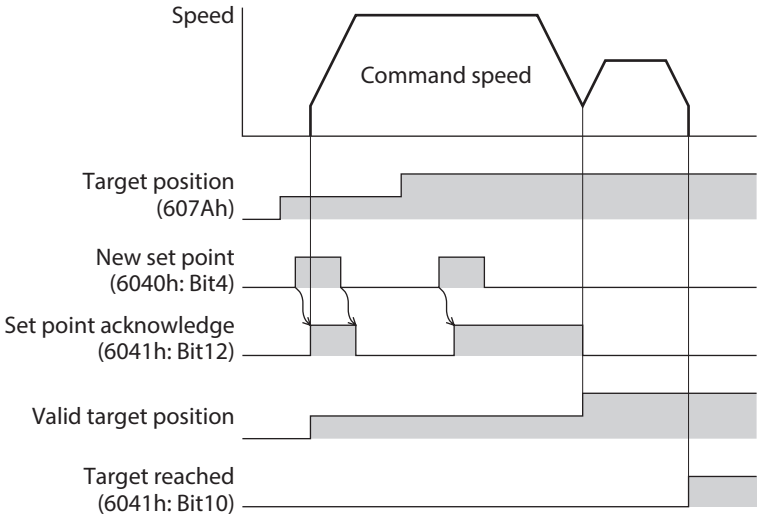
Single set-point [When the Change set immediately (6040h: Bit 5) is 1]

If the New set point (6040h: Bit 4) is newly set during operation, the new operation command is applied immediately.



Set of set-points [When the Change set immediately (6040h: Bit 5) is 0]

When the New set point (6040h: Bit 4) is newly set during operation, the new operation command is saved. When the present operation is completed, the stored new operation command is started.



● Push-motion positioning operation

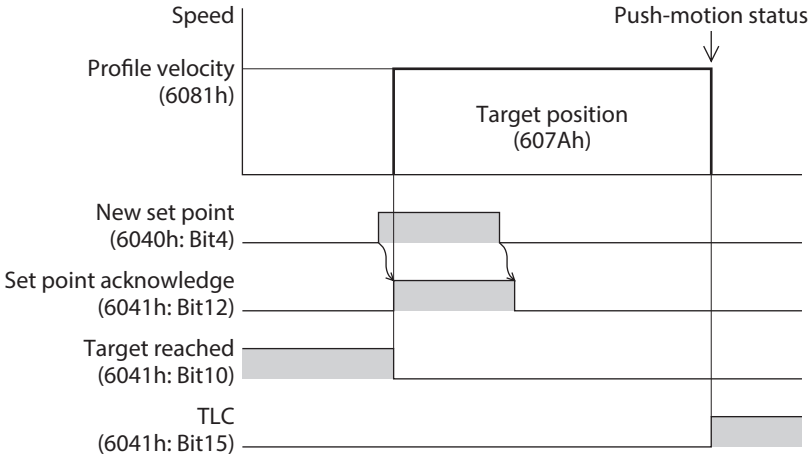
After the Push (6040h: Bit 13) is set to 1, when the New set point (6040h: Bit 4) is set to 1, push-motion positioning operation is started. When push-motion positioning operation is started, self-start operation (rectangular operation) is performed at the operating speed set in the Profile velocity (6081h).
During push-motion positioning operation, when the New set point (6040h: Bi t 4) is set from 0 to 1 to start new operation, set the Change set immediately (6040h: Bit 5) 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 degrees generates. Since an alarm of Overload may be generated if the operation is stopped in this state, perform operation to return the actual position by 3.6 degrees before push-motion operation is stopped.
- Do not perform push-motion operation with geared motors and the **DGII** Series. Doing so may cause damage to the motor or gear unit.
- 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 the operation transitions, causing an unexpected push force to apply.

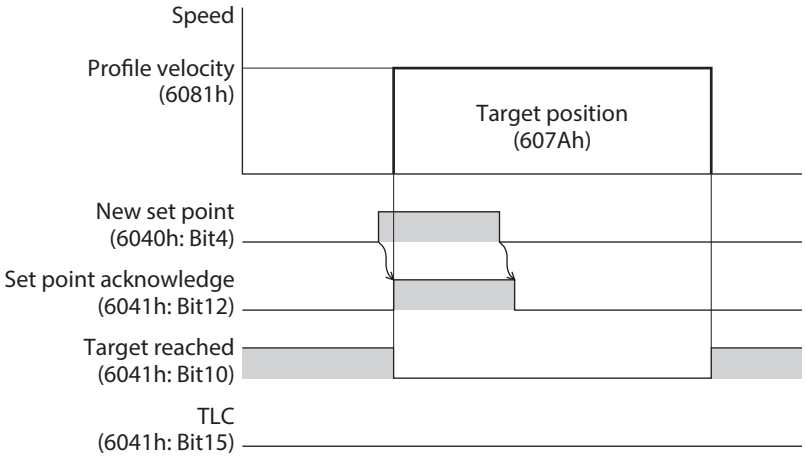
When a mechanism installed to the motor had presses against a load

When a load is pressed, the TLC (6041h: Bit 15) of Statusword changes to 1.
If the Halt (6040h: Bit 8) of 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

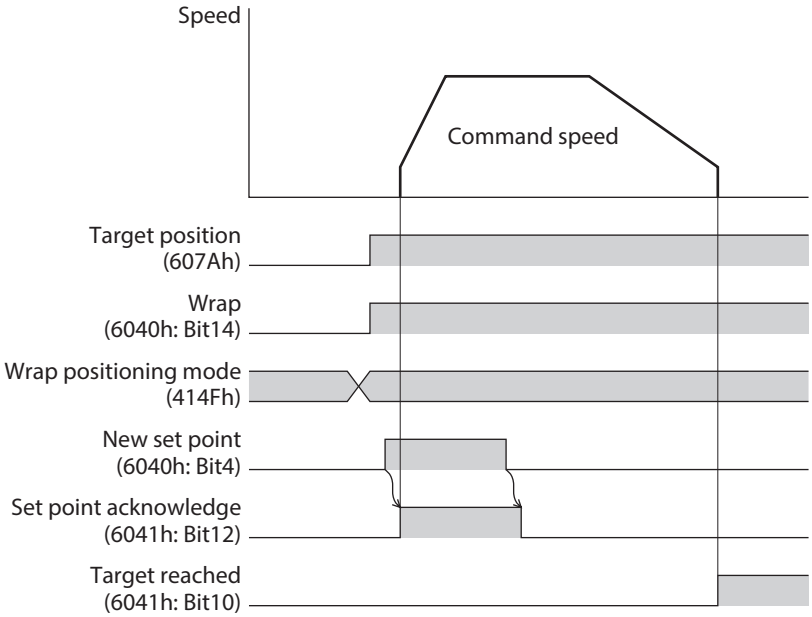
If the motor reaches the target position without pressing a load, the operation is completed. The TLC (6041h: Bit 15) does not change to 1.



- **Wrap absolute positioning operation**

After the Target position (607Ah) is set and the Wrap (6040h: Bit 14) is set to 1, wrap absolute positioning operation is started when the New set point (6040h: Bit 4) is set to 1. With wrap absolute positioning operation, absolute positioning operation is performed regardless of the value of the Abs/Rel (6040h: Bit 6).

memo When wrap absolute positioning operation is performed, set the Wrap (RND) setting (41C7h) to "1: Enable."



■ Operation type of Profile position mode

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

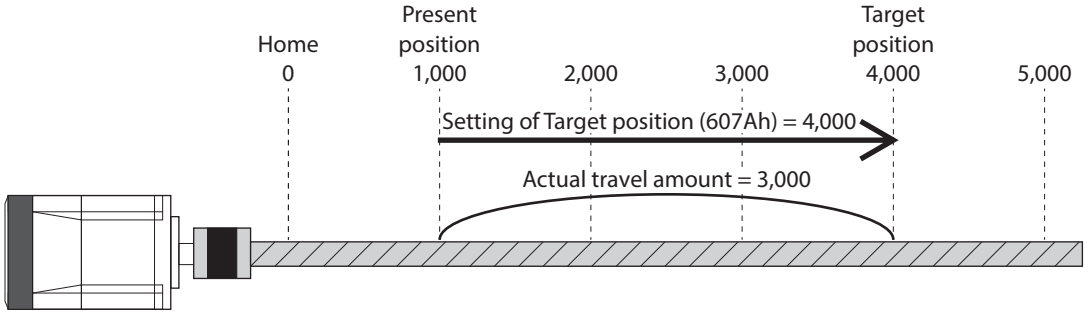
Operation mode	Wrap positioning mode (414Fh)	Controlword (6040h)			
		Wrap (Bit 14)	Push (Bit 13)	Base position of Rel (Bit 12)	Abs/Rel (Bit 6)
Absolute positioning	–	0	0	–	0
Incremental positioning (based on command position)	–	0	0	0	1
Incremental positioning (based on feedback position)	–	0	0	1	1
Absolute 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.

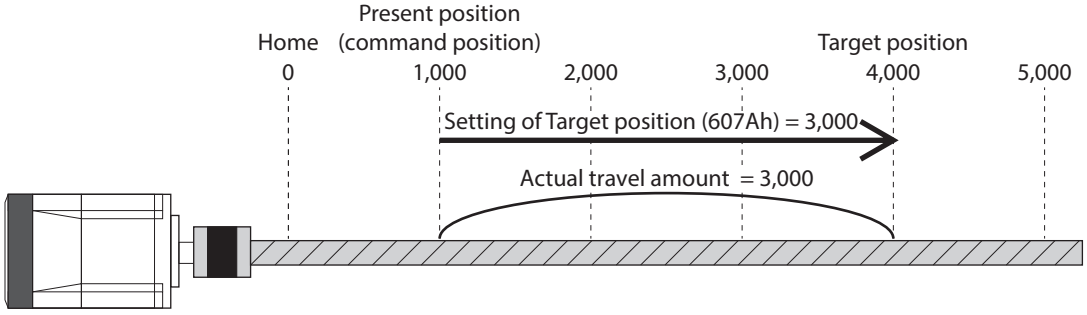


● Incremental positioning (Based on command position)

Positioning operation with 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.

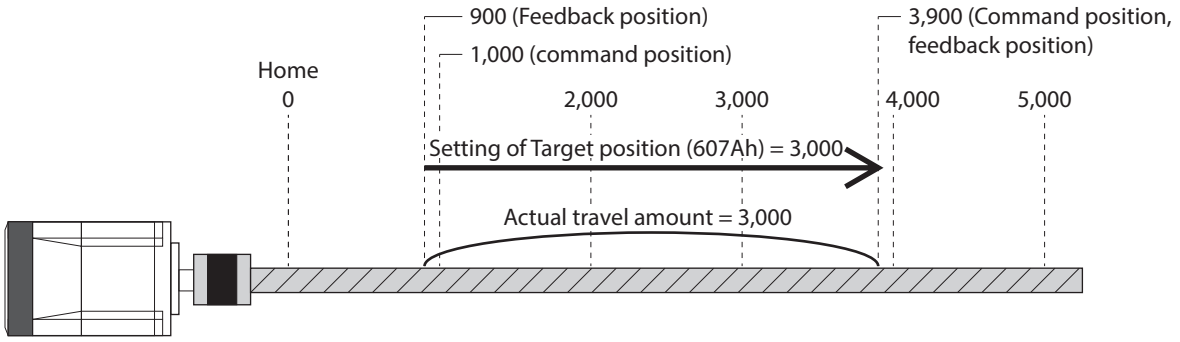


- **Incremental positioning (Based on feedback position)**

  Positioning operation with the set travel amount is performed from the present feedback position. In the Target position (607Ah), set the travel amount from the present feedback position.

  Example: When moving 3,000 steps from the command position "1,000" and the feedback 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 feedback position after the operation is completed will be "3,900."



memo
- The reference position of the operation based on the feedback position varies depending on a load.
- If the command position and the feedback position are different such as push-motion operation, the next operation can be started based on the feedback position of the push position or the like.

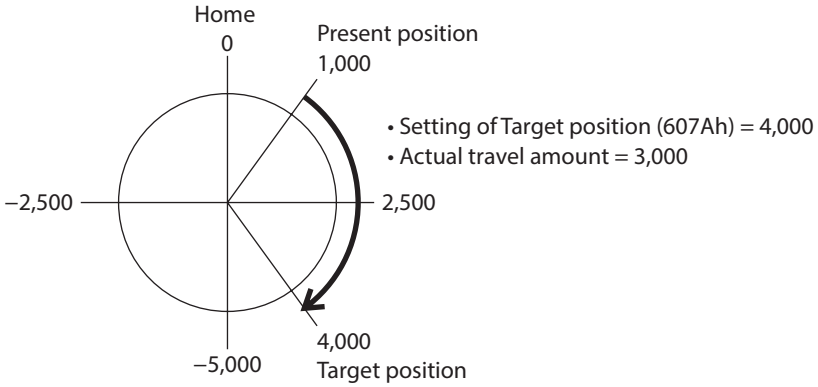
- **Wrap absolute positioning**

  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.87 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=0.1 rev]	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



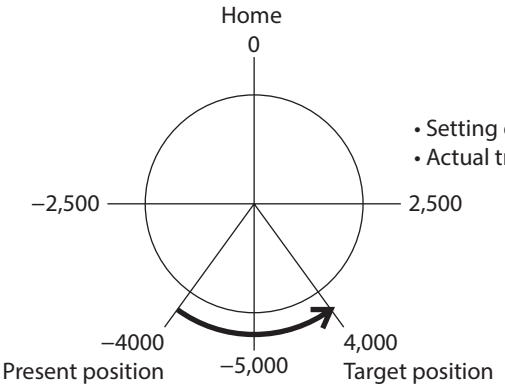
- **Wrap proximity positioning**

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.87 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=0.1 rev]	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



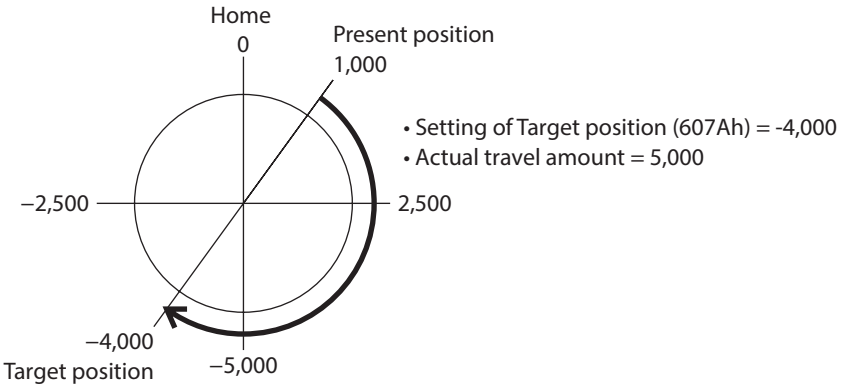
- **Wrap forward direction absolute positioning**

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.87 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=0.1 rev]	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



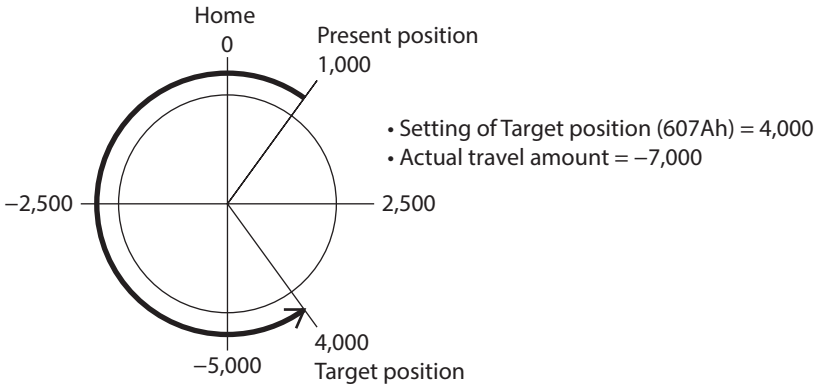
- **Wrap reverse direction absolute positioning**

  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.87 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 %)

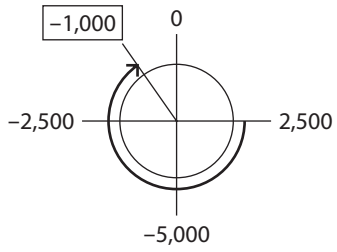
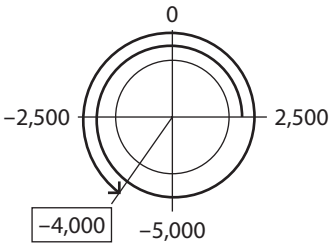
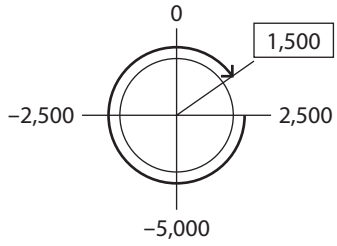
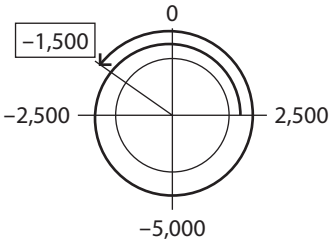
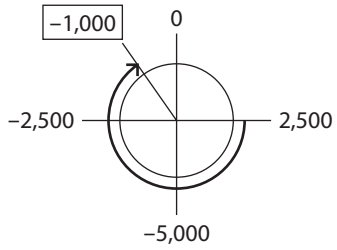
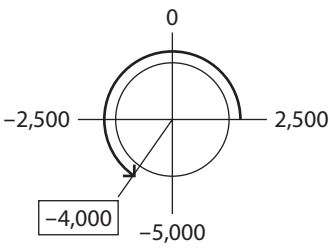
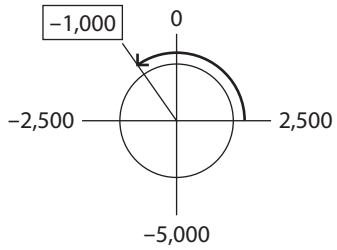
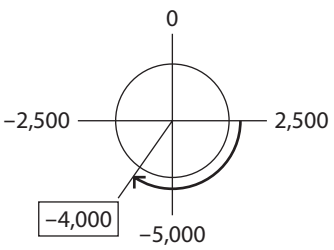
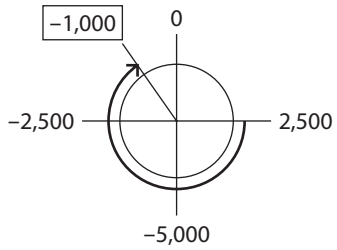
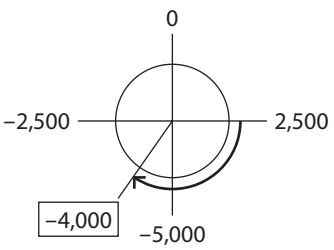
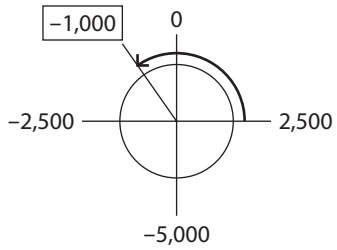
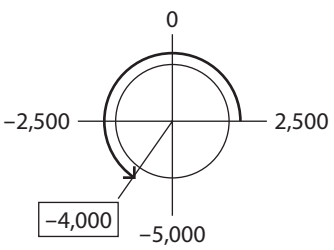
  Set the items in the table to start wrap reverse direction absolute positioning operation.

Index	Name	Setting value
41C7h	Wrap setting	1: Enable
41C9h	Initial coordinate generation & wrap setting range [1=0.1 rev]	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



■ 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.		
• 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.		
• Wrap absolute positioning * Sets the target position on coordinates with the home as a reference. Operation is performed within the wrap range.		
• 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.		
• 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.		
• 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.		

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

2-5 Cyclic synchronous velocity mode (CSV)

In the Cyclic synchronous velocity mode, 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 control.

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 (Initial value), 1, 3, 6, 8, 9 (⇨p.49)	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 Cyclic synchronous velocity mode

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific (ms)					Reserved	oms	Halt
–	–	Type		–		–	
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	–	–	–				

Details of Controlword

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

For Bit 7 and Bit 3 to Bit 0, refer to "State transition of drive state machine" on p.47.

■ Operation mode of Cyclic synchronous velocity mode

The operation mode of the Cyclic synchronous velocity mode is set with the Type (6040h: Bit 13, Bit 12). The operation modes are listed in the table.

Bit13	Bit12	Operation mode	Description
0	0	Continuous operation (Position control)	Performs continuous operation at the Target velocity (60FFh). Since operation is performed while the position deviation is monitored, an alarm of Overload or Excessive position deviation is generated when a load exceeding the motor torque is applied. If the position deviation suddenly occurs, for example, when a large load is removed, the motor accelerates suddenly or goes into a state of overspeed to remove the deviation.
0	1	Continuous operation (Speed control)	Performs continuous operation at the Target velocity (60FFh). When a load exceeding the motor torque is applied, an alarm of Overload is generated.
1	0	Continuous operation (Push-motion)*	Performs continuous operation at the Target velocity (60FFh). When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load. In the Cyclic synchronous velocity mode, the movement is the same between continuous operation (push-motion) and continuous operation (torque control).
1	1	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 degrees generates. Since an alarm of Overload may be generated if the operation is stopped in this state, perform operation to return the feedback position by 3.6 degrees before push-motion operation is stopped.
- Do not perform push-motion operation with geared motors and the **DGII** Series. Doing so may cause damage to the motor or gear unit.
- 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 the operation transitions, causing an unexpected push force to apply.

■ Statusword of Cyclic synchronous velocity mode

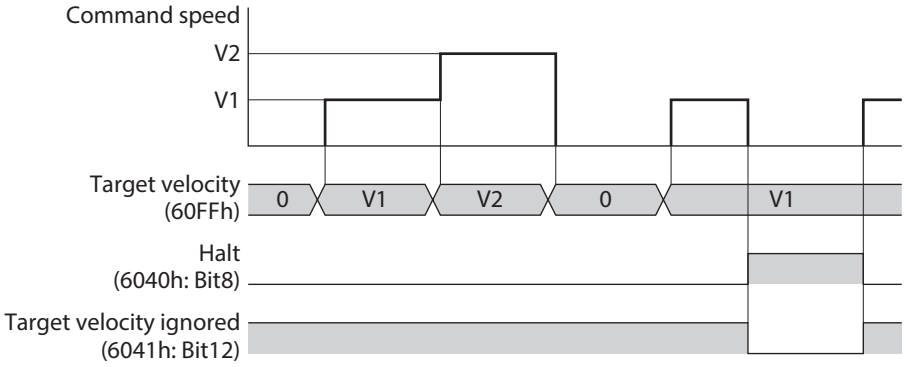
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific		Operation mode specific		Internal limit active	Reserved	Remote	ms
TLC	–	Reserved	Target velocity ignored				–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation 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	The target velocity command is disabled. When the state is any of the following, the value changes to 0 and the Target velocity is disabled. • The drive state machine is other than "Operation enabled." • The motor is in a non-excitation state. • The Halt (6040h: Bit 8) has been set to 1. • The STOP input is being ON. • The internal limit is in an active state.
		1	The target velocity command is enabled.
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 changes to 1 while any of the internal limit functions listed below are active. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanism limit
10	Reserved	0	Reserved
9	Remote	1	The value changes to 1 when the initialization is completed.
7	Warning	0	Information is not generated. When the cause of information is cleared, the Warning is automatically cleared to 0.
		1	Information is being generated.

For Bit 6 to Bit 0, refer to "Status output of drive state machine" on p.48.

■ Operation in Cyclic synchronous velocity mode



2-6 Profile velocity mode (PV)

The Profile velocity mode operates in the internal profile of the driver. Path generation (profile generation) is performed with the driver. The speed, acceleration, and others are set with 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 (Initial value), 1, 3, 6, 8, 9 (⇨ p.49)	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/s^2]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B
6084h	00h	Profile deceleration [step/s^2]	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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

■ Controlword of Profile velocity mode

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific (ms)					Reserved	oms	Halt
–	–	Type		–		–	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	–	–	–				

Details of Controlword

Bit	Name	Value	Description
13	Type	–	Selects the operation mode of the Profile velocity mode. The operation mode changed is updated immediately. For details, refer to "Operation mode of Profile velocity mode" on p.65.
12		–	
8	Halt	0	Operation is allowed.
		1	Stop operation. The stopping method is based on the setting of the Halt option code (605Dh).

For Bit 7 and Bit 3 to Bit 0, refer to "State transition of drive state machine" on p.47.

■ Operation mode of Profile velocity mode

The operation mode of the Profile velocity mode is set with the Type (6040h: Bit 13, Bit 12). The operation modes are listed in the table.

Bit 13	Bit 12	Operation mode	Description
0	0	Continuous operation (Position control)	The motor starts rotating at the Starting speed (4142h) and accelerates until the Target velocity (60FFh) is reached. Once the Target velocity (60FFh) is reached, operation is continued with the speed maintained. Since operation is performed while the position deviation is monitored, an alarm of Overload or Excessive position deviation is generated when a load exceeding the motor torque is applied. If the position deviation suddenly occurs, for example, when a large load is removed, the motor accelerates suddenly or goes into a state of overspeed to remove the deviation.
0	1	Continuous operation (Speed control)	The motor starts rotating at the Starting speed (4142h) and accelerates until the Target velocity (60FFh) is reached. Once the Target velocity (60FFh) is reached, operation is continued with the speed maintained. When a load exceeding the motor torque is applied, an alarm of Overload is generated.
1	0	Continuous operation (Push-motion)*	The motor starts rotating at the Starting speed (4142h) and accelerates until the Target velocity (60FFh) is reached. Once 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)*	The motor performs self-start operation (rectangular operation) at the Target velocity (60FFh) and continues the operation 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 degrees generates. Since an alarm of Overload may be generated if the operation is stopped in this state, perform operation to return the feedback position by 3.6 degrees before push-motion operation is stopped.
- Do not perform push-motion operation with geared motors 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 the operation transitions, causing an unexpected push force to apply.

■ Statusword of Profile velocity mode

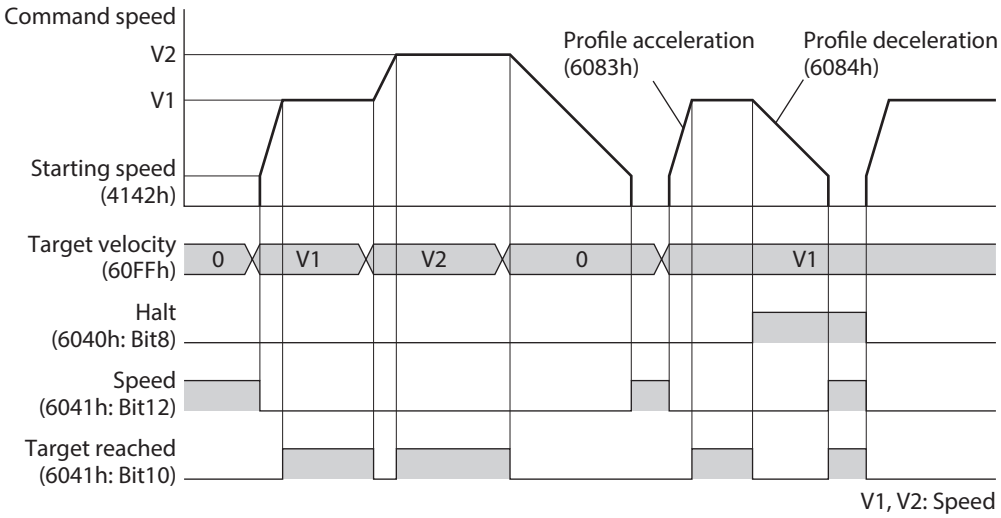
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific		Operation mode specific		Internal limit active	Target reached	Remote	ms
TLC	–	–	Speed				–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched 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 command speed is other than 0.
		1	Internal command speed 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 changes to 1 while any of the internal limit functions listed below are active. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanism limit
10	Target reached	0	• When the Halt (6040h: Bit 8) is 0: The internal command speed does not reach the Target velocity (60FFh). • When the Halt (6040h: Bit 8) is 1: During deceleration stop. (Internal command speed is other than 0.)
		1	• When the Halt (6040h: Bit 8) 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 criterion of the target velocity reached can be set with the VA mode selection (4718h) and the VA detection speed range (4719h). • When the Halt (6040h: Bit 8) is 1: The internal command speed is 0.
9	Remote	1	The value changes to 1 when the initialization is completed.
7	Warning	0	Information is not generated. When the cause of information is cleared, the Warning is automatically cleared to 0.
		1	Information is being generated.

For Bit 6 to Bit 0, refer to "Status output of drive state machine" on p.48.

■ Operation in Profile velocity mode



memo When the Type (6040h: Bit 12, Bit 13) 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 Homing mode is used to set the home. Path generation (profile generation) is performed with the driver.
If return-to-home operation is performed, the position preset (P-PRESET) is executed when the operation is completed, and the home will be the value set in the Home offset (607Ch).

- **Related objects**

  Refer to "Selection of return-to-home (Homing) methods" on p.69.

■ Before starting operation: When a motorized actuator is used

For parameters of the **AZ** Series, the different values have been stored in the ABZO sensor and the driver, respectively. The values based on the product specifications are stored in the ABZO sensor, so 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 ABZO information (fixed value) of the ABZO sensor to the driver.
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 Homing mode

<table>
<tr><th>Bit 15</th><th>Bit 14</th><th>Bit 13</th><th>Bit 12</th><th>Bit 11</th><th>Bit 10</th><th>Bit 9</th><th>Bit 8</th></tr>
<tr><td colspan="5">Manufacturer specific (ms)</td><td rowspan="2">Reserved</td><td>oms</td><td rowspan="2">Halt</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><th>Bit 7</th><th>Bit 6</th><th>Bit 5</th><th>Bit 4</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th></tr>
<tr><td rowspan="2">Fault reset</td><td colspan="3">Operation mode specific (oms)</td><td rowspan="2">Enable operation</td><td rowspan="2">Quick stop</td><td rowspan="2">Enable voltage</td><td rowspan="2">Switch on</td></tr>
<tr><td>–</td><td>–</td><td>Homing operation start</td></tr>
</table>

Details of Controlword

Bit	Name	Value	Description
8	Halt	0	Operation is allowed.
		1	Stop operation. The stopping method is based on the setting of the Halt option code (605Dh).
4	Homing operation start	0 → 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 following, the command is not received, and the operation is not started. • During operation • The Halt (6040h: Bit 8) has been set to 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 Bit 7 and Bit 3 to Bit 0, refer to "State transition of drive state machine" on p.47.

■ Statusword of Homing Mode

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Manufacturer specific		Operation mode specific		Internal limit active	Target reached	Remote	ms
TLC	–	Homing error	Homing attained				–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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	Outputs the status of the motor based on a combination of values in the Homing error, Homing attained (6041h: Bit 12), and Target reached (6041h: Bit 10). Refer to the next table for details.
12	Homing attained	0/1	Outputs the status of the motor based on a combination of values in the Homing error (6041h: Bit 13), Homing attained, and Target reached (6041h: Bit 10). Refer to the next table for details.
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 changes to 1 while any of the internal limit functions listed below are active. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanism limit
10	Target reached	0/1	Outputs the status of the motor based on a combination of values in the Homing error (6041h: Bit 13), Homing attained (6041h: Bit 12), and Target reached. Refer to the next table for details.
9	Remote	1	The value changes to 1 when the initialization is completed.
7	Warning	0	Information is not generated. When the cause of information is cleared, the Warning is automatically cleared to 0.
		1	Information is being generated.

For Bit 6 to Bit 0, refer to "Status output of drive state machine" on p.48.

● Status output of motor

The status of the motor is output based on a combination of values in the Homing error (Bit 13), Homing attained (Bit 12), and Target reached (Bit 10).

Homing error (Bit 13)	Homing attained (Bit 12)	Target reached (Bit 10)	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 completed.
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 (Homing) methods

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

Homing method	Description
17	Return-to-home with the limit sensor (FW-LS/RV-LS), to start running in the negative direction.
18	Return-to-home with the limit sensor (FW-LS/RV-LS), to start running in the positive direction.
24	Return-to-home with the home sensor (HOMES), to start running in the positive direction.
28	Return-to-home with the home sensor (HOMES), to start in the negative direction.
35, 37*	Home preset
–1	Return-to-home operation 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 (Initial value), 28, 35, 37, –1 (⇨Selection of return-to-home (Homing) methods)	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
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) Return-to-home starting speed [Hz]	INT32	RW	No	○	1 to 4,000,000 (Initial value: 5,000)	B
4169h	*	(HOME) Backward steps in 2 sensor return-to-home [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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

● Return-to-home operation of Oriental Motor's specifications

When the Homing method (6098h) is set to −1, the return-to-home mode of Oriental Motor's specifications is applied.

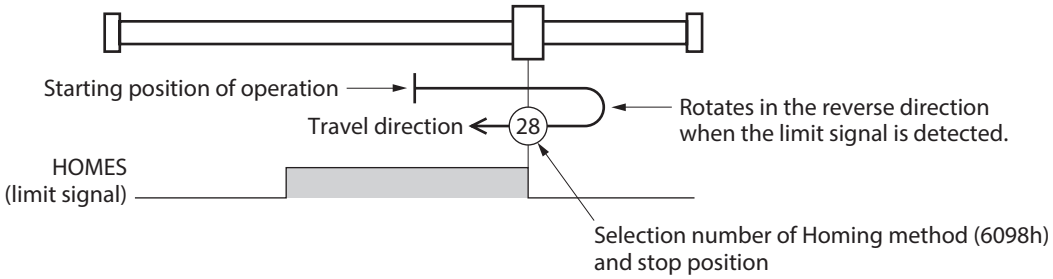
Related objects (Oriental Motor's specifications)

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) Return-to-home mode	U8	RW	No	○	0: 2 sensors 1: 3 sensors 2: One-way rotation 3: Push-motion	B
4161h	*	(HOME) Return-to-home starting direction	U8	RW	No	○	0: Negative side 1: Positive side (Initial value)	B
4163h	*	(HOME) Return-to-home starting speed [Hz]	INT32	RW	No	○	1 to 4,000,000 (Initial value: 5,000)	B
4166h	*	(HOME) Return-to-home SLIT detection	U8	RW	No	○	0: Disable (Initial value) 1: Enable	B
4167h	*	(HOME) Return-to-home TIM/ ZSG signal detection	U8	RW	No	○	0: Disable (Initial value) 1: TIM 2: ZSG	B
4168h	*	(HOME) Return-to-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 return-to-home [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 5,000)	B
416Ah	*	(HOME) Operating amount in uni-directional return-to-home [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 5,000)	B
416Bh	*	(HOME) Operating current for push-motion return-to-home [1=0.1 %]	INT16	RW	No	○	0 to 1,000 (Initial value: 1,000)	B
416Ch	*	(HOME) Backward steps after first entry in push-motion return-to-home [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 0)	B
416Dh	*	(HOME) Pushing time in push-motion return-to-home [ms]	U16	RW	No	○	0 to 65,535 (Initial value: 200)	B
416Eh	*	(HOME) Backward steps in push-motion return-to-home [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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

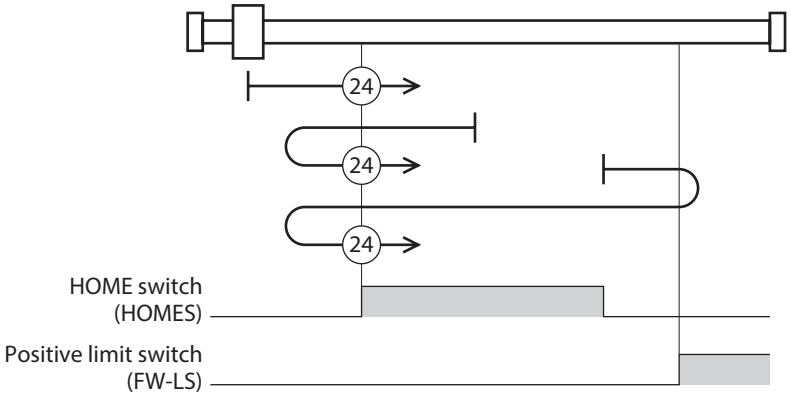
■ Operation in Homing mode of CiA402 drive profile

How to read the figure



- **Homing method: 24 [Return-to-home with the home sensor (HOMES), to start running 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) Return-to-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 is set as the home.

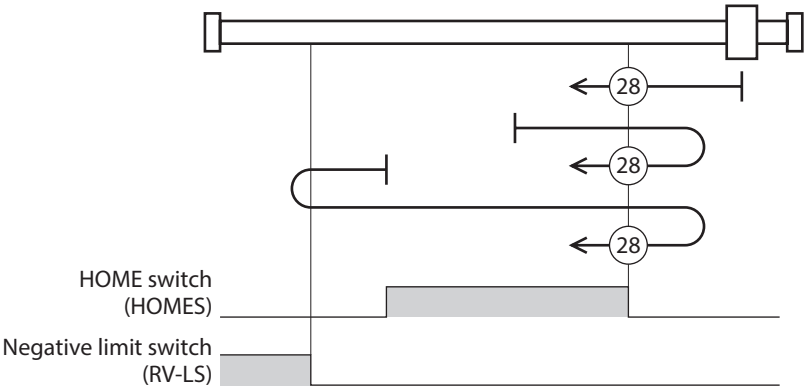


In the case of return-to-home operation of Oriental Motor's specifications, the same operation is performed if the following data is set.

- (HOME) Return-to-home mode (4160h): 1 [3-sensor]
- (HOME) Return-to-home starting direction (4161h): 1 [Positive side]
- (HOME) Return-to-home SLIT detection (4166h): 0 [Disable]
- (HOME) Return-to-home TIM/ZSG signal detection (4167h): 0 [Disable]

- **Homing method: 28 [Return-to-home with the home sensor (HOMES), to start running in the negative direction]**

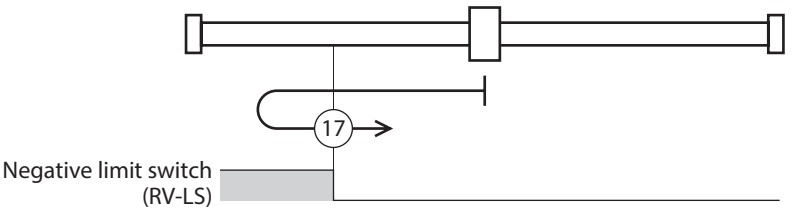
  When the HOME sensor is detected, the motor rotates in the reverse direction and pulls out of the HOME sensor at the (HOME) Return-to-home starting speed (4163h). After pulling out of the HOME sensor, the motor reverses once again, and continues to operate at the Speed during search for zero (6099h-02h).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



  In the case of return-to-home operation of Oriental Motor's specifications, the same operation is performed if the following data is set.
  - (HOME) Return-to-home mode (4160h): 1 [3-sensor]
  - (HOME) Return-to-home starting direction (4161h): 0 [Negative side]
  - (HOME) Return-to-home SLIT detection (4166h): 0 [Disable]
  - (HOME) Return-to-home TIM/ZSG signal detection (4167h): 0 [Disable]

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

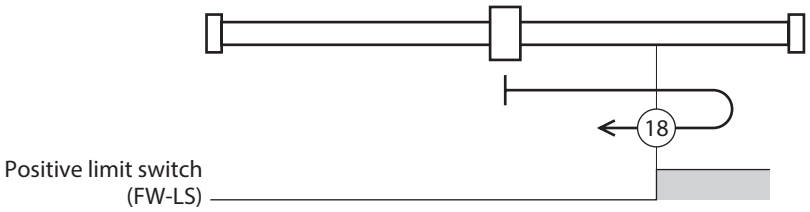
  After pulling out of the limit sensor, the motor rotates according to the value set in the (HOME) Backward steps in 2 sensor return-to-home (4169h) and stops. The position at which the motor stopped is set as the home.



  In the case of return-to-home operation of Oriental Motor's specifications, the same operation is performed if the following data is set.
  - (HOME) Return-to-home mode (4160h): 0 [2-sensor]
  - (HOME) Return-to-home starting direction (4161h): 0 [Negative side]
  - (HOME) Return-to-home SLIT detection (4166h): 0 [Disable]
  - (HOME) Return-to-home TIM/ZSG signal detection (4167h): 0 [Disable]

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

  After pulling out of the limit sensor, the motor rotates according to the value set in the (HOME) Backward steps in 2 sensor return-to-home (4169h) and stops. The position at which the motor stopped is set as the home.



  In the case of return-to-home operation of Oriental Motor's specifications, the same operation is performed if the following data is set.
  - (HOME) Return-to-home mode (4160h): 0 [2-sensor]
  - (HOME) Return-to-home starting direction (4161h): 1 [Positive side]
  - (HOME) Return-to-home SLIT detection (4166h): 0 [Disable]
  - (HOME) Return-to-home TIM/ZSG signal detection (4167h): 0 [Disable]

- **Homing method: 35, Homing method: 37 [Home preset]**

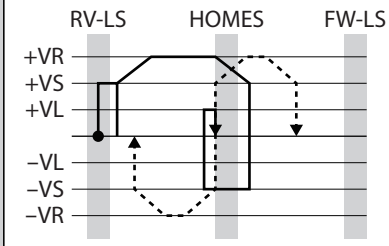
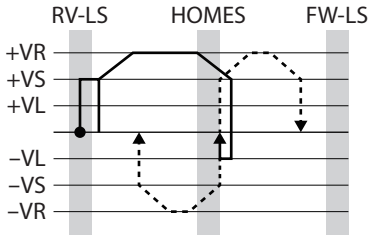
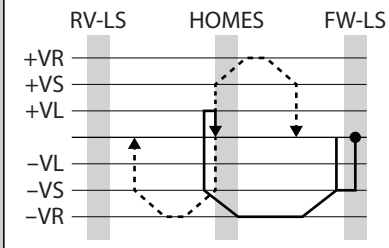
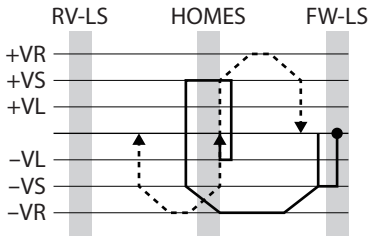
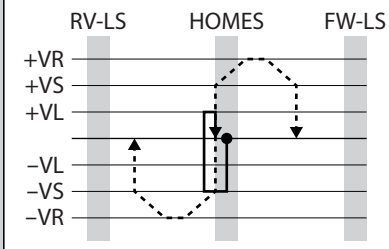
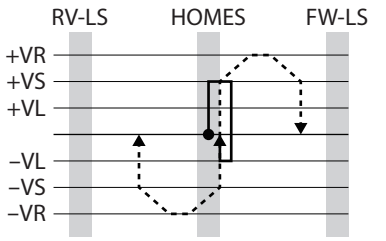
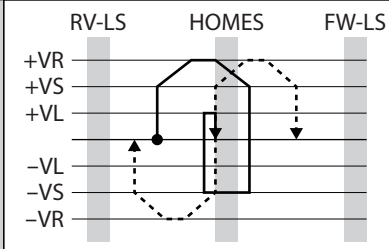
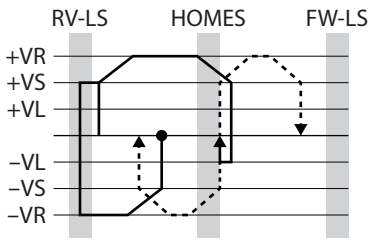
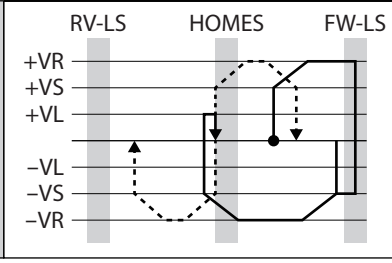
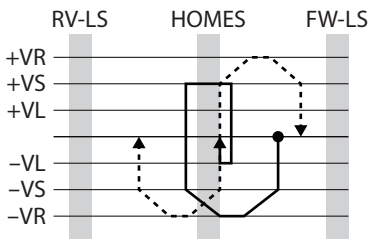
  The present position is set as the home. The home preset can be executed except when the drive state machine is in a state of "Operation enabled." It can also be executed even when the motor is in a non-excitation state.

■ Operation in return-to-home mode of Oriental Motor's specifications

● Return-to-home operation sequence of 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. The motor stops when the ON edge of the HOME sensor is detected, and the position at which the motor stopped is set as the home.

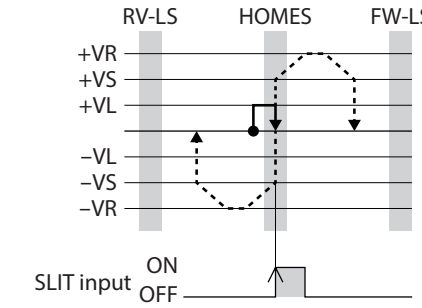
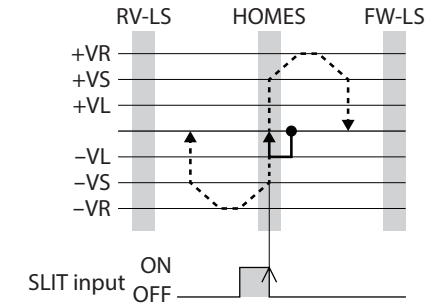
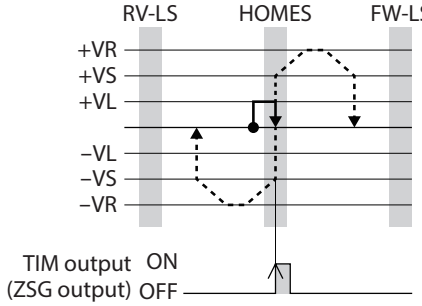
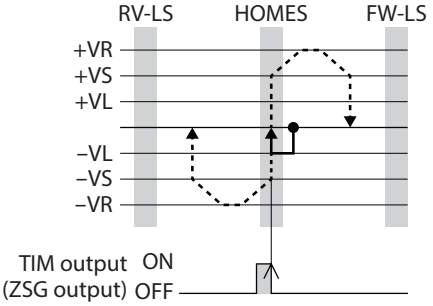
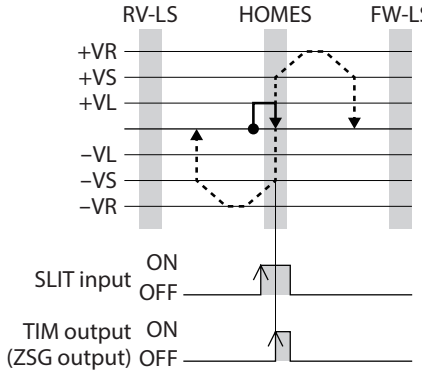
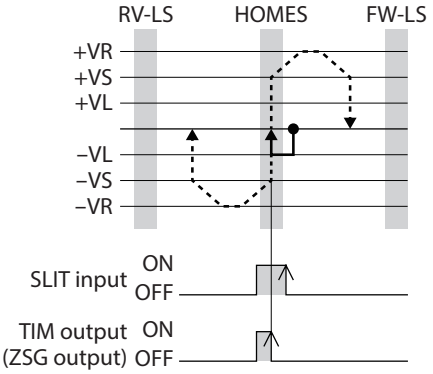
Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the home offset is set

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/or ZSG signal are used simultaneously

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

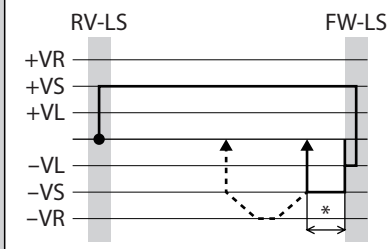
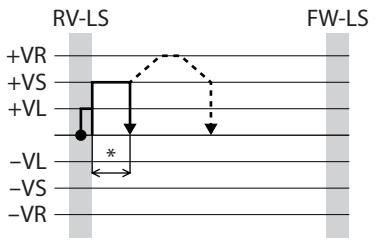
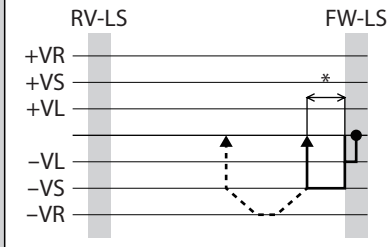
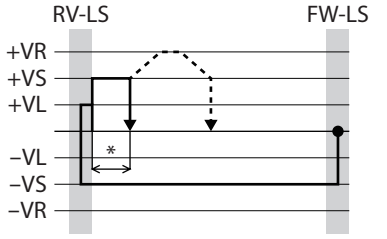
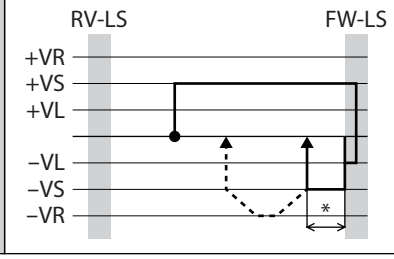
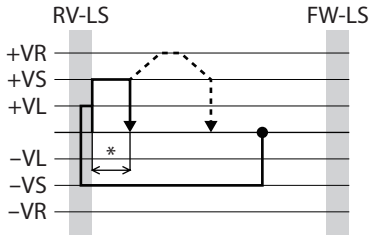
Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the home offset is set

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 2-sensor mode

The motor operates at the the (HOME) Return-to-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 of the limit sensor, the motor rotates according to the value set in the (HOME) Backward steps in 2 sensor return-to-home (4169h) and stops. The position at which the motor stopped is set as the home.

Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the home offset is set

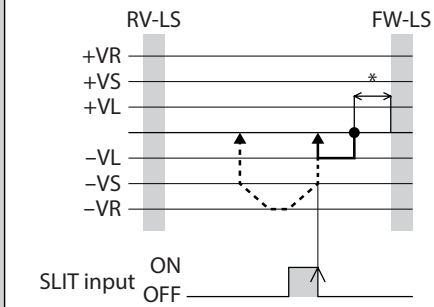
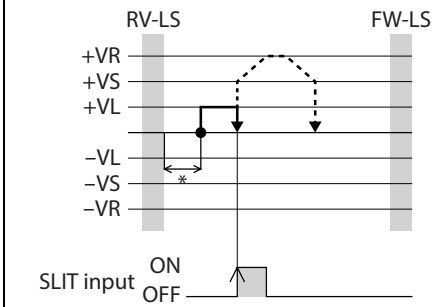
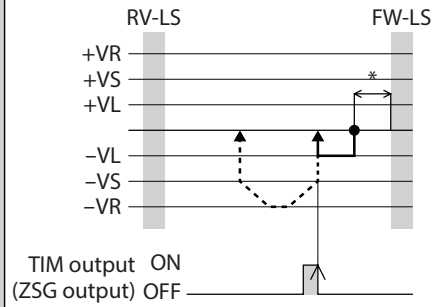
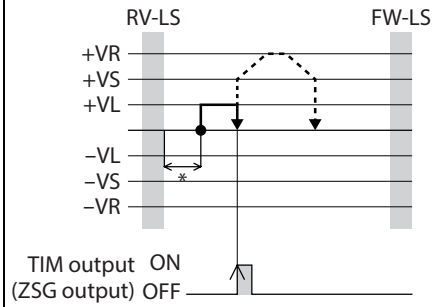
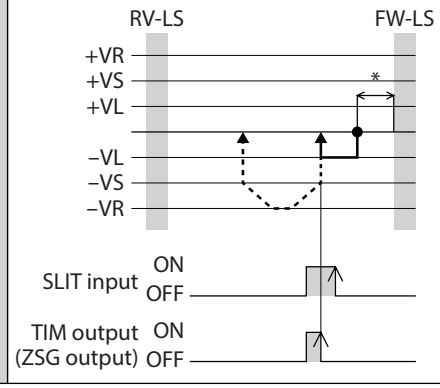
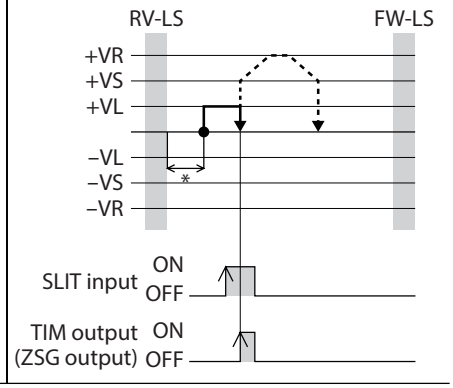
Starting position of return-to-home operation	Starting direction of return-to-home operation: Positive side	Starting direction of return-to-home operation: Negative side
RV-LS		
FW-LS		
Between RV-LS and FW-LS		

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

When the SLIT input, TIM signal, and/or ZSG signal are used simultaneously

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

Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the home offset is set

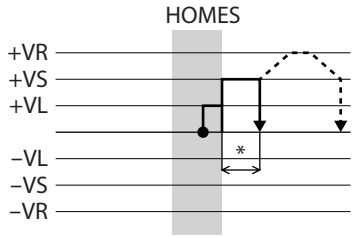
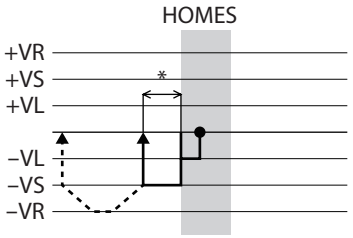
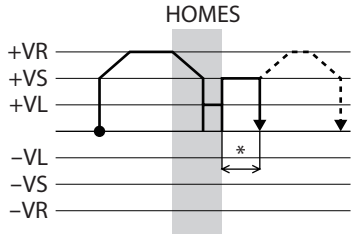
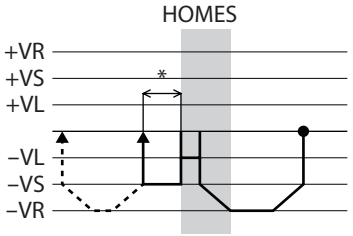
Home detection signal	Starting direction of return-to-home operation: Positive side	Starting direction of return-to-home operation: Negative side
SLIT input		
TIM signal or ZSG signal		
SLIT input and TIM signal or SLIT input and ZSG signal		

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

● One-way rotation mode

The motor operates at 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 HOME sensor at the Speed during search for zero (6099h-02h).
After pulling out of the limit sensor, the motor rotates according to the value set in the (HOME) Operating amount in uni-directional return-to-home (416Ah) and stops. The position at which the motor stopped is set as the home.

Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the 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		

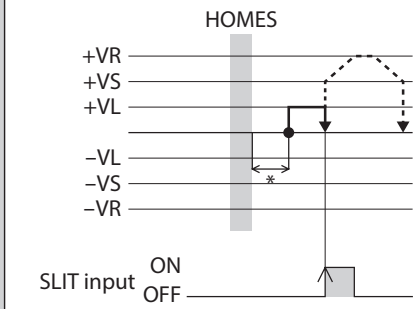
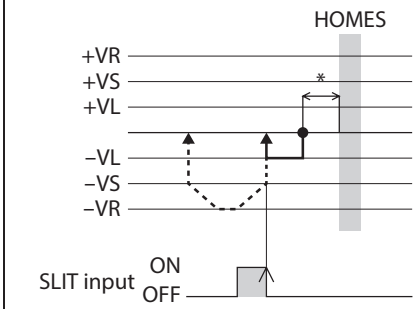
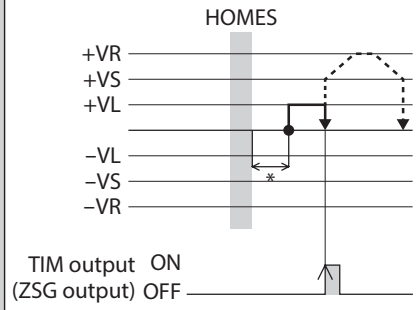
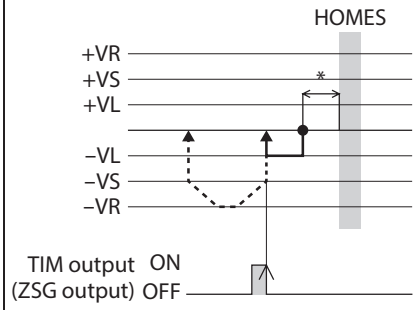
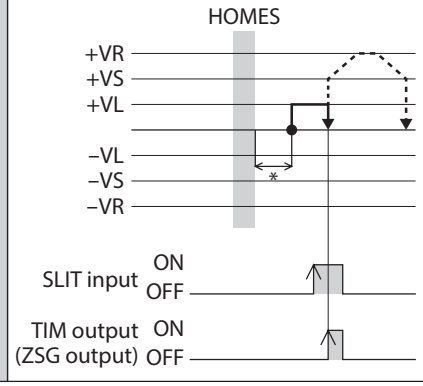
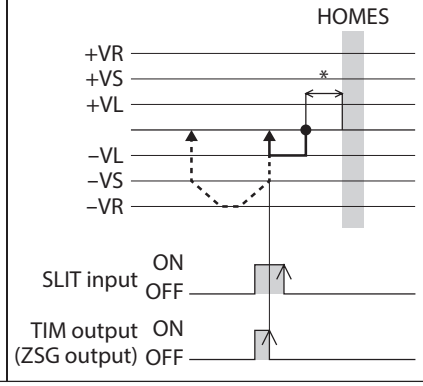
* After pulling out of the HOME sensor, the motor rotates according to the value set in the (HOME) Operating amount in uni-directional return-to-home (416Ah) and stops.

memo If the motor pulls out of the HOME sensor during deceleration stop after the HOME sensor has been detected, 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.

When the SLIT input, TIM signal, and/or ZSG signal are used simultaneously

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

Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the 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		

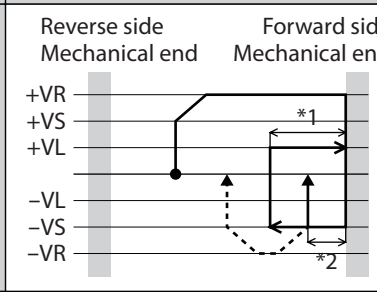
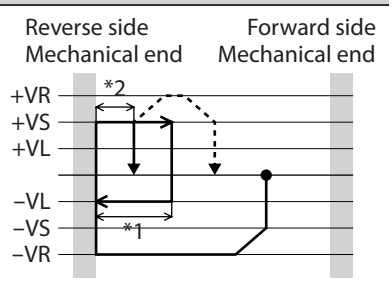
* After pulling out of the HOME sensor, the motor rotates according to the value set in the (HOME) Operating amount in uni-directional return-to-home (416Ah) and stops.

● Push-motion mode

The motor operates at the Speed during search for switch (6099h-01h). When a mechanism installed to the motor presses against the stopper or others installed in the mechanical end, the motor rotates in the reverse direction and stops after rotating according to the value set in the (HOME) Backward steps after first entry in push-motion return-to-home (416Ch). Once again, the motor starts operation toward the stopper. It rotates in the reverse direction when pressing against the stopper, and stops after rotating the value set in the (HOME) Backward steps in push-motion return-to-home (416Eh).

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

Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the 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		

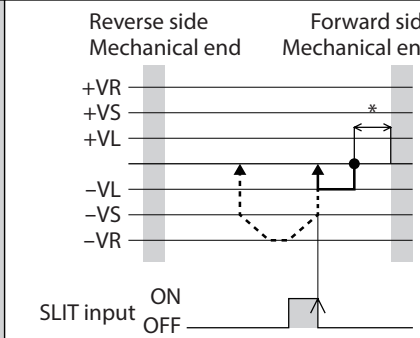
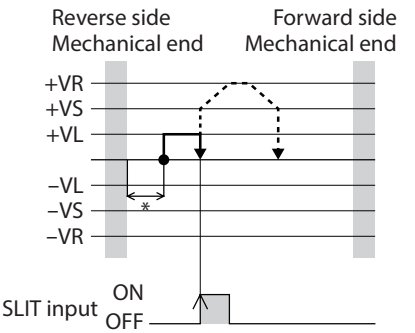
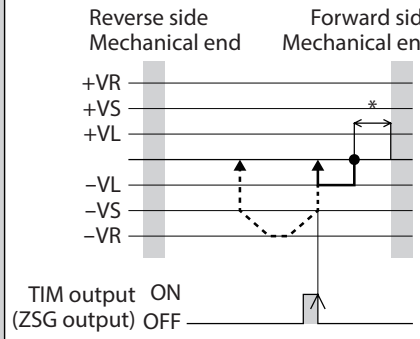
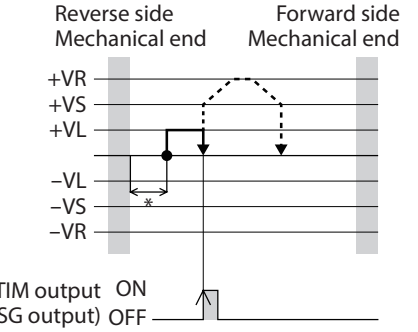
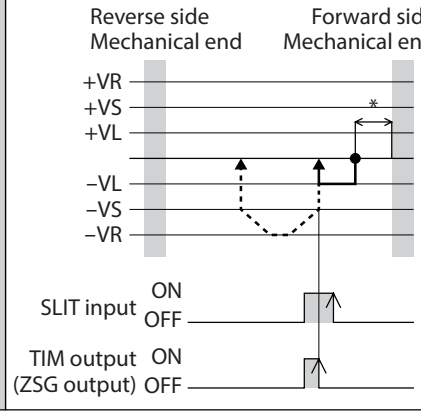
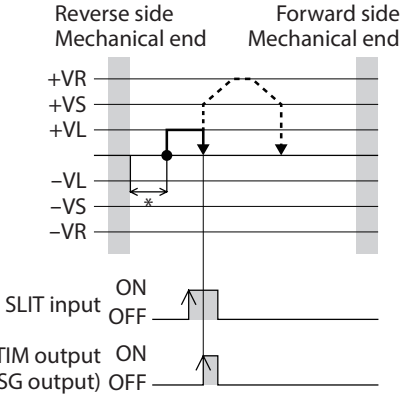
*1 The motor rotates from the mechanical end according to the value set in the (HOME) Backward steps after first entry in push-motion return-to-home (416Ch) and stops.

*2 The motor rotates from the mechanical end according to the value set in the (HOME) Backward steps in push-motion return-to-home (416Eh) and stops.

When the SLIT input, TIM signal, and/or ZSG signal are used simultaneously

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

Explanation of code	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Return-to-home starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when the 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 rotates from the mechanical end according to the value set in the (HOME) Backward steps in push-motion return-to-home (416Eh) and stops.

3 Functions

3-1 Touch probe

The touch probe is a function to set the external latch input signal (EXT1 input, EXT2 input) or the 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 the internal command position or the 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 position actual value (feedback position) (Initial value) 1: Latches the command position	A
44B1h	*	Touch probe 2 latch position	U8	RW	No	–	0: Latches the position actual value (feedback position) (Initial value) 1: Latches the command position	A
44B2h	*	Touch probe 1 TIM/ZSG signal select	U8	RW	No	–	0: Latch on the ZSG output (Initial value) 1: Latch on the TIM output	A
44B3h	*	Touch probe 2 TIM/ZSG signal select	U8	RW	No	–	0: Latch on the ZSG output (Initial value) 1: Latch on the TIM output	A

* Set an axis number (1 to 4) in Sub-index due to the driver objects of 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 every time the motor output shaft rotates by 7.2 degrees. It can be used in the touch probe 1 and touch probe 2.

■ Details of touch probe function

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

Set the trigger condition using the Touch probe 1 trigger action / Touch probe 2 trigger action (Bit 1 / Bit 9) and the Touch probe 1 trigger selection / Touch probe 2 trigger selection (Bit 2 / Bit 10). After that, changing the Touch probe 1 permission / Touch probe 2 permission (Bit 0 / Bit 8) from 0 to 1 latches according to the set trigger condition.
Be sure to change the Touch probe 1 permission / Touch probe 2 permission (Bit 0 / Bit 8) back to 0 before changing the trigger condition. Changing the trigger condition while the Touch probe 1 permission / Touch probe 2 permission (Bit 0 / Bit 8) remains 1 will not be enabled.

Bit	Name	Value	Description
0	Touch probe 1 permission	0	Disables the touch probe 1.
		1	Enables the touch probe 1.
1	Touch probe 1 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous action Latches each 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 the TIM output as a trigger.
3	Reserved	0	Reserved
4	Touch probe 1 positive value action	0	Disables the latch function on the positive value of a trigger.
		1	Enables the latch function on the positive value of a trigger.
5	Touch probe 1 negative value action	0	Disables the latch function on the negative value of a trigger.
		1	Enables the latch function on the negative value of a trigger.
6	Reserved	0	Reserved
7	Reserved	0	Reserved
8	Touch probe 2 permission	0	Disables the touch probe 2.
		1	Enables the touch probe 2.
9	Touch probe 2 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous action Latches each 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 the TIM output as a trigger.
11	Reserved	0	Reserved
12	Touch probe 2 positive value action	0	Disables the latch function on the positive value of a trigger.
		1	Enables the latch function on the positive value of a trigger.
13	Touch probe 2 negative value action	0	Disables the latch function on the negative value of a trigger.
		1	Enables the latch function on the negative value 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 in the lower 8 bits and that of the touch probe 2 is output in the upper 8 bits.

Bit	Name	Value	Description
0	Touch probe 1 permission status	0	The touch probe 1 is disabled.
		1	The touch probe 1 is enabled.
1	Touch probe 1 positive value latch	0	Has not latch on the positive value of the touch probe 1.
		1	Latched on the positive value of the touch probe 1.
2	Touch probe 1 negative value latch	0	Has not latch on the negative value of the touch probe 1.
		1	Latched on the negative value of the touch probe 1.
3 to 7	Reserved	0	Reserved
8	Touch probe 2 permission status	0	The touch probe 2 is disabled.
		1	The touch probe 2 is enabled.
9	Touch probe 2 positive value latch	0	Has not latch on the positive value of the touch probe 2.
		1	Latched on the positive value of the touch probe 2.
10	Touch probe 2 negative value latch	0	Has not latch on the negative value of the touch probe 2.
		1	Latched on the negative value of the touch probe 2.
11 to 15	Reserved	0	Reserved

■ Trigger and latch position

Select the signal that is set as a trigger with the Trigger selection (Bit 2 / Bit 10) of the Touch probe function (60B8h).
The ZSG output and the TIM output can be selected with the Touch probe TIM/ZSG signal select (44B2h/44B3h).
The latch position varies depending on the signal that is set as a trigger. When the external latch input (EXT1 input, EXT2 input) is set as a trigger, the latch position can be set to either the position actual value (feedback position) or the internal command position.

Signal name	Latch position
External latch input	Position actual value (feedback position) or internal command position (Select by the Touch probe latch position (44B0h/44B1h))
ZSG output	Position actual value (Feedback position)
TIM output	Internal command position

Related objects

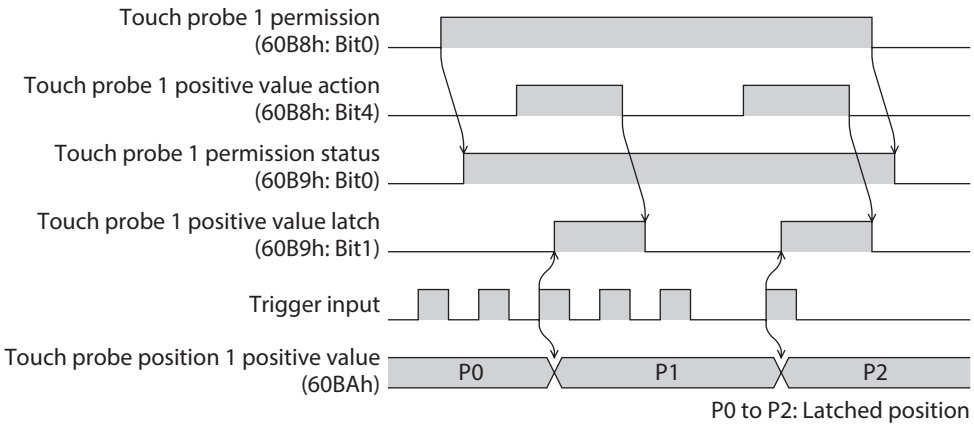
Index	Sub	Name	Initial value	Item
44B0h	*	Touch probe 1 latch position	0	0: Latches the position actual value (feedback position) (Initial value) 1: Latches the command position
44B1h	*	Touch probe 2 latch position	0	
44B2h	*	Touch probe 1 TIM/ZSG signal select	0	0: Latch on the ZSG output 1: Latch on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

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

■ Operation sequence of touch probe

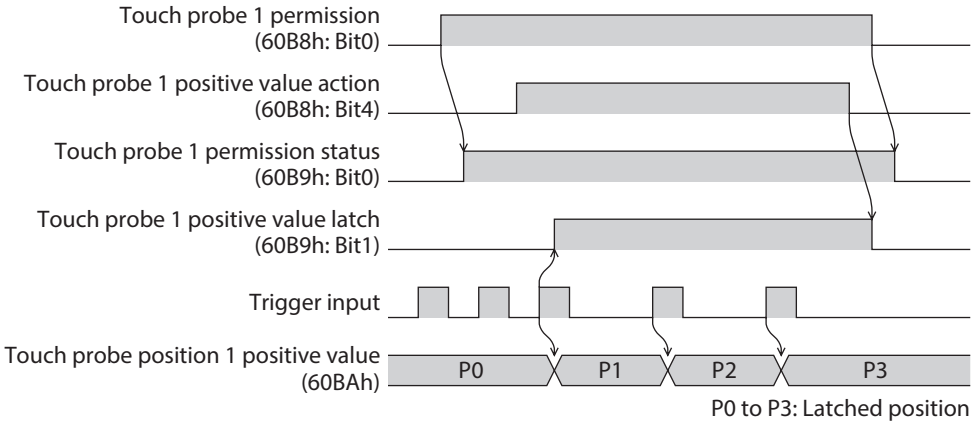
The operation examples of the touch probe 1 are shown below.

- **When the trigger action is "First trigger action" (60B8h: Bit 1 is 0)**



P0 to P2: Latched position

- **When the trigger action is "Continuous action" (60B8h: Bit 1 is 1)**



P0 to P3: Latched position

3-2 Resolution

The resolution per revolution of the motor output shaft can be set with the Gear ratio (6091h).

- 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 objects

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 a value out of the setting range is set, information of Electronic gear setting error is generated (information code 2000h). If the control power supply is turned on again or Configuration is executed in a state where information of Electronic gear setting error is being generated, an alarm of Electronic gear setting error will be generated (alarm code 71h).
- If the resolution was changed after the position preset (P-PRESET) was executed in a state where the Home offset (607Ch) is other than 0, execute the position preset (P-PRESET) again. When the Home offset (607Ch) is 0, it is no need to execute the 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 the like, set the resolution to an integral multiple of 50.

3-3 Wrap function

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

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
41C7h	*	Wrap (RND) setting	U8	RW	No	○	0: Disable 1: Enable (Initial value)	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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

3-4 Operating current and stop current

Sets the base current rate (%) for the operating current and standstill current with the Base current (4126h).

- Operating current = Maximum output current × Base current (4126h) × Operating current (4120h)
- Stop 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 a 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 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-motion return-to-home [1=0.1 %]	INT16	RW	No	○	0 to 1,000 (Initial value: 1,000)	B

*1 Set an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.
*2 *In the Profile position mode, it will be updated when operation is started.

3-5 Maintenance commands

Maintenance commands are used to perform alarm reset, position preset (P-PRESET), batch processing for non-volatile memory, and others.

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

Related objects

Index	Sub	Name	Description
40C0h	*	Alarm reset	Resets the alarm being generated presently. Some alarms cannot be reset.
40C2h	*	Clear alarm history	Clears the alarm history.
40C5h	*	P-PRESET execution	Presets the command position.
40C6h	*	Configuration	Executes recalculation and setup of the parameters.
40C8h	*	Read batch NV memory	Reads the parameters stored in non-volatile memory to RAM. All parameters stored in RAM are overwritten.
40C9h	*	Write batch NV memory	Writes the parameters stored in RAM to non-volatile memory. Non-volatile memory can be rewritten approximately 100,000 times.
40CAh	*	All data batch initialization	Resets the parameters stored in 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 is 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	Sets the position of phase Z again.
40D2h	*	Clear ZSG-PRESET	Clears the position data of phase Z that was set again with the ZSG-PRESET (40D1h).
40D3h	*	Clear information	Clears the information.
40D4h	*	Clear information history	Clears the information history.

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

■ How to execute the maintenance commands

The following two methods are available to execute maintenance commands. Use them selectively according to their intended use.

- **Write 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 consecutively written from the MainDevice.

- **Write 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 be restored to 1 and can be written consecutively.
  If commands that take time to write to 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 met.

- No alarm is present.
- The motor is not operated.
- I/O test, remote operation, and download are not being executed with the **MEXE02**.

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

Item	Configuration is ready to execute	Configuration is being executed	After Configuration is executed
PWR/ALM LED of the driver axis	PWR/ALM LED; Green light	PWR/ALM LED: Blink in green and red colors simultaneously	Based on the driver condition.
Electromagnetic brake	Hold/Release	Hold	
Motor excitation	Excitation/non-excitation	Non-excitation	
Output signal	Enable	Disable	Enable
Input signal	Enable	Disable	Enable

memo If monitor is performed while Configuration is being executed, the correct monitor value may not be returned.

3-6 Assignment of I/O functions

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

■ Assignment to input terminals

The input signal can be assigned to the input terminals IN0 to IN3 of the driver axis. For signals that can be assigned, refer to p.94.

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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

■ Assignment to output terminals

The output signal can be assigned to the output terminal OUT0 of the driver axis. For signals that can be assigned, refer to p.95.

Related object

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

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

■ Direct I/O

The status of direct I/O can be checked with the Direct I/O (406Ah). The arrangement of bits is as follows.

Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
–	–	–	–	–	–	–	–
Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
–	–	–	–	–	–	–	OUT0
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
VR-IN3	VR-IN2	VR-IN1	VR-IN0	–	–	–	–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
–	–	–	–	IN3	IN2	IN1	IN0

Related object

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

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

■ I/O status

The status of the I/O inside the driver can be monitored with the I/O status. The arrangement of bits for the internal I/O is as follows.

Driver object	Description							
I/O status 1 (40B8h)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	SLIT	HOMES	RV-LS	FW-LS	RV-BLK	FW-BLK	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	SPD-LMT	CRNT-LMT	T-MODE	–	–	CCM	–	HMI
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	INFO-CLR	LAT-CLR	–	–	–	P-PRESET	ALM-RST
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	STOP	–	CLR	–	FREE	Not used
I/O status 2 (40B9h)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	–	–	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	–	–	–	–	–	–
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	–	–	–	–	–	–
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	–	–	–	–	–	–
I/O status 3 (40BAh)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	R15	R14	R13	R12	R11	R10	R9	R8
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	R7	R6	R5	R4	R3	R2	R1	R0
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	–	–	–	–	–	–
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	–	–	–	–	–	–
I/O status 4 (40BBh)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	–	–	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	–	–	–	–	–	–
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	–	–	–	–	EXT2	EXT1
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	–	–	–	–	–	–
I/O status 5 (40BCh)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	TIM	RND-ZERO	ZSG	RV-SLS	FW-SLS	RND-OVF
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	ORGN-STLD	PRST-STLD	PRST-DIS	–	–	–	ABSPEN	HOME-END
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	AUTO-CD	CRNT	VA	TLC	–	IN-POS	–	SYS-BSY
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	INFO	MOVE	–	READY	SYS-RDY	ALM-B	ALM-A	CONST-OFF

Driver object	Description							
I/O status 6 (40BDh)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	–	–	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	USR-OUT1	USR-OUT0	–	–	–	–
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	–	–	–	–	MBC	MPS
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	AREA7	AREA6	AREA5	AREA4	AREA3	AREA2	AREA1	AREA0
I/O status 7 (40BEh)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	–	–	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	–	–	–	–	–	–
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	DCMD-FULL	DCMD-RDY	–	–	–	–
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	–	OPE-BSY	–	–	SPD-LMTD	CRNT-LMTD
I/O status 8 (40BFh)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	INFO-RBT	INFO-CFG	INFO-IOTEST	INFO-DSLMTD	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	INFO-ODO	INFO-TRIP	INFO-CULD1	INFO-CULD0	INFO-RV-OT	INFO-FW-OT
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	INFO-RND-E	INFO-EGR-E	–	INFO-PR-REQ	INFO-ZHOME	INFO-START	INFO-SPD
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	INFO-OLTIME	INFO-UVOLT	INFO-OVOLT	INFO-MTRTMP	INFO-DRVTMP	INFO-POSERR	INFO-USRIO

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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

■ Driver input command

The Driver input command (403Eh) is an input command from the MainDevice to the driver. The arrangement of bits is as follows.
Bit 0 to Bit 7 are assigned to the R-IN0 to R-IN7. Bit 8 to Bit 15 are not used.
Values in parentheses ( ) are initial values.

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
–	–	–	–	–	–	–	–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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 signals that can be assigned, refer to p.94.

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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

■ Driver output status

The status of the R-OUT0 to R-OUT15 can be checked with the Driver status (403Fh). The arrangement of bits is as follows.
Values in parentheses ( ) are initial values.

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
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)
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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 signals that can be assigned, refer to p.95.

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

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
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 an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.

■ Input signal list

To assign signals via EtherCAT communication, use the "Assignment number" in the table instead of the signal names.

Assignment number	Signal name	Function	Status
0	Not used	This is used to set when the input terminal is not used.	–
1	FREE	Shut off the motor current and put the motor in a non-excitation state. When an electromagnetic brake motor is used, the electromagnetic brake is in a state of releasing the motor shaft.	0: No operation 1: Electromagnetic brake is in a state of releasing and motor non-excitation
3	CLR	Clear the deviation (position deviation) between the command position and the feedback position to zero.	0: No operation 1: Clear deviation
5	STOP	Stop the motor.	0: No operation 1: Operation stop
8	ALM-RST	Reset the alarm presently being generated.	0: No operation 1: Alarm reset
9	P-PRESET	Rewrite the mechanical home to the present position.	0: No operation 1: Execute preset
13	LAT-CLR	Clear the cumulative load. This is used when the Cumulative load value auto clear (41B3h) is set to "0: Does not clear."	0: No operation 1: Cumulative load clear
14	INFO-CLR	Clear the information status.	0: No operation 1: Information status clear
16	HMI	Release the function limitation of the **MEXE02** software.	0: Function limitation 1: Release the function limitation
18	CCM	Switch 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 operation 1: Overload alarm disabled

Assignment number	Signal name	Function	Status
22	CRNT-LMT	Perform the current limit.	0: Release the current limitation 1: Current limit
23	SPD-LMT	Perform the speed limit. This signal cannot be used in the Cyclic synchronous position mode (CSP).	0: Release the speed limit 1: Speed limit
26	FW-BLK	Stop the operation in the forward direction.	0: No operation 1: Forward direction operation stop
27	RV-BLK	Stop the operation in the reverse direction.	0: No operation 1: Reverse direction operation stop
28	FW-LS	This is a signal to be input from the limit sensor in the forward direction.	0: OFF 1: ON
29	RV-LS	This is a signal to be input from the limit sensor in the reverse direction.	
30	HOMES	This is a signal to be input from the HOME sensor.	
31	SLIT	This is a signal to be input from the SLIT sensor.	
80	R0	These are general signals.	0: OFF 1: ON
81	R1		
82	R2		
83	R3		
84	R4		
85	R5		
86	R6		
87	R7		
88	R8		
89	R9		
90	R10		
91	R11		
92	R12		
93	R13		
94	R14		
95	R15		
104	EXT1	This is an external latch signal for the touch probe 1.	0: OFF 1: ON
105	EXT2	This is an external latch signal for the touch probe 2.	

Note

- When the same input signal is assigned to multiple input terminals, the function will be executed if any of the terminals becomes active.
- When the HMI input is not assigned to the input terminal, this input will always be 1. When it is assigned to both direct I/O (DIN0 to DIN3) and remote I/O (R-IN0 to R-IN7), the function will be executed when both of them changes to 1.

■ Output signal list

To assign signals via EtherCAT communication, use the "Assignment number" in the table instead of the signal names.

Assignment number	Signal name	Function	Status
0	Not used	This is used to set when the input terminal is not used.	–
1 to 127	Response signal (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 at all times.	0: OFF
129	ALM-A	Output the alarm status of the driver. (Normally open)	0: No alarm 1: During alarm generation

Assignment number	Signal name	Function	Status
130	ALM-B	Output the alarm status of the driver. (Normally closed)	0: During alarm generation 1: No alarm
131	SYS-RDY	Output when the control power supply of the driver is turned on.	0: Normal state 1: System preparation completion
132	READY	Output when the driver is ready to operate.	0: Operation not possible 1: Ready for operation
134	MOVE	Output while the motor operates.	0: Motor standstill 1: During motor operation
135	INFO	Output the information status of the driver.	0: No information 1: During information generation
136	SYS-BSY	Output when the driver is in an internal processing state.	0: No internal processing 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 completed
140	TLC	Output when the output torque reaches the upper limit value.	0: Within 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: Target speed is not reached 1: Target speed is reached
142	CRNT	Output when the motor is in an excitation state.	0: Motor non-excitation 1: Motor excitation
143	AUTO-CD	Output when the motor is in a state of automatic current cutback.	0: Normal state 1: Automatic current cutback status
144	HOME-END	Output when return-to-home operation is completed or the position preset (P-PRESET) is executed.	0: Other than home 1: Home
145	ABSPEN	Output when coordinates have been set.	0: Coordinates setting is not completed 1: Coordinates setting is completed
149	PRST-DIS	After the position preset (P-PRESET) was executed, this signal is output when the position preset (P-PRESET) is required again before the motor is operated.	0: Normal state 1: Preset is not completed
150	PRST-STLD	Output when the mechanical home has been set.	0: Mechanical home setting is not completed 1: Mechanical home setting is completed
151	ORGN-STLD	Output when the mechanical home, which is suitable for the product, is set at the time of shipment.	0: Mechanical home setting is not completed 1: Mechanical home setting is completed
152	RND-OVF	The 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: Software limit in the forward direction is not reached 1: Software limit in the forward direction is reached
154	RV-SLS	Output when the software limit in the reverse direction is reached.	0: Software limit in the reverse direction is not reached. 1: Software limit in the reverse direction is reached.
155	ZSG	Output each time the feedback position of the motor rotates one revolution from the preset position.	0: Normal state 1: Motor one revolution

Assignment number	Signal name	Function	Status
156	RND-ZERO	Output when the motor is at the home of the wrap range in a state where the Wrap setting (41C7h) is enabled.	0: Other than wrap home 1: Wrap home
157	TIM	Output each time the motor output shaft rotates by 7.2 degrees with reference to the command position.	0: OFF 1: ON
160	AREA0	Output when the motor is in the range of the AREA0.	0: Outside the range of AREA 1: Inside the range of AREA
161	AREA1	Output when the motor is in the range of the AREA1.	
162	AREA2	Output when the motor is in the range of the AREA2.	
163	AREA3	Output when the motor is in the range of the AREA3.	
164	AREA4	Output when the motor is in the range of the AREA4.	
165	AREA5	Output when the motor is in the range of the AREA5.	
166	AREA6	Output when the motor is in the range of the AREA6.	
167	AREA7	Output when the motor is in the range of the AREA7.	
168	MPS	Output when the main power supply is in an ON state.	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 shaft.	0: Electromagnetic brake is in a state of holding 1: Electromagnetic brake is in a state of releasing
180	USR-OUT0	Output a logical product (AND) or a logical sum (OR) for two types of output signals.	0: OFF 1: ON
181	USR-OUT1		
192	CRNT-LMTD	Output when the current limit is performed.	0: No current limit 1: Current limit
193	SPD-LMTD	Output when the speed limit is performed.	0: No speed limit 1: Speed limit
196	OPE-BSY	Output while internal oscillation is performed. 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: Operation not possible 1: Ready for operation
205	DCMD-FULL	Output while data is written in the buffer area. If 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

Assignment number	Signal name	Function	Status
224	INFO-USRIO	Output when corresponding information is generated.	0: No information 1: During information generation
225	INFO-POSERR		
226	INFO-DRVTMP		
227	INFO-MTRTMP		
228	INFO-OVOLT		
229	INFO-UVOLT		
230	INFO-OLTIME		
232	INFO-SPD		
233	INFO-START		
234	INFO-ZHOME		
235	INFO-PR-REQ		
237	INFO-EGR-E		
238	INFO-RND-E		
240	INFO-FW-OT		
241	INFO-RV-OT		
242	INFO-CULD0		
243	INFO-CULD1		
244	INFO-TRIP		
245	INFO-ODO		
252	INFO-DSLMTD		
253	INFO-IOTEST		
254	INFO-CFG		
255	INFO-RBT		

4 Coordinates management

This chapter explains how to set using the MEXE02 software.

4-1 Overview of coordinates management

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

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

↓

Set the mechanical home.
Factory home or user home

↓

Set the initial coordinates generation range and the wrap range.

↓

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

■ About ABZO sensor

The ABZO sensor is a mechanical multi-rotation absolute encoder that does not require a battery.
It stores the present position as an absolute position until the number of revolutions of the motor output shaft exceeds 1,800 (*). The present position is stored even if the control power supply is turned off.
When the number of counts exceeds 1,800 revolutions (*), it is reset to 0 and is newly started from 1.
* The amount of multiple rotations varies depending on the motor frame size. Check on the following table.

Multiple 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

■ Initial coordinate generation

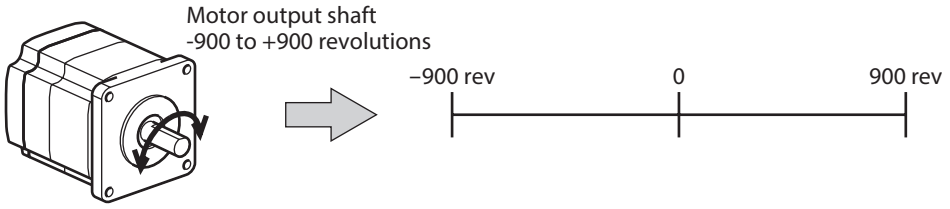
"Initial coordinate generation" refers to determining how to use the rotation range of up to 1,800 revolutions (or 900 revolutions) that the ABZO sensor can manage. There are four parameters required for initial coordinate generation as shown below. These parameters are read when the control power supply 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 when the control power supply is turned on.

● Example of factory setting of the motor

This example shows when the motor with a frame size of 60 mm (2.36 in.) is used.
To use coordinates in both the forward and reverse directions, the 1,800 revolutions are divided into positive and negative revolutions, with 50 % to each direction. .



● Setting example of motorized linear slides

The following is an example to set the home of a motorized linear slide at the position of 30 mm from the motor side.

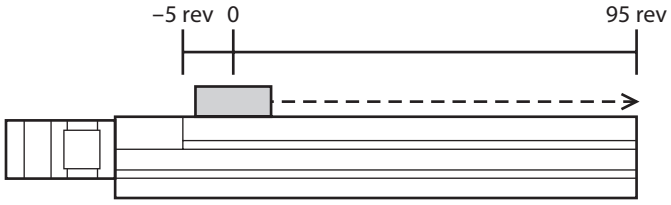
- Motorized linear slide size: 4
- Motorized linear slide stroke: 600 mm
- Motorized linear slide pitch: 6 mm/rev

Concept of initial coordinate

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

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

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



Setting examples of parameters

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

■ Wrap function

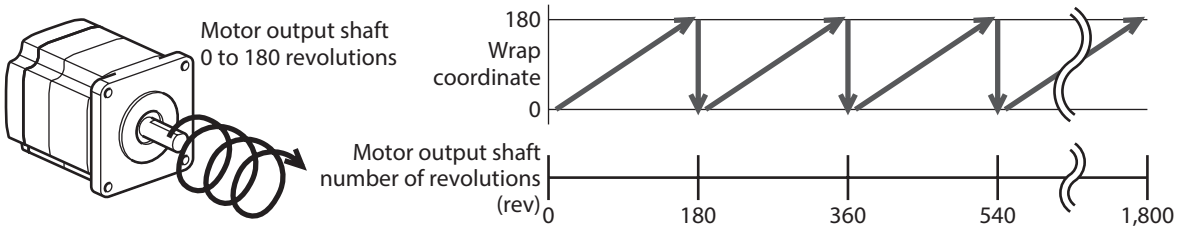
The wrap function is a function to automatically preset the position information of the present position when the number of revolutions of the motor output shaft exceeds the set range. Setting the wrap offset can restrict the operation area of equipment or control an index table with coordinates on the positive and negative sides.
Refer to p.106 for the specific setting methods. (⇨p.106)

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

● Concept of wrap setting

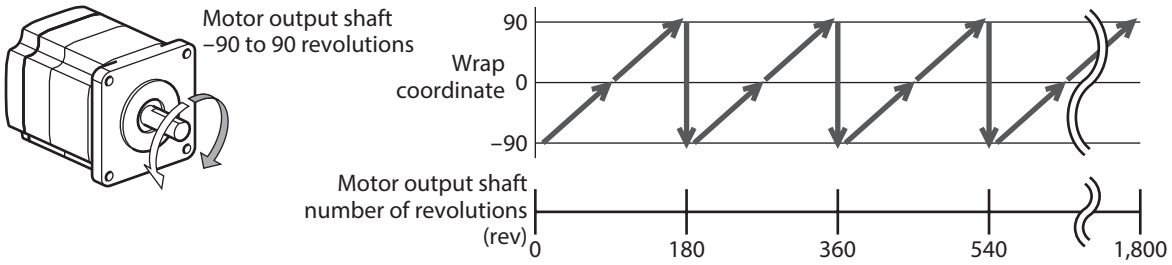
This example explains using the motor with a frame size of 60 mm (2.36 in.).
With the wrap setting, the 1,800 revolutions managed by the ABZO sensor are evenly divided to generate coordinates within the number of revolutions that is evenly divided.
Therefore, only a divisor (divisible value) of 1,800 can be set.

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 every 180 revolutions, however, the 32-bit counter in the driver is not preset.

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

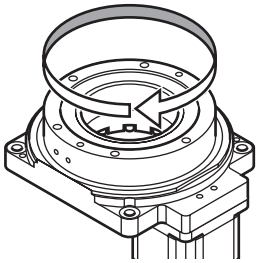


When the wrap setting range is exceeded, the sign is reversed.

- **Setting example of index table**

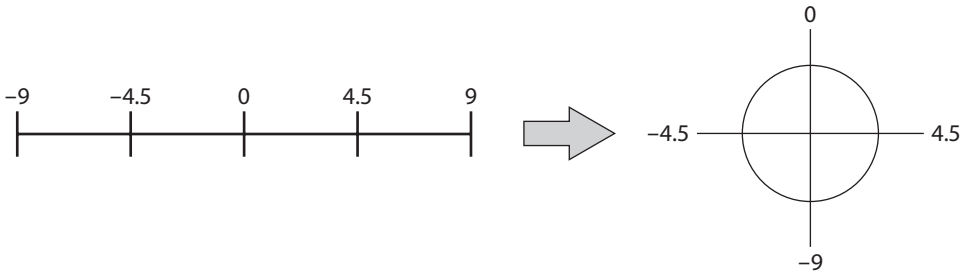
This is an example in which the index table is made to rotate once when the motor output shaft rotates 18 times.

- Gear ratio of motor:18



Concept of initial coordinate

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



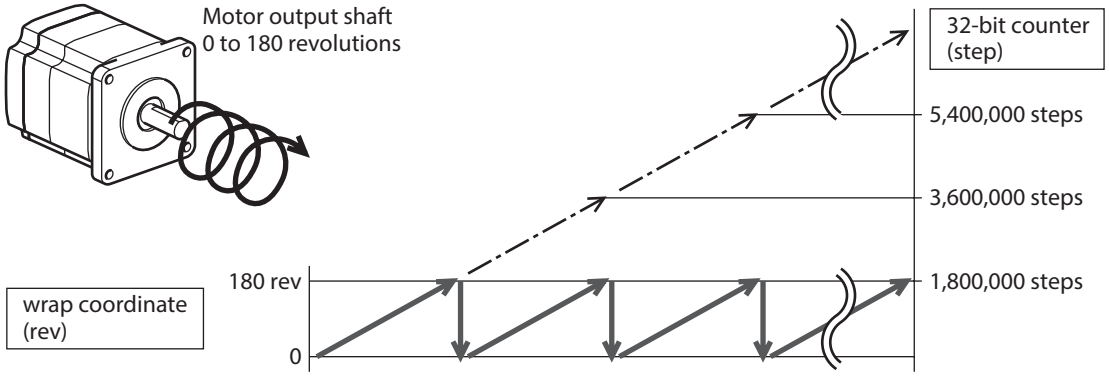
Setting examples of parameters

MEXE02 Tree view	Name	Setting value
Motor & Mechanism	Initial coordinate generation & wrap coordinate setting	Manual setting
	Wrap (RND) 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**

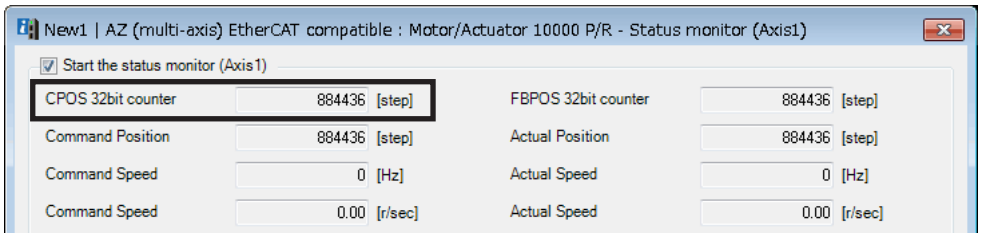
The 32-bit counter inside the driver outputs the position information of the motor as the number of steps regardless of whether the wrap function is enabled or disabled.
When the wrap function is enabled, the relationship between the wrap coordinate and the 32-bit counter is shown below.

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

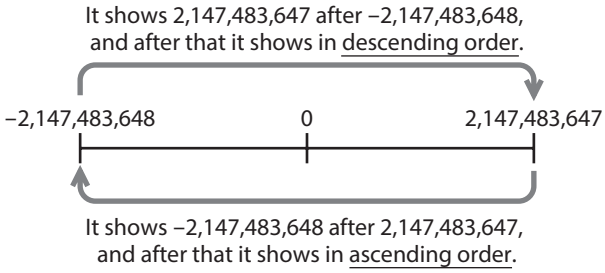


The present position of the motor is preset by 180 revolutions, however, the 32-bit counter is not preset.

The value of the 32-bit counter can be checked on the status monitor (axis1 to axis4) screen of the **MEXE02** software.



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



4-2 Coordinate origin

When coordinates are set, the ABSPEN output is turned ON.

Note

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

Related parameter

MEXE02 Tree view	Name	Description	Initial value
Base settings	Permission of absolute positioning without setting absolute coordinates	Permits absolute positioning operation in a state where coordinates are not set. **[Setting range]** 0: Disable 1: Enable	0

■ Mechanical home

The mechanical home is a position of the home stored by the ABZO sensor. The mechanical home includes the "factory home" written in the ABZO sensor at the time of factory shipment and the "User home" set by performing return-to-home operation or the position preset (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 the position preset (P-PRESET), the PRST-STLD output is turned ON. The user home can be cleared by the "Position preset clear" of the **MEXE02** software.
If the user home is set, the home information is written to non-volatile memory. Non-volatile memory can be rewritten approximately 100,000 times.

■ Mechanical home setting

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

- **Position preset (P-PRESET)**

If the position preset (P-PRESET) is executed, the command position and the feedback position changes to the value 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 in a state where coordinates are 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.

■ A state where coordinates setting is not completed

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

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

4-3 Parameters related to ABZO sensor

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

Related parameters

MEXE02 Tree view	Name	Description	Initial value
Motor & 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" causes 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 & 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 parameters of the wrap function are set

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

1. Change the "Initial coordinate generation & wrap coordinate setting" parameter to "Manual setting."
   If it is changed to "1: 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 parameter as follows.

MEXE02 Tree view	Name	Setting value
Motor & Mechanism	Wrap (RND) 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 when used in combination with a mechanism, such as geared motors or motorized actuators.

Note To change the mechanism settings parameter, change the "Mechanism settings" parameter to "1: Manual setting." (Initial value: Manual setting)
When this parameter is changed, turn off the control power supply of the driver and on 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 & 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 when the coordinate system is generated.

■ Wrap function

Refer to p.101 for the wrap function. (⇨p.101)

● Related operation types

When the following operations are performed in 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 type for wrap positioning operation. **[Setting range]** 0: Wrap absolute positioning 1: Wrap proximity 2: Wrap forward direction 3: Wrap reverse direction	0
Motor & 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 (RND) setting	Sets the wrap function. **[Setting range]** 0: Disable 1: Enable	1
	Initial coordinate generation & wrap setting range	Sets the wrap range. The command position returns to 0 when the motor rotates by 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 offset amount of the wrap range. **[Setting range]** −536,870,912 to 536,870,911 steps	0

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

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

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**

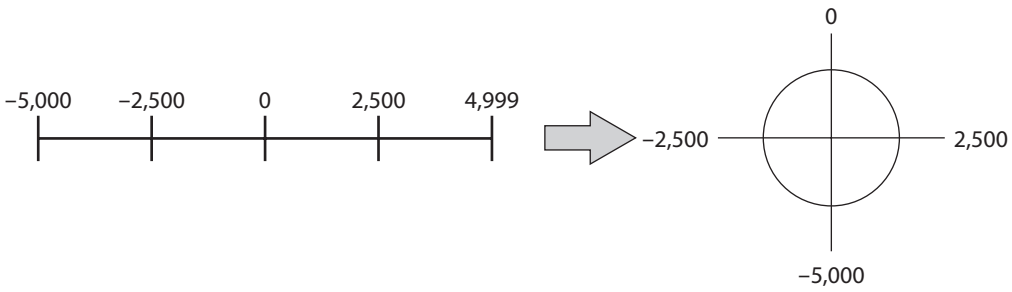
When setting the "Initial coordinate generation & wrap range offset ratio" parameter to "50 %" and the "Initial coordinate generation & wrap range offset value" parameter to "0 step"

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

MEXE02 Tree view	Name	Setting
Objects of profile area	Electronic gear A	1
	Electronic gear B	1
Motor & Mechanism	Initial coordinate generation & wrap coordinate setting	Manual setting
	Wrap (RND) 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

Coordinates example

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

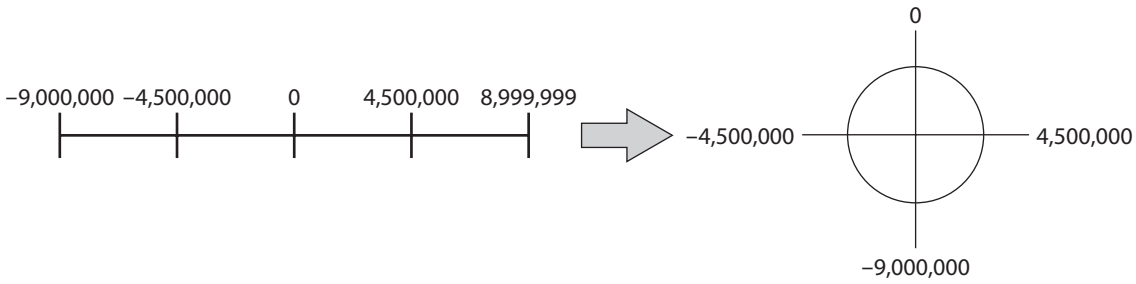


Example 2: Coordinates when the wrap setting range is 1,800 rev and the resolution is 10,000 P/R

MEXE02 Tree view	Name	Setting
Objects of profile area	Electronic gear A	1
	Electronic gear B	1
Motor & Mechanism	Initial coordinate generation & wrap coordinate setting	Manual setting
	Wrap (RND) 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

Coordinates example

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



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

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

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

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

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

Setting example 1

- Wrap setting range: 100 rev
- Resolution: 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) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 10{,}000 = 100 \times \dfrac{1}{1} \times 10{,}000 = 1{,}000{,}000$

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

Setting example 2

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

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

Setting example 3

- Wrap setting range: 4.5 rev
- Resolution: 10,000 P/R (Electronic gear A: 1, Electronic gear B: 1)
- Actuator: **DGII** Series (Gear ratio 18)

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

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

The setting conditions are satisfied since both the conditions (1) and (2) are integers. In the case of this setting, the wrap function is executed each time the motor rotates 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) Wrap setting range × Resolution = 1,000 × 10,000 = 10,000,000

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

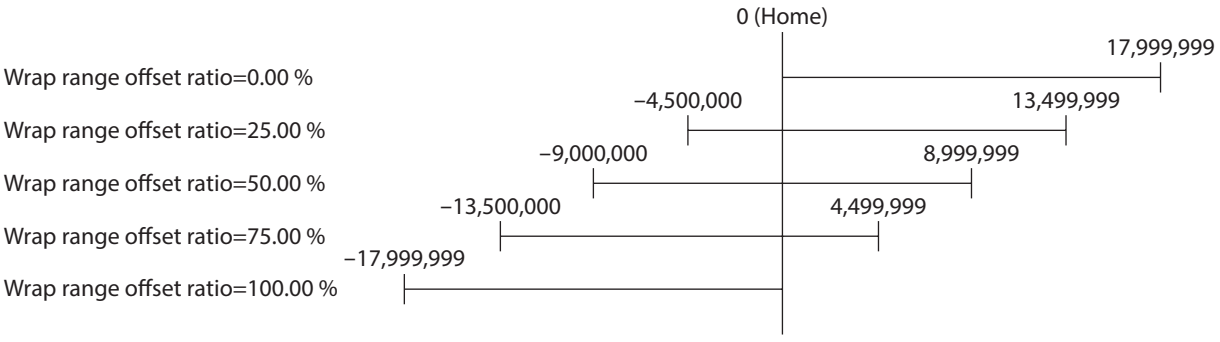
■ Wrap offset function

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

● Wrap offset ratio setting

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

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

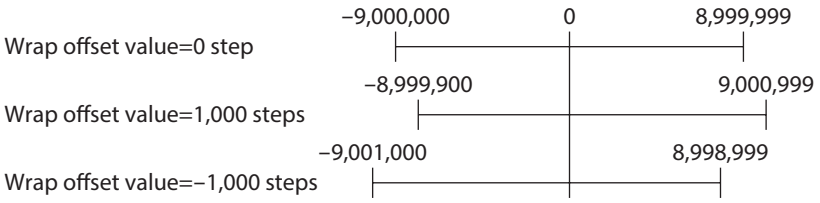


- **Wrap range offset value setting**

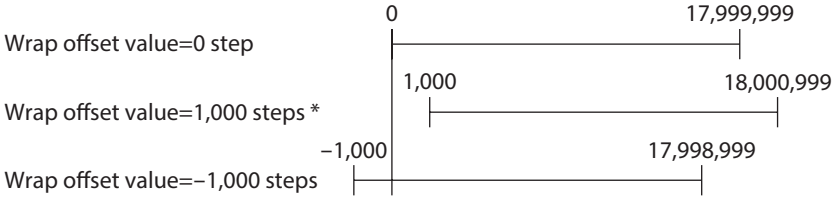
  The coordinates can be shifted in a step unit for the coordinate system having offset with the "Initial coordinate generation & wrap range offset ratio" parameter.

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

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



Setting example 2:
When the wrap range is 1,800 rev, the resolution is 10,000 P/R, and the wrap offset ratio setting is 0 %.



*Information of wrap setting error is generated

■ RND-ZERO output

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

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

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

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

- **Example of use 2**
  When the moving range is evenly divided by 90 degrees and the RND-ZERO signal is output for a certain travel amount

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

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

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

  Related parameter

MEXE02 Tree view	Name	Description	Initial value
Motor & Mechanism	The number of the RND-ZERO output in wrap range	Sets the number of times that the RND-ZERO output is turned ON within the wrap range. **[Setting range]** 1 to 536,870,911 divisions	1

5 Saving parameters

Parameters are stored in RAM or non-volatile memory in the driver. The parameters stored in RAM are erased when the control power supply is shut off, but the parameters stored in non-volatile memory remain stored even when the control power supply is shut off. When the control power supply of the driver is turned on, the parameters stored in non-volatile memory is transferred to RAM, and recalculation and setup for the parameters is executed in RAM.

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

memo

- Non-volatile memory can be rewritten approximately 100,000 times.
- Do not shut off the control power supply while writing the data to non-volatile memory, and also do not shut off for five seconds after writing is completed. Doing so may abort the data write and cause an alarm of EEPROM error (alarm code 41h) to generate.

■ How to execute the maintenance commands

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

- **Write 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 consecutively written from the MainDevice.

- **Write 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 be restored to 1 and can be written consecutively.
  If commands that take time to write to non-volatile memory, such as Write batch NV memory (40C9h), are executed consecutively, increase the length of the intervals between commands.

6 Object dictionary

This chapter explains the details of objects.

6-1 Composition of object dictionary

Objects are configured 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 an axis number (1 to 4) to the Sub-Index of the driver objects.
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

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- In this manual, the index of the driver axis 1 is described for the objects in the profile area. The objects of the driver axis 2 to axis 4 are indexes offset by 800h from the object on the previous axis.
- In the manufacturer-specific area, the driver objects for each driver axis is provided, except for the controller object. When setting the driver objects of the manufacturer-specific area, set an axis number (1 to 4) to Sub-Index.

■ Object dictionary item

Item	Description
Index, Sub, name	Index, Sub-Index, and name of objects.
Type	Definition objects of data type. Abbreviations described in the table below are used in this manual.
Access	Access method of objects. • RW: Values can be read and written. • RO: Values can be read only.
PDO	Indicates whether PDO mapping of objects can be performed. • RxPDO: Mapping to RxPDO can be performed. • TxPDO: Mapping to TxPDO can be performed. • No: Mapping to PDO cannot be performed.

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

Item	Description
Save	Indicates whether or not data will be saved to non-volatile memory when the Write batch NV memory is executed. • O: Saved in non-volatile memory. • –: Not saved in non-volatile memory.
Update	Indicates the timing for updating the change when a value in the object is 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 CoE communication area

These objects are used to make settings related to EtherCAT communication and to indicate the status.

- **Device type (1000h)**

This 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)**

This indicates the error status of the driver. If an error occurs in any axis of the driver, the General error (Bit 0) will change to 1. It will change to 0 when all errors are cleared.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1001h	00h	Error register	U8	RO	No	–	Bit 0: General error Bit 1 to Bit 7: Reserved	–

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

This indicates the product name.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1008h	00h	Manufacturer device name	STRING	RO	No	–	**AZD4C-KED**	–

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

This 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)**

This 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)**

This 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	–	**AZD4C-KED**: 0000 1433h	–
	03h	Revision number	U32	RO	No	–	**AZD4C-KED**: 0000 xxxxh	–
	04h	Serial number	U32	RO	No	–	0	–

- **Driver axis 1 Receive PDO mapping 1 (1600h)**

This is used to set 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	–	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

- **Driver axis 1 Receive PDO mapping 2 (1601h)**

This is used to set 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	–	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

- **Driver axis 1 Receive PDO mapping 3 (1602h)**

This is used to set 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

- **Driver axis 1 Receive PDO mapping 4 (1603h)**

This is used to set 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

- **Driver axis 2 Receive PDO mapping 1 (1610h)**

This is used to set 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

- **Driver axis 2 Receive PDO mapping 2 (1611h)**

This is used to set 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

- **Driver axis 2 Receive PDO mapping 3 (1612h)**

This is used to set 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

- **Driver axis 2 Receive PDO mapping 4 (1613h)**

This is used to set 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

- **Driver axis 3 Receive PDO mapping 1 (1620h)**

This is used to set 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

- **Driver axis 3 Receive PDO mapping 2 (1621h)**

This is used to set 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

● **Driver axis 3 Receive PDO mapping 3 (1622h)**

This is used to set 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

● **Driver axis 3 Receive PDO mapping 4 (1623h)**

This is used to set 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

- **Driver axis 4 Receive PDO mapping 1 (1630h)**

This is used to set 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

- **Driver axis 4 Receive PDO mapping 2 (1631h)**

This is used to set 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

- **Driver axis 4 Receive PDO mapping 3 (1632h)**

This is used to set 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

- **Driver axis 4 Receive PDO mapping 4 (1633h)**

This is used to set 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)**

This is used to set 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

- **Driver axis 1 Transmit PDO mapping 1 (1A00h)**

This is used to set the transmit PDO mapping 1 of 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

- **Driver axis 1 Transmit PDO mapping 2 (1A01h)**

This is used to set the transmit PDO mapping 2 of 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

- **Driver axis 1 Transmit PDO mapping 3 (1A02h)**

This is used to set the transmit PDO mapping 3 of 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

- **Driver axis 1 Transmit PDO mapping 4 (1A03h)**

This is used to set the transmit PDO mapping 4 of 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

- **Driver axis 2 Transmit PDO mapping 1 (1A10h)**

This is used to set the transmit PDO mapping 1 of 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

- **Driver axis 2 Transmit PDO mapping 2 (1A11h)**

This is used to set the transmit PDO mapping 2 of 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

- **Driver axis 2 Transmit PDO mapping 3 (1A12h)**

This is used to set the transmit PDO mapping 3 of 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

- **Driver axis 2 Transmit PDO mapping 4 (1A13h)**

This is used to set the transmit PDO mapping 4 of 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

- **Driver axis 3 Transmit PDO mapping 1 (1A20h)**

This is used to set the transmit PDO mapping 1 of 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

- **Driver axis 3 Transmit PDO mapping 2 (1A21h)**

This is used to set the transmit PDO mapping 2 of 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

- **Driver axis 3 Transmit PDO mapping 3 (1A22h)**

This is used to set the transmit PDO mapping 3 of 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

- **Driver axis 3 Transmit PDO mapping 4 (1A23h)**

This is used to set the transmit PDO mapping 4 of 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

- **Driver axis 4 Transmit PDO mapping 1 (1A30h)**

This is used to set the transmit PDO mapping 1 of 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

- **Driver axis 4 Transmit PDO mapping 2 (1A31h)**

This is used to set the transmit PDO mapping 2 of 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

- **Driver axis 4 Transmit PDO mapping 3 (1A32h)**

This is used to set the transmit PDO mapping 3 of 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

- **Driver axis 4 Transmit PDO mapping 4 (1A33h)**

This is used to set the transmit PDO mapping 4 of 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)**

This is used to set 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 (1C00h)**

This is used to set 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)	–

- **Sync Manager 2 PDO assignment (1C12h)**

This is used to set the object assigned in the Process data output (receive PDO: RxPDO) of the Sync Manager 2 (SM2).
It can be changed when the EtherCAT communication state machine is Pre-operational.
Refer to "1-4 Process data objects (PDO)" on p.40 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)**

This is used to set the object assigned in the Process data input (transmit PDO: TxPDO) of the Sync Manager 3 (SM3).
It can be changed when the EtherCAT communication state machine is Pre-operational.
Refer to "1-4 Process data objects (PDO)" on p.40 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)**

This is used to set the synchronization type of the Sync Manager 2 (SM2) and indicate 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 objects

Sub	Name	Description
01h	Synchronization type	00h: Free Run mode (Asynchronous) 01h: Sync Manager 2 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. Bit 0: Free Run mode (Asynchronous) Bit 1: Sync Manager 2 event synchronization mode Bit 2: 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 calculation and copy time needed from the Sync Manager 2 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)**

This is used to set the synchronization type of the Sync Manager 3 (SM3) and indicate 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 objects

Sub	Name	Description
01h	Synchronization type	00h: Free Run mode (Asynchronous) 02h: DC mode (SYNC0 event synchronization) 22h: Sync Manager 2 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. Bit 0: Free Run mode (Asynchronous) Bit 1: Sync Manager 2 event synchronization mode Bit 2: 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 calculation and copy time needed from the SYNC0 event to the Sync Manager 3 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. These are used to set the driver operation and indicate the status.

- **Error code (603Fh)**

This 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, an error code is indicated. The lower 8 bits of the error code represents the alarm code, and the upper 8 bits represents FFh. "0000h" is indicated when an alarm is not generated.
Refer to p.154 for alarm codes.

- **Controlword (6040h)**

This is used to control the transition of the drive state machine, start/stop of operation, etc.

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. Refer to "State transition of drive state machine" on p.47 for details.
1	Enable voltage	
2	Quick stop	
3	Enable operation	
4	Operation mode specific	It varies depending on the operation mode. Refer to each operation mode of "2 Drive profile" on p.46 for details.
5		
6		
7	Fault reset	Resets the alarm when changing from 0 to 1.
8	Halt	Refer to each operation mode of "2 Drive profile" on p.46 for details.
9	Operation mode specific	
10	Reserved	Reserved
11	Manufacturer specific	Manufacturer-specific bit. Refer to each operation mode of "2 Drive profile" on p.46 for details.
12		
13		
14		
15		

- **Statusword (6041h)**

This 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. Refer to "Status output of drive state machine" on p.48 for details.
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 of the driver is generated. It will automatically change to 0 when the information status is cleared.
8	Manufacturer specific	Manufacturer-specific bit. Refer to each operation mode of "2 Drive profile" on p.46 for details.
9	Remote	Changes to 1 when the driver initialization is completed.
10	Target reached	It varies depending on the operation mode. Refer to each operation mode of "2 Drive profile" on p.46 for details.
11	Internal limit active	Indicates the status of the function limitation by the internal limit. Refer to each operation mode of "2 Drive profile" on p.46 for details.
12	Operation mode specific	It varies depending on the operation mode. Refer to each operation mode of "2 Drive profile" on p.46 for details.
13		
14	Manufacturer specific	Manufacturer-specific bit. Refer to each operation mode of "2 Drive profile" on p.46 for details.
15		

- **Quick stop option code (605Ah)**

This is used to set the action by the Quick stop command. When the setting is changed while the Quick stop is being operated, 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 (Initial value), 3, 5, 6, 7	A

Details of range

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

memo If the Quick stop command is executed while the motor decelerates to a stop, the deceleration switches to the Quick stop deceleration. However, when the deceleration stop is performed by the STOP input signal or STOP-DRV (Bit 1) of the controller command 2 (2F02h), the deceleration will not switch even if the Quick stop command is executed.

- **Shutdown option code (605Bh)**

This is used to set the action 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 according to the Profile deceleration (6084h). The motor goes into a non-excitation state after it stops.

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

This is used to set the action 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 according to the Profile deceleration (6084h). The motor goes into a non-excitation state after it stops.

- **Halt option code (605Dh)**

This is used to set the action when Halt (Bit 8) of the Controlword (6040h) is set.

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

Details of range

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

- **Modes of operation (6060h)**

This is used to set 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 (Initial value), 1, 3, 6, 8, 9	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)

This indicates the operation mode that is enabled actually. The range is the same as the 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)

This indicates the command position. When the Wrap (RND) setting (41C7h) is set to 1, the value within 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)

This indicates the present position detected by the ABZO sensor. When the Wrap (RND) setting (41C7h) is set to 1, the value within 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)

This is used to set 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)

This is used to set 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: Bit 10) of the Statusword changes to 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	○	1 to 180 (Initial value: 18)	A

● Velocity demand value (606Bh)

This 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)

This 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)

This is used to set the target position in the Cyclic synchronous position mode and the 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)**

This is used to offset the home after return-to-home operation is completed in the Homing mode. The command position and the feedback position after completion of 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)**

This is used to set 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)**

This is used to set the operating speed for 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)**

This is used to set the acceleration for the Profile position mode and the 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)**

This is used to set the deceleration for the Profile position mode and the 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)**

This is used to set the deceleration for the Quick stop. This is the deceleration 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)

This is used to set 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.86 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)

This is used to set the return-to-home method for return-to-home operation. Refer to p.69 for details.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6098h	00h	Homing method	INT8	RW	No	○	17, 18, 24 (Initial value), 28, 35, 37, –1	B

Details of range

Setting value	Description
17	Return-to-home with the limit sensor (FW-LS/RV-LS), to start running in the negative direction.
18	Return-to-home with the limit sensor (FW-LS/RV-LS), to start running in the positive direction.
24	Return-to-home with the home sensor (HOMES), to start running in the positive direction.
28	Return-to-home with the home sensor (HOMES), to start in the negative direction.
35, 37*	Home preset
–1	Return-to-home operation of Oriental Motor's specifications

* 35 and 37 perform the same action.

● Homing speed (6099h)

This is used to set the operating speed and feedback speed for return-to-home operation. The feedback speed is the operating speed when position adjustment is performed 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)

This is used to set the acceleration/deceleration 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

- **Touch probe function (60B8h)**

This is used to set the action of the touch probe. Refer to p.82 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	Description
0	Touch probe 1 permission	0	Disables the touch probe 1.
		1	Enables the touch probe 1.
1	Touch probe 1 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous action Latches each 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 the TIM output as a trigger.
3	Reserved	0	Reserved
4	Touch probe 1 positive value action	0	Disables the latch function on the positive value of a trigger.
		1	Enables the latch function on the positive value of a trigger.
5	Touch probe 1 negative value action	0	Disables the latch function on the negative value of a trigger.
		1	Enables the latch function on the negative value of a trigger.
6	Reserved	0	Reserved
7	Reserved	0	Reserved
8	Touch probe 2 permission	0	Disables the touch probe 2.
		1	Enables the touch probe 2.
9	Touch probe 2 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous action Latches each 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 the TIM output as a trigger.
11	Reserved	0	Reserved
12	Touch probe 2 positive value action	0	Disables the latch function on the positive value of a trigger.
		1	Enables the latch function on the positive value of a trigger.
13	Touch probe 2 negative value action	0	Disables the latch function on the negative value of a trigger.
		1	Enables the latch function at the down-edge of a trigger.
14	Reserved	0	Reserved
15	Reserved	0	Reserved

- **Touch probe status (60B9h)**

This indicates the status of the touch probe. Refer to p.82 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	Description
0	Touch probe 1 permission status	0	The touch probe 1 is disabled.
		1	The touch probe 1 is enabled.
1	Touch probe 1 positive value latch	0	Has not latch on the positive value of the touch probe 1.
		1	Latched on the positive value of the touch probe 1.
2	Touch probe 1 negative value latch	0	Has not latch on the negative value of the touch probe 1.
		1	Latched on the negative value of the touch probe 1.
3 to 7	Reserved	0	Reserved
8	Touch probe 2 permission status	0	The touch probe 2 is disabled.
		1	The touch probe 2 is enabled.
9	Touch probe 2 positive value latch	0	Has not latch on the positive value of the touch probe 2.
		1	Latched on the positive value of the touch probe 2.
10	Touch probe 2 negative value latch	0	Has not latch on the negative value of the touch probe 2.
		1	Latched on the negative value of the touch probe 2.
11 to 15	Reserved	0	Reserved

- **Touch probe position 1 positive value (60BAh)**

This indicates the position latched on the positive value 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)**

This indicates the position latched on the negative value 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)**

This indicates the position latched on the positive value 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)**

This indicates the position latched on the negative value 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	–	–	–

- **Supported homing methods (60E3h)**

This indicates the Homing (return-to-home) methods 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 with the limit sensor (FW-LS/RV-LS), to start running in the negative direction.
18	Return-to-home with the limit sensor (FW-LS/RV-LS), to start running in the positive direction.
24	Return-to-home with the home sensor (HOMES), to start running in the positive direction
28	Return-to-home with the home sensor (HOMES), to start running in the negative direction
35, 37*	Home preset

* 35 and 37 perform the same action.

- **Following error actual value (60F4h)**

This indicates the deviation between the command position and the position actual value (feedback position).

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60F4h	00h	Following error actual value [step]	INT32	RO	TxPDO	–	–	–

- **Digital inputs (60FDh)**

This indicates the status of direct I/O.

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 RV-BLK input (0: OFF, 1: ON)*2
1	FW-BLK*1	Status of FW-BLK input (0: OFF, 1: ON)*2
2	HOMES*1	Status of HOMES input (0: OFF, 1: ON)*2
3 to 15	–	Reserved
16	EXT1*1	Status of EXT1 input (0: OFF, 1: ON)*2
17	EXT2*1	Status of EXT2 input (0: OFF, 1: ON)*2
18 to 19	–	Reserved
20	ZSG	Status of ZSG output (0: OFF, 1: ON)*2
21 to 23	–	Reserved
24	DIN0	Status of DIN0 input (0: Not carrying current, 1: Carrying current)*3
25	DIN1	Status of DIN1 input (0: Not carrying current, 1: Carrying current)*3
26	DIN2	Status of DIN2 input (0: Not carrying current, 1: Carrying current)*3
27	DIN3	Status of DIN3 input (0: Not carrying current, 1: Carrying current)*3
28 to 31	–	Reserved

*1 To acquire the status, input signals are required to be assigned to the input terminals IN0 and IN3 of the I/O signal connector (CN6). Assign using the DIN0 input function (4840h) to the DIN3 input function (4843h).
*2 [Normally open] ON: Carrying current, OFF: Not carrying current
[Normally closed] ON: Not carrying current, OFF: Carrying current
*3 It represents a state of "Carrying current" or "Not carrying current" of the internal photocoupler.

- **Digital outputs (60FEh)**

This is used to control the electromagnetic brake.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60FEh	00h	Number of entries	U8	RO	No	–	2	–
	01h	Physical output	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 physical outputs

Bit	Name	Description
0	Electromagnetic brake control	0: Electromagnetic brake releasing 1: Electromagnetic brake holding
1 to 31	–	Reserved

Details of bit mask

Bit	Name	Description
0	Mask of bit 0	0: Brake control of physical outputs disable 1: Brake control of physical outputs enable
1 to 31	–	Reserved

- **Target velocity (60FFh)**

This is used to set the operating speed for the Cyclic synchronous velocity mode and the 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)**

This indicates the operation modes 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 (Torque 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)**

This indicates the device type and the 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

Controller objects are used to indicate the status of the entire driver and to control the driver.

- **Controller status 1 (2E31h)**

This 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 the driver axis. Communication usually begins approximately two seconds after the control power supply is turned on. The value becomes 0 during the initialization of communication.
		1	Communication between the controller axis and the driver axis is normal. The value becomes 1 when communication responds normally to all axes that request the connection of the driver axis. The connection request of the driver axis can be checked with 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 in an overheat state.
		1	The regeneration resistor is in an overheat state. Or the thermal 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 is detected. Or the fan is not connected. If a standstill state of the fan is detected for 10 consecutive seconds during the operation command of the fan, the value becomes 1.
7	OH	0	The operation command of the fan is OFF.
		1	The operation command of the fan is being performed. If information of an overheat is generated in the driver axis, the value becomes 1.

- **Controller status 2 (2E32h)**

This indicates the status of 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-Axis1	0	An alarm is not generated in the driver axis 1.
		1	An alarm is being generated in the driver axis 1.
1	ALM-Axis2	0	An alarm is not generated in the driver axis 2.
		1	An alarm is being generated in the driver axis 2.
2	ALM-Axis3	0	An alarm is not generated in the driver axis 3.
		1	An alarm is being generated in the driver axis 3.
3	ALM-Axis4	0	An alarm is not generated in the driver axis 4.
		1	An alarm is being generated in the driver 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)**

This indicates a connection request for 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)**

This indicates a connection response for 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 is not established with the driver axis 1.
		1	Communication is being established with the driver axis 1.
1	LINK2	0	Communication is not established with the driver axis 2.
		1	Communication is being established with the driver axis 2.
2	LINK3	0	Communication is not established with the driver axis 3.
		1	Communication is being established with the driver axis 3.
3	LINK4	0	Communication is not established with the driver axis 4.
		1	Communication is being established with the driver axis 4.
4 to 7	Reserved	0	Reserved

- **Controller command 1 (2F01h)**

This is used to control 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 → 1	Resets an alarms in the controller axis
1 to 7	Reserved	0	Reserved

- **Controller command 2 (2F02h)**

This is used to control 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 → 1	Resets alarms generated in all driver axes at a time.
1	STOP-DRV	0	This does not stop the operation of the driver axes.
		1	Stops the operation for all driver axes. The stopping movement is performed based on the STOP input action (4700h).
2 to 7	Reserved	0	Reserved

● **Controller command 3 (2F03h)**

This is used to execute the position preset (P-PRESET) of the driver axis. If the position preset (P-PRESET) is executed, the command position and the feedback position changes to the value set in the Home offset (607Ch) and the home is set. Set the Home offset (607Ch) for each 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-Axis1	0 → 1	Executes the position preset (P-PRESET) of the driver axis 1.
1	PRESET-Axis2	0 → 1	Executes the position preset (P-PRESET) of the driver axis 2.
2	PRESET-Axis3	0 → 1	Executes the position preset (P-PRESET) of the driver axis 3.
3	PRESET-Axis4	0 → 1	Executes the position preset (P-PRESET) of the driver axis 4.
4 to 7	Reserved	0	Reserved

■ Driver objects

The driver objects are the objects for driver axes 1 to axis 4.
In this manual, the Sub-index is described as "*". Set the axis number (1 to 4) in the Sub-Index of each object to access.
Refer to the **AZ** Series OPERATING MANUAL Function Edition for driver objects that are not described in this document.

● **Operation voltage mode (40B7h)**

This indicates the voltage mode of the actual main power supply. Set the voltage mode of the main power supply with the Main power mode (41FAh).

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
40B7h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Operation voltage mode	U8	RO	No	–	–	–
	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)

This is used to select the setting method of the current for push-motion operation.
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
413Ch	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Current setting during push-motion	U8	RW	No	○	0 (Initial value), 1	A
	02h	Axis 2 Current setting during push-motion	U8	RW	No	○	0 (Initial value), 1	A
	03h	Axis 3 Current setting during push-motion	U8	RW	No	○	0 (Initial value), 1	A
	04h	Axis 4 Current setting during push-motion	U8	RW	No	○	0 (Initial value), 1	A

Details of range

Setting value	Description
0	Push current
1	Operating current

● Non-excitation mode selection (413Dh)

This is used to select 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 (Initial value), 1	A
	02h	Axis 2 Non-excitation mode selection	U8	RW	No	○	0 (Initial value), 1	A
	03h	Axis 3 Non-excitation mode selection	U8	RW	No	○	0 (Initial value), 1	A
	04h	Axis 4 Non-excitation mode selection	U8	RW	No	○	0 (Initial value), 1	A

Details of range

Setting value	Description
0	Dynamic brake status
1	Free-run status

- **Wrap positioning mode (414Fh)**

This is used to set the operation mode for wrap positioning operation.
For details about the operation modes, refer to "Operation type of Profile position mode" on p.57.

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 (Initial value), 1, 2, 3	B
	02h	Axis 2 Wrap positioning mode	U8	RW	RxPDO	○	0 (Initial value), 1, 2, 3	
	03h	Axis 3 Wrap positioning mode	U8	RW	RxPDO	○	0 (Initial value), 1, 2, 3	
	04h	Axis 4 Wrap positioning mode	U8	RW	RxPDO	○	0 (Initial value), 1, 2, 3	

Details of range

Setting value	Description
0	Wrap absolute positioning
1	Wrap proximity
2	Wrap forward direction
3	Wrap reverse direction

- **Other axis alarm (4187h)**

When an alarm is generated in one of the driver axes, it will cause all other driver axes to generate the alarm. If one of the driver axes is set to enable, all of the driver axes will be 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 (Initial value), 1	A
	02h	Axis 2 Other axis alarm	U8	RW	No	○	0 (Initial value), 1	A
	03h	Axis 3 Other axis alarm	U8	RW	No	○	0 (Initial value), 1	A
	04h	Axis 4 Other axis alarm	U8	RW	No	○	0 (Initial value), 1	A

Details of range

Setting value	Description
0	Disable: Even if an alarm is generated in one of the driver axes, no alarm is generated in the other driver axes.
1	Enable: If an alarm is generated in one of the driver axes, it will also be generated in all other driver axes.

● Main power mode (41FAh)

This is used to set 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 (Initial value), 0, 1	D
	02h	Axis 2 Main power mode	INT8	RW	No	○	−1 (Initial value), 0, 1	D
	03h	Axis 3 Main power mode	INT8	RW	No	○	−1 (Initial value), 0, 1	D
	04h	Axis 4 Main power mode	INT8	RW	No	○	−1 (Initial value), 0, 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. If the voltage mode is not set correctly, torque may decrease or vibration may increase.
- If −1 is set, after the control power supply is turned on, the voltage value is automatically discriminated when the main power supply is turned on first. Be sure to shut off the control power supply when changing the voltage of the main power supply.
- When using 48 VDC, if a rise time of the driver input voltage from 10 V to 32 V is needed for 50 ms or more, set the value to 1 instead of −1 (automatic discrimination). If the rise time is slow, the voltage mode may be incorrectly recognized as 24 VDC, which can result in torque deterioration or vibration.
- The voltage mode actually operated can be checked with the Operation voltage mode (40B7h).

● Touch probe 1 latch position (44B0h)

This is used to set the position to latch by the external latch input (EXT1). The changed value is updated when the Touch probe 1 permission (60B8h: Bit 0) 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 (Initial value), 1	A
	02h	Axis 2 Touch probe 1 latch position	U8	RW	No	○	0 (Initial value), 1	A
	03h	Axis 3 Touch probe 1 latch position	U8	RW	No	○	0 (Initial value), 1	A
	04h	Axis 4 Touch probe 1 latch position	U8	RW	No	○	0 (Initial value), 1	A

Details of range

Setting value	Description
0	Latches the position actual value (feedback position).
1	Latches the command position.

- **Touch probe 2 latch position (44B1h)**

This is used to set the position to latch by the external latch input (EXT2). The changed value is updated when the Touch probe 2 permission (60B8h: Bit 8) 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 (Initial value), 1	A
	02h	Axis 2 Touch probe 2 latch position	U8	RW	No	○	0 (Initial value), 1	A
	03h	Axis 3 Touch probe 2 latch position	U8	RW	No	○	0 (Initial value), 1	A
	04h	Axis 4 Touch probe 2 latch position	U8	RW	No	○	0 (Initial value), 1	A

Details of range

Setting value	Description
0	Latches the position actual value (feedback position).
1	Latches the command position.

- **Touch probe 1 TIM/ZSG signal select (44B2h)**

This is used to set the TIM output or the ZSG output as a trigger. The changed value is updated when the Touch probe 1 permission (60B8h: Bit 0) 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 (Initial value), 1	A
	02h	Axis 2 Touch probe 1 TIM/ ZSG signal select	U8	RW	No	○	0 (Initial value), 1	A
	03h	Axis 3 Touch probe 1 TIM/ ZSG signal select	U8	RW	No	○	0 (Initial value), 1	A
	04h	Axis 4 Touch probe 1 TIM/ ZSG signal select	U8	RW	No	○	0 (Initial value), 1	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)**

This is used to set the TIM output or the ZSG output as a trigger. The changed value is updated when the Touch probe 2 permission (60B8h: Bit 8) 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 (Initial value), 1	A
	02h	Axis 2 Touch probe 2 TIM/ ZSG signal select	U8	RW	No	○	0 (Initial value), 1	A
	03h	Axis 3 Touch probe 2 TIM/ ZSG signal select	U8	RW	No	○	0 (Initial value), 1	A
	04h	Axis 4 Touch probe 2 TIM/ ZSG signal select	U8	RW	No	○	0 (Initial value), 1	A

Details of range

Setting value	Description
0	Latches by the ZSG output.
1	Latches by the TIM output.

- **Driver axis CPU number (4642h)**

This 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)**

This indicates the software version of the driver axis. "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 manufacturer software version	U16	RO	No	–	–	–
	02h	Axis 2 Driver axis manufacturer software version	U16	RO	No	–	–	–
	03h	Axis 3 Driver axis manufacturer software version	U16	RO	No	–	–	–
	04h	Axis 4 Driver axis manufacturer software version	U16	RO	No	–	–	–

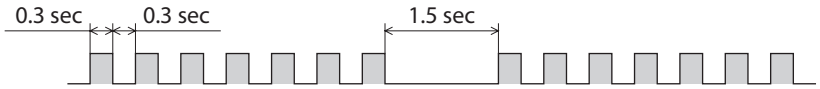
7 Alarm and information

This chapter explains alarm and information functions.

7-1 Alarms

This driver is equipped with the alarm function that protects against temperature rise, poor connection, operation error, and the like. If an alarm is generated, the ALM-A output is turned ON and the ALM-B output is turned OFF to stop the motor. At the same time, the ALARM LED blinks in red. The type of the generated alarm can be checked by counting the number of times the ALARM LED blinks.

Example of ALARM LED blinking (When the number of blinks 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: Bit 7) of Controlword to 1. (It is enabled when changing from 0 to 1.)
- Set the ALM-RST-DRV (Bit 0) of 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 ON. (It is enabled at the ON edge.)
- Execute the alarm reset using the **MEXE02** software.
- 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 five seconds before doing so. The driver may be damaged if the control power supply is turned on immediately after it is turned off.

memo
- Some alarms cannot be reset by other methods than turning on the control power supply again. "Alarm lists" on p.154 Refer to “Alarm lists” on p.152.
- An alarm of Absolute position error can be reset by turning the control power supply off and then on again after executing the position preset (P-PRESET). If it cannot be reset by this method, the ABZO sensor may be damaged.

■ Alarm history

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

- Read the alarm history by the Alarm history (4041h to 404Ah) via EtherCAT communication.
- Clear the alarm history by setting the Clear alarm history (40C2h) to 1 via EtherCAT communication. (It is enabled when changing from 0 to 1.)
- Read and clear the alarm history using the **MEXE02** software.

■ Alarm lists

● Alarms of the controller axis

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	How to reset
41h	9	EEPROM error	The 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 alarm still cannot be cleared, 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 in communication with the network CPU.	Refer to "Alarm reset" on p.153 to reset the alarm. If the alarm still cannot be cleared, contact your nearest Oriental Motor sales office.	Any of 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 alarm still cannot be cleared, contact your nearest Oriental Motor sales office.	Turn on the control power supply again
F0h	Light	CPU error	The CPU 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 goes into a non-excitation state.

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	How to reset
10h	4	Excessive position deviation	• When the motor was in a state of current ON (excitation state), the deviation between the command position and the feedback position exceeded the value set in the excessive position deviation alarm (6065h) in the motor shaft. • A load is large or the acceleration/deceleration is too short for the load. • The operating range of positioning push-motion was exceeded.	• Reduce the load. • Increase the acceleration/deceleration time or slow down the acceleration/deceleration rate. • Increase the operating current. • Reconsider the setting of the operation data.	Any of reset operations
20h	5	Overcurrent	The motor, the cable, and the driver output circuit were short-circuited.	Turn off the main power supply and the control power supply first, and check that the motor, the cable, and the driver are not damaged before turning on the power supplies 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 specification value.	Reconsider the ventilation condition.	Any of reset operations

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	How to reset
22h	3	Overvoltage	[Sub code 00h: Overvoltage of the main power supply] • The main power supply voltage exceeded the permissible value. • A large load inertia was suddenly stopped. • Vertical operation (elevating operation) was performed. [Sub code 01h: Overvoltage of the control power supply] The control power supply voltage exceeded the permissible value.	[Sub code 00h: Overvoltage of the main power supply] • Check the input voltage of the main power supply. • Reduce the load. • Increase the acceleration/ deceleration time or slow down the acceleration/ deceleration rate. [Sub code 01h: Overvoltage of the control power supply] Check the input voltage of the control power supply.	Any of reset operations
23h	3	Main power supply OFF	• The main power supply was shut off during operation. • The temperature of the power supply circuit inside the driver reached the upper limit of the specification value.	• Check if the main power supply is applied properly. • Reconsider the load condition or operating condition so that the input current of the main power supply is an average of 4.0 A or less (with a maximum of 7.0 A). • Reconsider the ventilation condition.	Any of reset operations
25h	3	Undervoltage	The main power supply was momentarily shut off or the voltage was insufficient.	Check the input voltage of the main power supply.	Any of reset operations
26h	8	Motor overheat	The detection temperature of the ABZO sensor reached the upper limit of the specification value.	• Check the heat radiation condition of the motor. • Reconsider the ventilation condition.	Any of reset operations
28h	8	Sensor error	An error of the ABZO sensor was detected during operation.	Turn off the main power supply and the control power supply, and check the connection of the motor before turning on the power supplies again.	Turn on the control power supply again
29h	9	CPU peripheral circuit error	The voltage around the CPU was decreased by shutting off the control power supply momentarily.	• Turn on the control power supply again. • Check the input voltage of the control power supply. • Check the power supply capacity of the control power supply.	Turn on the control power supply again
2Ah	8	Encoder communication error	An error was detected in communication between the driver and the ABZO sensor.	Turn off the main power supply and the control power supply, and check the connection of the ABZO sensor before turning on the power supplies again.	Turn on the control power supply again
30h	2	Overload	A load exceeding the maximum torque was applied for the time exceeded the value set in the Overload alarm (4180h).	• Reduce the load. • Increase the acceleration/ deceleration time or slow down the acceleration/ deceleration rate. • Increase the operating current.	Any of reset operations

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	How to reset
31h	2	Overspeed	The feedback speed of the motor output shaft exceeded the specification value.	• Reconsider the Electronic gear (6091h), and set the speed of the motor output shaft to a value lower than the specification value. • If an overshoot occurs while accelerating, increase the acceleration time or slow the acceleration rate.	Any of reset operations
33h	7	Absolute position error	The home information of the ABZO sensor was damaged.	Execute the position preset (P-PRESET), and then turn the control power supply off and on again. After that, set the home again.	Turn on the control power supply again
34h	2	Command pulse error	• The frequency of the command pulse exceeded the specification 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.	• Reduce the frequency of the command pulse. • Put the motor in a non-excitation state before executing the position preset (P-PRESET) of the driver in the Cyclic synchronous position mode.	Any of reset operations
35h	2	Alarm detection of other axes	An alarm was generated in one of the driver axes in a state where the Other axis alarm (4187h) was enabled.	Check the alarm content and take appropriate action. Then, reset the alarm for each driver axis.	Any of reset operations
37h	4	Driver input current error	The rated value of the driver input current was exceeded.	Reconsider the operating condition.	Any of reset operations
41h	9	EEPROM error	The data stored in the driver 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 the control power supply, and check the connection of the ABZO sensor before turning on the power supplies again.	Turn on the control power supply again
43h	8	Rotation error at power on	The motor was being rotated when the control power supply was turned on.	Reconsider the load conditions so that the motor output shaft does not rotate by an external force when the control power supply is turned on.	Turn on the control power supply again
44h	8	Encoder EEPROM error	The data stored in the ABZO sensor was damaged.	Execute one of the following operations. If the same alarm is still generated, the ABZO sensor has been damaged. Contact your nearest Oriental Motor sales office. • Set phase Z again with the "ZSG-PRESET" of the maintenance command. • Execute the "Clear tripmeter" with the **MEXE02** software, or execute the "Clear tripmeter" of the maintenance command.	Turn on the control power supply again

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	How to reset
45h	8	Motor combination error	A motor not supported by the driver was connected. (Refer to p.160 for details.)	Check the motor model and the driver model, and connect them in the correct combination.	Turn on the control power supply again
4Ah	7	Return-to-home incomplete	Absolute positioning operation was started in a state where the coordinates were not set.	• Reconsider the setting of the Permission of absolute positioning without setting absolute coordinates (4148h). • Execute the position preset (P-PRESET) or return-to-home operation.	Any of reset operations
60h	7	±LS both sides active	• When the FW-LS/RV-LS input action (4701h) is set to "Immediate stop with alarm" or "Deceleration stop with alarm," both the FW-LS input or the RV-LS input were detected. • Return-to-home operation was executed in a condition where both the FW-LS input and the RV-LS input were detected.	Check the sensor logic installed and the parameter for the inverting mode.	Any of reset operations
61h	7	Reverse ±LS connection	The LS input opposite to the operating direction was detected while return-to-home operation in the 2-sensor mode or the 3-sensor mode was performed.	Check the wiring of the sensor.	Any of reset operations
62h	7	Return-to-home operation error	• An unanticipated load was applied while return-to-home operation was performed. • The installation positions of the FW-LS and RV-LS sensors and the HOME sensor are close to each other. • Position preset (P-PRESET) processing upon completion of return-to-home operation was failed. • During return-to-home operation in the one-way rotation mode, the motor position exceeded the HOME sensor while the motor was decelerating to a stop.	• Check the load. • Reconsider the sensor installation positions and the starting direction of motor operation. • Upon completion of return-to-home operation, ensure that no load exceeding the maximum torque is applied. • Reconsider the specifications of the HOME sensor and the setting the Homing acceleration (609Ah).	Any of reset operations
63h	7	No HOMES	The HOMES input was not detected at a position between the FW-LS input and the RV-LS input while return-to-home operation in the 3-sensor mode was performed.	Install the HOME sensor at a position between the FW-LS and RV-LS sensors.	Any of reset operations
64h	7	TIM, ZSG, SLIT signal error	None of the TIM output, the ZSG output, or the SLIT input could be detected during return-to-home operation.	• Reconsider the connection status of the load and the position of the HOMES sensor so that these signals should be ON while the HOMES input is ON. • If the signals are not used, disable the Return-to-home TIM/ZSG signal detection (4167h) and Return-to-home SLIT detection (4166h).	Any of reset operations

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	How to reset
66h	7	Hardware overtravel	When the FW-LS/RV-LS input action (4701h) is set to "Immediate stop with alarm" or "Deceleration stop with alarm," the FW-LS input or the RV-LS input was detected.	• Reconsider the setting of the operation data. • Operate the motor in the opposite direction to escape from the sensor. The operation can be performed in any operation mode. It can be escaped even in return-to-home operation.	Any of reset operations
67h	7	Software overtravel	When the Software overtravel (41C3h) is set to "Immediate stop with alarm" or "Deceleration stop with alarm," the motor position reached the value set in the software limit.	• Reconsider the setting of the operation data. • Operate the motor in the opposite direction to escape from the sensor. The operation can be performed in any operation mode. It can be escaped even in return-to-home operation.	Any of reset operations
6Ah	7	Return-to-home operation offset error	When offset movement as part of return-to-home operation was performed, the FW-LS input or the RV-LS input was detected.	Check the offset value.	Any of reset operations
6Dh	7	Mechanical overtravel	The product having set the home reached the mechanical end.	Check the travel amount (position).	Any of reset operations
70h	7	Abnormal operation data	• Operation was performed at the operating speed or operating current that exceeded the value set in the Mechanism protection parameter. • Operation in the profile position mode was started when the operating speed was zero. • Wrap operation was executed when the Wrap (RND) setting (41C7h) was disabled. • Push-motion operation or push-motion return-to-home operation was performed with the **DGII** Series.	• Check the operation data. • Check the setting of the Wrap (RND) setting (41C7h). • Push-motion operation as well as push-motion return-to-home operation cannot be performed with the **DGII** Series.	Any of reset operations
71h	7	Electronic gear setting error	The resolution set in the Electronic gear (6091h) was out of the specification range.	Reconsider the Electronic gear (6091h) and set it so that the resolution is within the specification range.	Turn on the control power supply again
72h	7	Wrap setting error	The control power supply was turned on in a state where the resolution set with the Electronic gear (6091h) was mismatched with the wrap setting value.	Perform the wrap setting properly, 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 EtherCAT connector, cable, and MainDevice.	Any of reset operations

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	How to reset
82h	7	Driver internal communication error 1	An error was detected in communication with the network CPU.	Refer to "Alarm reset" on p.153 to reset the alarm. If the alarm still cannot be cleared, contact your nearest Oriental Motor sales office.	Any of 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.153 to reset the alarm. If the alarm still cannot be cleared, contact your nearest Oriental Motor sales office.	Any of 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.153 to reset the alarm. If the alarm still cannot be cleared, contact your nearest Oriental Motor sales office.	Any of reset operations
F0h	Light	CPU error	The CPU malfunctioned.	Turn on the control power supply again.	Turn on the control power supply again

■ Generation condition of alarms

For alarms shown in the table below, an alarm will be generated if the generation condition is exceeded.

Alarm code	Alarm type	Motor model	Generation condition	Unit
21h	Main circuit overheat	–	85 (185)	°C (°F)
22h	Overvoltage	–	Main power supply: 63 Control power supply: 36	V
23h	Main power supply off	–	100 (212)	°C (°F)
26h	Motor overheat	–	85 (185)	°C (°F)
31h	Overspeed	**AZM14, AZM15, AZM24, AZM26**	8,000	r/min
		AZM46	4,500	r/min
34h	Command pulse error	–	38,400	r/min

■ 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 condition under which the overload alarm is generated. **[Setting range]** 1 to 300 (1=0.1 s)	50

Index	Sub	Name	Description	Initial value
4185h	*	Regeneration resistor overheat alarm	An alarm is generated when the regeneration resistor exceeded the allowable power consumption. If one of the driver axes is set to enable, all of the driver axes will be enabled. **[Setting range]** 0: Disable 1: Enable	0
4186h	*	Fan low speed alarm	An alarm is generated when a standstill state of the fan is detected for 10 consecutive seconds during the operation command of the fan. If one of the driver axes is set to enable, all of the driver axes will be enabled. **[Setting range]** 0: Disable 1: Enable	0
4187h	*	Other axis alarm	When an alarm is generated in one of the driver axes, it will cause all other driver axes to generate the alarm. If one of the driver axes is set to enable, all of the driver axes will be enabled. **[Setting range]** 0: Disable 1: Enable	0

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

■ About causes of the Motor combination error (Alarm code 45h)

An alarm of 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) with a frame size of 20 mm (0.79 in.) or 28 mm (1.10 in.).
- When a motor (motorized actuators) with a frame size of 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."
- When a motor (motorized actuator) not compatible with the version of the driver axis is connected.

7-2 Information

The driver is equipped with a function to generate information output before an alarm is generated.
This function can be utilized for periodic maintenance of equipment by setting a suitable value in the parameter of information.
For example, using the "Motor temperature information" (41A8h) can prevent equipment malfunction or production stoppage due to motor overheating. In addition, the "Tripmeter information" (41AFh) can be used as a reference to perform maintenances each time a certain travel distance is reached.

■ Status when information is generated

- **Information bit output**

  If information is generated, a bit output (INFO-** output) of the corresponding information is turned ON. (Details of bit output ⇨p.163)
  A desired output signal can be assigned to the INFO-USRIO output among the bit outputs and used. If the assigned output signal is turned ON, the INFO-USRIO output is also turned ON.

- **INFO output**

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

- **LED indicator**

  If information is generated, the PWR/ALM LED (green) and PWR/ALM LED (red) of the driver axis will blink twice simultaneously.

- **Motor operation**

  Unlike in the case of an alarm, the motor continues to operate during information.

● Parameters

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

Related parameters

Name	Description	Initial value
Information auto clear	When the cause of the information is removed, the INFO output and the bit output of the corresponding information are automatically turned OFF. **[Setting range]** 0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically)	1
Information LED condition	Sets the LED status when information is generated. **[Setting range]** 0: The LED does not blink 1: The LED blinks	1
INFO-USRIO output selection	Selects the output signal to be checked by the INFO-USRIO output. **[Setting range]** Output signal⇨p.95	128: CONST-OFF
INFO-USRIO output inversion	Sets the ON/OFF status of the INFO-USRIO output. **[Setting range]** 0: Non invert 1: Invert	0
Position deviation information (INFO-POSERR)	Sets the condition under which the position deviation information (INFO-POSERR) is generated. **[Setting range]** 1 to 30,000 (1=0.01 rev)	300
Driver temperature information (INFO-DRVTMP)	Sets the condition under which the driver temperature information (INFO-DRVTMP) is generated. **[Setting range]** 40 to 85 °C	85
Motor temperature information (INFO-MTRTMP)	Sets the condition under which the motor temperature information (INFO-MTRTMP) is generated. **[Setting range]** 40 to 120 °C	85
Overvoltage information (INFO-OVOLT)	Sets the condition under which the overvoltage information (INFO-OVOLT) is generated. **[Setting range]** 150 to 630 (1=0.1 V)	630
Undervoltage information (INFO-UVOLT)	Sets the condition under which the undervoltage information (INFO-UVOLT) is generated. **[Setting range]** 150 to 630 (1=0.1 V)	180
Overload time information (INFO-OLTIME)	Sets the condition under which the overload time information (INFO-OLTIME) is generated. **[Setting range]** 1 to 300 (1=0.1 s)	50
Speed information (INFO-SPD)	Sets the condition under which the speed information (INFO-SPD) is generated. **[Setting range]** 0 to 12,000 r/min	0
Cumulative load 0 information (INFO-CULD0)	Sets the condition under which the cumulative load 0 information (INFO-CULD0) is generated. **[Setting range]** 0 to 2,147,483,647	0
Cumulative load 1 information (INFO-CULD1)	Sets the condition under which the cumulative load 1 information (INFO-CULD1) is generated. **[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 clear 1: Clear	1
Cumulative load value count divisor	Sets the divisor of the cumulative load. **[Setting range]** 1 to 32,767	1

Name	Description	Initial value
Tripmeter information (INFO-TRIP)	Sets the condition under which the tripmeter information (INFO-TRIP) is generated. **[Setting range]** 0: Disable 1 to 2,147,483,647 (1=0.1 kRev)	0
Odometer information (INFO-ODO)	Sets the condition under which the odometer information (INFO-ODO) is generated. **[Setting range]** 0: Disable 1 to 2,147,483,647 (1=0.1 kRev)	0
INFO action (Assigned I/O status information (INFO-USRIO))	Sets the bit output, the INFO output, and the LED status when information is generated. **[Setting range]** 0: Only the bit output is turned ON 1: The bit output and the INFO output are turned ON, and the LED blinks	1
INFO action (Position deviation information (INFO-POSERR))		
INFO action (Driver temperature information (INFO-DRVTMP))		
INFO action (Motor temperature information (INFO-MTRTMP))		
INFO action (Overvoltage information (INFO-OVOLT))		
INFO action (Undervoltage information (INFO-UVOLT))		
INFO action (Overload time information (INFO-OLTIME))		
INFO action (Speed information (INFO-SPD))		
INFO action (Start operation error information (INFO-START))		
INFO action (Start ZHOME error information (INFO-ZHOME))		
INFO action (PRESET request information (INFO-PR-REQ))		
INFO action (Electronic gear setting error information (INFO-EGR-E))		
INFO action (Wrap setting error information (INFO-RND-E))		
INFO action (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))		

Check the index number of the parameter in "4 Driver objects of the manufacturer-specific area" on p.179.

■ Information history

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

- Read the information history by the Information history (4510h to 451Fh) via EtherCAT communication.
- Clear the information history by setting the Clear information history (40D4h) to 1 via EtherCAT communication. (It is enabled when changing from 0 to 1.)
- Read or clear the information history using the **MEXE02** software.

memo Since information history is stored in RAM, it is cleared when the control power supply of the driver is turned off.

■ Information list

Information item	Information bit output signal	Cause	Condition to clear
Assigned I/O status	INFO-USRIO	The I/O signal set in the "INFO-USRIO output selection" (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 the feedback position exceeded the value set in the "Position deviation information" (41A5h) in the motor output shaft.	The deviation between the command position and the feedback position fell below the value set in the "Position deviation information" (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 fell below 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 voltage of the main power supply exceeded the value set in the "Overvoltage information" (41ABh). • A large load inertia was suddenly stopped. • Vertical operation (elevating operation) was performed.	The voltage of the main power supply fell below the value set in the "Overvoltage information" (41ABh).
Undervoltage	INFO-UVOLT	• The voltage of the main power supply fell below the value set in the "Undervoltage information" (41ACh). • The main power supply was momentarily shut off or the voltage was insufficient.	The voltage of the main power supply exceeded the value set in the "Undervoltage information" (41ACh).
Overload time	INFO-OLTIME	A load exceeding the maximum torque was applied for a period of time exceeding the value set in the "Overload time information" (41A1h).	The overload counter fell below the value set in the "Overload time information" (41A1h).
Speed	INFO-SPD	The feedback speed of the motor exceeded the value set in the "Speed information" (41A2h).	The feedback speed of the motor fell below the value set in the "Speed information" (41A2h).
Start operation error	INFO-START	• Operation in the direction having stopped by the FW-BLK input or the RV-BLK input was started. • Operation in the direction having stopped by the FW-LS input or the RV-LS input was started. • Operation in the direction having stopped by the software limit was started.	Operation was started normally.
Start ZHOME error	INFO-ZHOME	When the coordinates were not set (the ABSPEN output was OFF), high-speed return-to-home operation was started.	Operation was started normally.
Preset request	INFO-PR-REQ	Preset was executed by the position preset (P-PRESET) or return-to-home operation.	Preset was completed.
Electronic gear setting error	INFO-EGR-E	The resolution set in the Electronic gear (6091h) was out of the specification range.	The resolution was set within the specification range.
Wrap setting error	INFO-RND-E	The resolution and the Initial coordinate generation & wrap setting range (41C9h) were inconsistent.	The Initial coordinate generation & wrap setting range (41C9h) was set within the specification range.
Forward operation prohibition	INFO-FW-OT	• The positive software limit was exceeded. • Either the FW-LS input or the FW-BLK input was turned ON.	The position of the motor fell into the range of the positive software limit, and additionally, both the FW-LS input and the FW-BLK input were turned OFF.
Reverse operation prohibition	INFO-RV-OT	• The negative software limit was exceeded. • Either the RV-LS input or the RV-BLK input was turned ON.	The position of the motor fell into the range of the negative software limit, and additionally, both the RV-LS input and the RV-BLK input were turned OFF.
Cumulative load 0	INFO-CULD0	The cumulative load exceeded the value set in the "Cumulative load 0 information" (41B1h).	The cumulative load fell below the value set in the "Cumulative load 0 information" (41B1h).
Cumulative load 1	INFO-CULD1	The cumulative load exceeded the value set in the "Cumulative load 1 information" (41B2h).	The cumulative load fell below the value set in the "Cumulative load 1 information" (41B2h).
Tripmeter	INFO-TRIP	The travel distance of the motor exceeded the value set in the "Tripmeter information" (41AFh).	After one of the following operations was performed, the travel distance (Tripmeter) of the motor fell below the value set in the"Tripmeter information" (41AFh). – The "Tripmeter information" (41AFh) was set again. – Tripmeter was cleared with the **MEXE02** software.
Odometer	INFO-ODO	The cumulative travel distance of the motor exceeded the value set in the "Odometer information" (41B0h).	After the following operation was performed, the cumulative travel distance (Odometer) of the motor fell below the value set in the "Odometer information" (41B0h). – The Odometer information (41B0h) was set again.
Start operation restricted mode	INFO-DSLMTD	• "Remote operation" was executed with the **MEXE02** software. • Configuration was executed.	• Remote operation was canceled. • Configuration was completed.
I/O test mode	INFO-IOTEST	• "I/O test" was executed with the **MEXE02** software. • Configuration was executed.	• The I/O test mode was canceled. • Configuration was completed.

Information item	Information bit output signal	Cause	Condition to clear
Configuration request	INFO-CFG	Configuration was requested to execute.	Configuration was executed.
Reboot request	INFO-RBT	Reboot was requested.	Reboot was executed.

memo If the "Preset request" information was generated for 100 ms or more in a state where the "Information auto clear" (41BFh) was set to disable, the preset may have been failed.

■ Monitor of information

Details of information can be checked with the "Information" (407Bh) of the driver objects.
The information code having read is indicated in 8-digit hexadecimal number. 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 item	Output signal
00000001h	0000 0000 0000 0000 0000 0000 0000 0001	I/O (User setting)	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

Information code	32 bits indication	Information item	Output signal
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 0 information (INFO-CULD0)	INT32	RW	RxPDO	○	0 to 2,147,483,647 (Initial value: 0)	A
41B2h	*	Cumulative load 1 information (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: Non invert (Initial value) 1: Invert	A
41BEh	*	Information LED condition	U8	RW	No	○	0: The LED does not blink 1: The LED blinks (Initial value)	A
41BFh	*	Information auto clear	U8	RW	No	○	0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically) (Initial value)	A

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
47A0h	*	INFO action (Assigned I/O status information (INFO-USRIO))	U8	RW	No	○	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks (Initial value)	A
47A1h	*	INFO action (Position deviation information (INFO-POSERR))	U8	RW	No	○		A
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
47A9h	*	INFO action (Start operation error information (INFO-START))	U8	RW	No	○		A
47AAh	*	INFO action (Start ZHOME error information (INFO-ZHOME))	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	○		A
47AEh	*	INFO action (Wrap setting error information (INFO-RND-E))	U8	RW	No	○		A
47B0h	*	INFO action (Forward operation prohibition information (INFO-FW-OT))	U8	RW	No	○		A
47B1h	*	INFO action (Reverse operation prohibition 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
47BEh	*	INFO action (Configuration request information (INFO-CFG))	U8	RW	No	○		A
47BFh	*	INFO action (Reboot request information (INFO-RBT))	U8	RW	No	○		A

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

3 Object lists

This part describes the lists of objects supported by the driver.

◆Table of contents

■ Notation rules

● About the update time

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

Notation	Item	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 CoE communication area

These objects are used to make settings related to EtherCAT communication or to indicate the status.

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting 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	–	**AZD4C-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	–	**AZD4C-KED**: 0000 1433h		–
	03h	Revision number	U32	RO	No	–	**AZD4C-KED**: 0000 xxxxh		–
	04h	Serial number	U32	RO	No	–	0	–	–
1600h	Axis 1 Receive PDO mapping 1 (Axis 1 - RxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1601h	Axis 1 Receive PDO mapping 2 (Axis 1 - RxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1602h	Axis 1 Receive PDO mapping 3 (Axis 1 - RxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
1603h	Axis 1 Receive PDO mapping 4 (Axis 1 - RxPDO4)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1610h	Axis 2 Receive PDO mapping 1 (Axis 2 - RxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1611h	Axis 2 Receive PDO mapping 2 (Axis 2 - RxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1612h	Axis 2 Receive PDO mapping 3 (Axis 2 - RxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1613h	Axis 2 Receive PDO mapping 4 (Axis 2 - RxPDO4)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
1620h	Axis 3 Receive PDO mapping 1 (Axis 3 - RxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1621h	Axis 3 Receive PDO mapping 2 (Axis 3 - RxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1622h	Axis 3 Receive PDO mapping 3 (Axis 3 - RxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1623h	Axis 3 Receive PDO mapping 4 (Axis 3 - RxPDO4)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1630h	Axis 4 Receive PDO mapping 1 (Axis 4 - RxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
1631h	Axis 4 Receive PDO mapping 2 (Axis 4 - RxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1632h	Axis 4 Receive PDO mapping 3 (Axis 4 - RxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1633h	Axis 4 Receive PDO mapping 4 (Axis 4 - RxPDO4)								
	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 to 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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A00h	Axis 1 Transmit PDO mapping 1 (Axis 1 - TxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
1A01h	Axis 1 Transmit PDO mapping 2 (Axis 1 - TxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A02h	Axis 1 Transmit PDO mapping 3 (Axis 1 - TxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A03h	Axis 1 Transmit PDO mapping 4 (Axis 1 - TxPDO4)								
	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
1A10h	Axis 2 Transmit PDO mapping 1 (Axis 2 - TxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
1A11h	Axis 2 Transmit PDO mapping 2 (Axis 2 - TxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A12h	Axis 2 Transmit PDO mapping 3 (Axis 2 - TxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A13h	Axis 2 Transmit PDO mapping 4 (Axis 2 - TxPDO4)								
	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 (Axis 3 - TxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
1A21h	Axis 3 Transmit PDO mapping 2 (Axis 3 - TxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A22h	Axis 3 Transmit PDO mapping 3 (Axis 3 - TxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A23h	Axis 3 Transmit PDO mapping 4 (Axis 3 - TxPDO4)								
	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 (Axis 4 - TxPDO1)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
1A31h	Axis 4 Transmit PDO mapping 2 (Axis 4 - TxPDO2)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A32h	Axis 4 Transmit PDO mapping 3 (Axis 4 - TxPDO3)								
	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 to 8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A33h	Axis 4 Transmit PDO mapping 4 (Axis 4 - TxPDO4)								
	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 to 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)		–

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting 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	0000h to FFFFh	A
	02h	Index of assigned PDO 2	U16	RW	No	–	1610h	0000h to FFFFh	A
	03h	Index of assigned PDO 3	U16	RW	No	–	1620h	0000h to FFFFh	A
	04h	Index of assigned PDO 4	U16	RW	No	–	1630h	0000h to FFFFh	A
	05h	Index of assigned PDO 5	U16	RW	No	–	1700h	0000h to 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	0000h to FFFFh	A
	02h	Index of assigned PDO 2	U16	RW	No	–	1A10h	0000h to FFFFh	A
	03h	Index of assigned PDO 3	U16	RW	No	–	1A20h	0000h to FFFFh	A
	04h	Index of assigned PDO 4	U16	RW	No	–	1A30h	0000h to FFFFh	A
	05h	Index of assigned PDO 5	U16	RW	No	–	1B00h	0000h to 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: Sync Manager 2 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: Sync Manager 2 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	–	–

2 Objects of the profile area

Objects in the profile area are defined by the CiA402 drive profile. These are used to set the driver operation and to indicate the status.

memo In this manual, the index of the driver axis 1 is described for the objects in the profile area. The objects of the driver axis 2 to axis 4 are indexes offset by 800h from the object on the previous axis.

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting 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	○	2	0, 1, 2, 3, 5, 6, 7	A
605Bh	00h	Shutdown option code	INT16	RW	No	○	1	0, 1	A
605Ch	00h	Disable operation option code	INT16	RW	No	○	1	0, 1	A
605Dh	00h	Halt option code	INT16	RW	No	○	1	1 to 3	A
6060h	00h	Modes of operation	INT8	RW	RxPDO	○	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=0.01 rev]	U32	RW	No	○	300	1 to 30,000	A
6067h	00h	Position window [1=0.1°]	U32	RW	No	○	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	○	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	○	–2,147,483,648	–2,147,483,648 to 2,147,483,647	A
	02h	Max. position limit [step]	INT32	RW	No	○	2,147,483,647	–2,147,483,648 to 2,147,483,647	A
6081h	00h	Profile velocity [Hz]	U32	RW	RxPDO	○	10,000	0 to 4,000,000	A
6083h	00h	Profile acceleration [step/s^2]	U32	RW	RxPDO	○	300,000	1 to 1,000,000,000	B
6084h	00h	Profile deceleration [step/s^2]	U32	RW	RxPDO	○	300,000	1 to 1,000,000,000	B
6085h	00h	Quick stop deceleration [step/s^2]	U32	RW	RxPDO	○	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	○	1	1 to 65,535	C
	02h	Electronic gear B	U32	RW	No	○	1	1 to 65,535	C
6098h	00h	Homing method	INT8	RW	No	○	24	17, 18, 24, 28, 35, 37, –1	B

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
6099h	Homing speed								
	00h	Number of entries	U8	RO	No	–	2	–	–
	01h	Speed during search for switch [Hz]	U32	RW	No	○	10,000	1 to 4,000,000	B
	02h	Speed during search for zero [Hz]	U32	RW	No	○	5,000	1 to 10,000	B
609Ah	00h	Homing acceleration [step/s^2]	U32	RW	No	○	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	–	–	–	–
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 Oriental Motor's specific objects. Controller objects are used to indicate the status of the entire driver and to control the driver.

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting 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 Driver objects of the manufacturer-specific area

These are Oriental Motor's specific objects. The driver objects are the objects for driver axes 1 to axis 4. In this manual, the Sub-index is described as "*". Set the axis number (1 to 4) in the Sub-index of each object to access.
Refer to "Parameters" and "Address/code lists" in the **AZ** Series OPERATING MANUAL Function Edition for details about each object.

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting 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 °C]	INT16	RO	TxPDO	–	–		
407Dh	*1	Motor temperature [1=0.1 °C]	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 32-bit counter	INT32	RO	TxPDO	–	–		
4091h	*1	Command position 32-bit 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 supply 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	Setting 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 batch 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		
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: Alpha 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

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
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
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	○	5,000	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) Return-to-home mode	U8	RW	No	○	1	0: 2 sensors 1: 3 sensors 2: One-way rotation 3: Push-motion	B
4161h	*1	(HOME) Return-to-home starting direction	U8	RW	No	○	1	0: Negative side 1: Positive side	B
4163h	*1	(HOME) Return-to-home starting speed [Hz]	INT32	RW	No	○	5,000	1 to 4,000,000	B
4166h	*1	(HOME) Return-to-home SLIT detection	U8	RW	No	○	0	0: Disable 1: Enable	B
4167h	*1	(HOME) Return-to-home TIM/ ZSG signal detection	U8	RW	No	○	0	0: Disable 1: TIM 2: ZSG	B
4168h	*1	(HOME) Return-to-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 return-to-home [step]	INT32	RW	No	○	5,000	0 to 8,388,607	B
416Ah	*1	(HOME) Operating amount in uni-directional return-to-home [step]	INT32	RW	No	○	5,000		
416Bh	*1	(HOME) Operating current for push-motion return-to-home [1=0.1 %]	INT16	RW	No	○	1,000	0 to 1,000	B
416Ch	*1	(HOME) Backward steps after first entry in push-motion return-to-home [step]	INT32	RW	No	○	0	0 to 8,388,607	B
416Dh	*1	(HOME) Pushing time in push-motion return-to-home [ms]	U16	RW	No	○	200	1 to 65,535	B
416Eh	*1	(HOME) Backward steps in push-motion return-to-home [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
4187h	*1	Other axis alarm	U8	RW	No	○	0	0: Disable 1: Enable	
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

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
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	0: Disable 1 to 2,147,483,647	A
41B1h	*1	Cumulative load 0 information (INFO-CULD0)	INT32	RW	RxPDO	○	0	0 to 2,147,483,647	A
41B2h	*1	Cumulative load 1 information (INFO-CULD1)	INT32	RW	RxPDO	○	0	0 to 2,147,483,647	A
41B3h	*1	Cumulative load value auto clear	U8	RW	No	○	1	0: Does not clear 1: Clear	A
41B4h	*1	Cumulative load value count divisor	U16	RW	No	○	1	1 to 32,767	A
41BCh	*1	INFO-USRIO output selection	U8	RW	No	○	128	Output signal list⇨p.94	A
41BDh	*1	INFO-USRIO output inversion	U8	RW	No	○	0	0: Non invert 1: Invert	A
41BEh	*1	Information LED condition	U8	RW	No	○	1	0: Disable (LED does not blink) 1: Enable (LED blinks)	A
41BFh	*1	Information auto clear	U8	RW	No	○	1	0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically)	A
41C2h	*1	Motor rotation direction	U8	RW	No	○	1	0: Positive side=Counterclockwise 1: Positive side=Clockwise	C
41C3h	*1	Software overtravel	INT8	RW	No	○	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	○	0	−2,147,483,648 to 2,147,483,647	A
41C7h	*1	Wrap (RND) setting	U8	RW	No	○	1	0: Disable 1: Enable	C
41C9h	*1	Initial coordinate generation & wrap setting range [1=0.1 rev]	INT32	RW	No	○	10	5 to 655,360	C
41CBh	*1	Initial coordinate generation & wrap range offset ratio [1=0.01 %]	U16	RW	No	○	5,000	0 to 10,000	C
41CCh	*1	Initial coordinate generation & wrap range offset value [step]	INT32	RW	No	○	0	−536,870,912 to 536,870,911	C
41CDh	*1	The number of the RND-ZERO output in wrap range	INT32	RW	No	○	1	1 to 536,870,911	C
41FAh	*1	Main power mode	INT8	RW	No	○	−1	−1: Automatic discrimination 0: 24 VDC 1: 48 VDC	D
41FFh	*1	Driver simulation mode	U8	RW	No	○	0	0: The motor is actually used 1: Virtual motor (when ABZO not connected = no ABZO information) 2: Virtual motor (when ABZO not connected = 1800 rev wrap enable) 3: Virtual motor (when ABZO not connected = 900 rev wrap enable) *3	D
44B0h	*1	Touch probe 1 latch position	U8	RW	No	○	0	0: Latches the feedback position 1: Latches the command position	A
44B1h	*1	Touch probe 2 latch position	U8	RW	No	○	0		
44B2h	*1	Touch probe 1 TIM/ZSG signal select	U8	RW	No	○	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	○	0		

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
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	–	–		
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 manufacturer software version	U16	RO	No	–	–	–	–
4700h	*1	STOP input action	INT8	RW	No	○	3	0: Immediate stop 3: Deceleration stop	A
4701h	*1	FW-LS/RV-LS input action	INT8	RW	No	○	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	○	0	0: Immediate stop 1: Deceleration stop	A
4704h	*1	IN-POS positioning completion signal offset [1=0.1°]	INT16	RW	No	○	0	–18 to 18	A
4707h	*1	ZSG signal width [1=0.1°]	U16	RW	No	○	18	1 to 1,800	A
4708h	*1	RND-ZERO signal width [step]	U16	RW	No	○	10	1 to 10,000	A
4709h	*1	RND-ZERO output data selection	U8	RW	No	○	0	0: Based on feedback position 1: Based on command position	A
470Ah	*1	MOVE minimum ON time [ms]	U8	RW	No	○	0	0 to 255	A
470Dh	*1	CRNT-LMT operating current limit value [1=0.1 %]	INT16	RW	No	○	500	0 to 1,000	A
470Eh	*1	SPD-LMT speed limit type selection	INT8	RW	No	○	0	0: Ratio 1: Value	A
470Fh	*1	SPD-LMT speed limit ratio [%]	INT8	RW	No	○	50	1 to 100	A
4710h	*1	SPD-LMT speed limit value [Hz]	INT32	RW	No	○	10,000	1 to 4,000,000	A

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
4718h	*1	VA mode selection	U8	RW	No	○	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	○	30	1 to 200	B
4740h	*1	AREA0 positive direction position/offset [step]	INT32	RW	No	○	0	−2,147,483,648 to 2,147,483,647	A
4741h	*1	AREA0 negative direction position/detection range [step]	INT32	RW	No	○	0		
4742h	*1	AREA1 positive direction position/offset [step]	INT32	RW	No	○	0		
4743h	*1	AREA1 negative direction position/detection range [step]	INT32	RW	No	○	0		
4744h	*1	AREA2 positive direction position/offset [step]	INT32	RW	No	○	0		
4745h	*1	AREA2 negative direction position/detection range [step]	INT32	RW	No	○	0		
4746h	*1	AREA3 positive direction position/offset [step]	INT32	RW	No	○	0		
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 feedback 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		

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
47A0h	*1	INFO action (Assigned I/O status information (INFO-USRIO))	U8	RW	No	○	1	0: No Info reflect: Only the bit output is ON. 1: Info reflect: The bit output and the INFO output are ON and the LED blinks.	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		
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		
47B0h	*1	INFO action (Forward operation prohibition information (INFO-FW-OT))	U8	RW	No	○	1		
47B1h	*1	INFO action (Reverse operation prohibition 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: Prioritize ABZO setting 1: Manual setting	D
47F1h	*1	Gear ratio setting	INT16	RW	No	○	0	0: Prioritize ABZO setting 1 to 32,767: Gear ratio	C
47F2h	*1	Initial coordinate generation & wrap coordinate setting	U8	RW	No	○	0	0: Prioritize ABZO setting 1: Manual setting	D
47F3h	*1	Mechanism limit parameter setting	U8	RW	No	○	0	0: Follow ABZO setting 1: Disable	D
47F4h	*1	Mechanism protection parameter setting	U8	RW	No	○	0	0: Follow ABZO setting 1: Disable	D
47F5h	*1	JOG/HOME/ZHOME operation setting	U8	RW	No	○	0	0: Prioritize ABZO setting 1: Manual setting	D

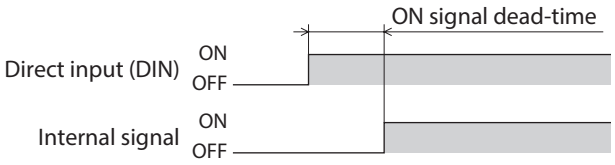
Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
4840h	*1	DIN0 input function	U8	RW	No	○	28	Input signal list⇨p.93	C
4841h	*1	DIN1 input function	U8	RW	No	○	29		
4842h	*1	DIN2 input function	U8	RW	No	○	30		
4843h	*1	DIN3 input function	U8	RW	No	○	1		
4850h	*1	DIN0 inverting mode	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.94	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.93	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.94	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		
48B0h	*1	DOUT0 composite logical combination	U8	RW	No	○	1	0: AND 1: OR	C
48B1h	*1	DOUT1 composite logical combination	U8	RW	No	○	1		
48B2h	*1	DOUT2 composite logical combination	U8	RW	No	○	1		
48C0h	*1	DIN0 ON signal dead-time [ms]	U8	RW	No	○	0	0 to 250	C
48C1h	*1	DIN1 ON signal dead-time [ms]	U8	RW	No	○	0		
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	0: Disable 1: Enable	C
48D1h	*1	DIN1 1 shot signal	U8	RW	No	○	0		
48D2h	*1	DIN2 1 shot signal	U8	RW	No	○	0		
48D3h	*1	DIN3 1 shot signal	U8	RW	No	○	0		
48E0h	*1	DOUT0 OFF delay time [ms]	U8	RW	No	○	0	0 to 250	C
48E1h	*1	DOUT1 OFF delay time [ms]	U8	RW	No	○	0		
48E2h	*1	DOUT2 OFF delay time [ms]	U8	RW	No	○	0		
4900h	*1	R-IN0 input function	U8	RW	No	○	0	Input signal list⇨p.93	C
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		
4904h	*1	R-IN4 input function	U8	RW	No	○	0		
4905h	*1	R-IN5 input function	U8	RW	No	○	0	Input signal list⇨p.93	C
4906h	*1	R-IN6 input function	U8	RW	No	○	0		
4907h	*1	R-IN7 input function	U8	RW	No	○	0		

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
4910h	*1	R-OUT0 output function	U8	RW	No	○	28	Output signal list⇨p.94	C
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		
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		
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	0 to 250	C
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		
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		
4940h	*1	Virtual input (VIR-IN0) function	U8	RW	No	○	0	Input signal list⇨p.93	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.94	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		

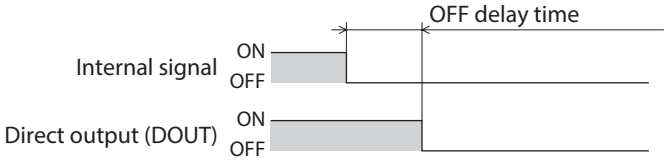
Index	Sub	Name	Type	Access	PDO	Save	Initial value	Setting range	Update
494Ch	*1	Virtual input (VIR-IN0) ON signal dead-time [ms]	U8	RW	No	○	0	0 to 250	C
494Dh	*1	Virtual input (VIR-IN1) ON signal dead-time [ms]	U8	RW	No	○	0		
494Eh	*1	Virtual input (VIR-IN2) ON signal dead-time [ms]	U8	RW	No	○	0		
494Fh	*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.94	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.94	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		
49FAh	*1	Current setting during motor standstill at T-MODE	INT32	RW	No	○	0	0: Stop current 1: Operating current	A

*1 Set an axis number (1 to 4) in Sub-index due to the driver objects of the manufacturer-specific area.
*2 In the Profile position mode, it will be updated when operation is started.
*3 It is effective for drivers of version 2.00 or later. If it is set in a driver older than version 2.00, the operation is the same as "1: Virtual motor (when ABZO not connected = no ABZO information)."
The version of the driver can be checked using the unit information monitor of the **MEXE02** software.

■ Reference example of ON signal dead-time [ms]



■ Reference example of OFF output-delay time [ms]



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