



αSTEP

AZ Series DC power input

Multi-Axis Driver

EtherCAT Drive Profile Compatible

USER MANUAL

   MSIP-REM-OMC-093

Hardware Edition

Communication
Specifications Edition

Operation Edition

Object List

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

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1 Hardware Edition

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

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1 Introduction

■ Before use

Only qualified personnel of electrical and mechanical engineering should work with the product.

Use the product correctly after thoroughly reading the section "2 Safety precautions" on p.9. In addition, be sure to observe the contents described in warning, caution, and note in this manual.

The product described in this manual has been designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose. Oriental Motor Co., Ltd. is not responsible for any damage caused through failure to observe this warning.

■ Operating manuals for the product

Operating manuals for this product are listed below. The USER MANUAL and AZ Series Function Edition do not come with the product. After reading the following manuals, keep them in a convenient place so that you can reference them at any time.

| Type of operating manual | Description of operating manual |
|---|--|
| AZ Series DC power input Multi-Axis Driver EtherCAT Drive Profile Compatible OPERATING MANUAL Driver (Included with product) | This manual explains the names of parts as well as the installation/connection method and others for the driver. |
| AZ Series DC power input Multi-Axis Driver EtherCAT Drive Profile Compatible USER MANUAL (this document) | This manual explains the functions, installation and connection methods, specifications of EtherCAT communication, troubleshooting, and others for the driver. |
| AZ Series/Motorized actuator equipped the AZ Series Function Edition | This manual explains detailed operations, functions and others of the AZ Series . |
| APPENDIX UL Standards for AZ Series DC power input type (Included with products conform to the UL Standards) | This appendix includes information required for certification of the UL Standards. |

For the functions, installation methods of the motors and motorized actuators, refer to the operating manual included with each product.



- This manual describes contents about the drivers which version is 2.00 and later. Note that some functions described in this manual cannot be used for the drivers older than the version 2.00. The version of the driver can be checked using the unit information monitor of the support software **MEXE02**. (⇒ p.189)
- In this manual, the specific contents of the multi-axis driver are described by partially changing the contents of the AZ Series Function Edition. Note about the operating manual referenced. Refer to the AZ Series Function Edition for the following items.
 - LED of the driver axis
 - Driver objects not described in this manual
 - Details about driver objects of manufacturer-specific area

■ Notation on this manual

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



The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.



The items under this heading contain related information and contents to gain a further understanding of the text in this manual.

- **About notation of objects**

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

- **Overview of the product**

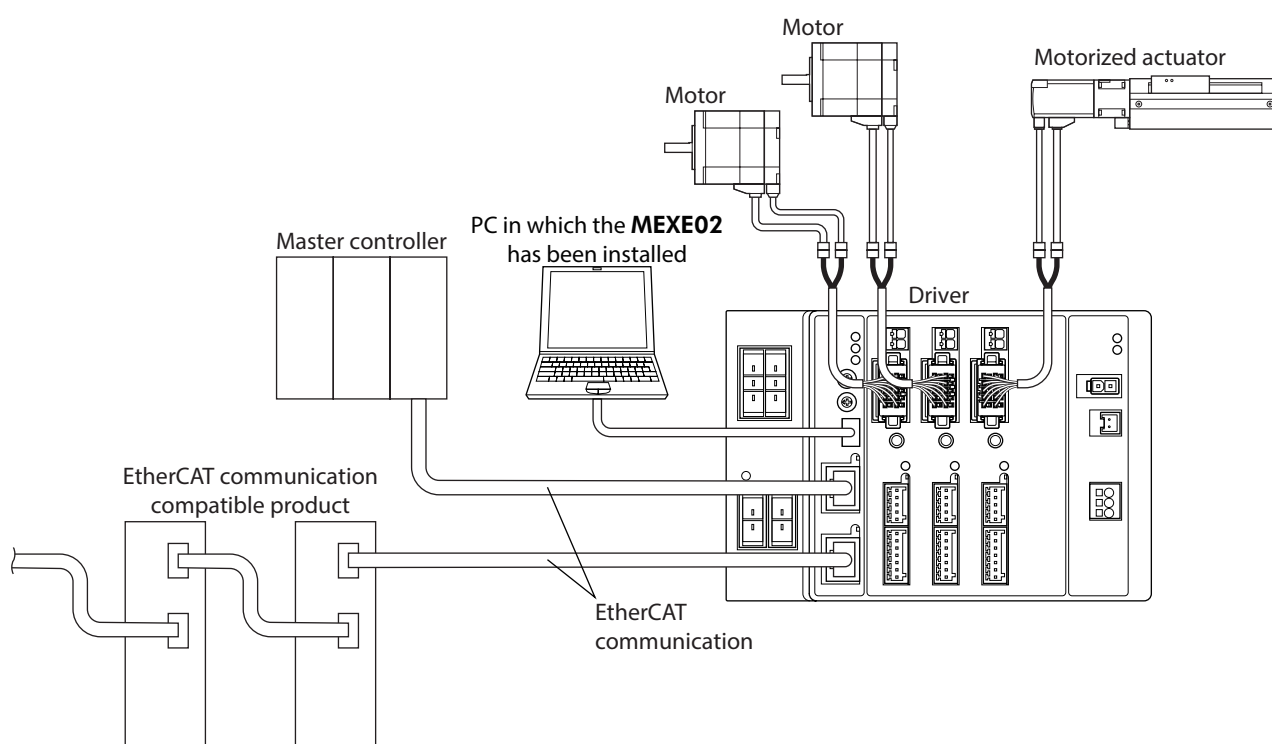
The **AZ** Series DC power input multi-axis driver is the dedicated driver for the **AZ** Series DC power input types.
Since this product is compatible with the EtherCAT drive profile, it can directly be connected to the network without using a converter (gateway).

Motors of up to 4 units can be connected per driver.

- **System configuration**

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

Be sure to create the recovery data file initially when a motorized actuator is used. Refer to p.172 for how to create.



■ General specifications

| | | |
|---|---|---|
| Degree of protection | IP10 | |
| Operation environment | Ambient temperature | 0 to +50 °C (+32 to +122 °F) (non-freezing) |
| | Humidity | 85% or less (non-condensing) |
| | Altitude | Up to 1,000 m (3,300 ft.) above sea level |
| | Surrounding atmosphere | No corrosive gas, dust, water or oil |
| Storage environment Shipping environment | Ambient temperature | -25 to +70 °C (-13 to +158 °F) (non-freezing) |
| | Humidity | 85% or less (non-condensing) |
| | Altitude | Up to 3,000 m (10,000 ft.) above sea level |
| | Surrounding atmosphere | No corrosive gas, dust, water or oil |
| Insulation resistance | 100 MΩ or more when 500 VDC megger is applied between the following places: • FG terminal - Power supply terminals | |
| Dielectric strength | Sufficient to withstand 1 kVAC at 50/60 Hz applied between the following places for 1 minute: • FG terminal - Power supply terminals Leak current 10 mA or less | |



■ Providing the ESI File

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



2 Safety precautions




The precautions described below are intended to prevent danger or injury to the user and other personnel through safe, correct use of the product. Use the product only after carefully reading and fully understanding these instructions.




Description of signs

| | |
|--|--|
|  WARNING | Handling the product without observing the instructions that accompany a "Warning" symbol may result in serious injury or death. |
|  CAUTION | Handling the product without observing the instructions that accompany a "Caution" symbol may result in injury or property damage. |

Description of graphic symbols

| | |
|---|--|
|  | Indicates "prohibited" actions that must not be performed. |
|  | Indicates "compulsory" actions that must be performed. |

|  WARNING | |
|--|---|
|  | <ul style="list-style-type: none"> Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. This may cause fire or injury. Do not transport, install the product, perform connections or inspections when the power is on. This may cause electric shock. Do not touch the driver while the power is on. This may cause fire or electric shock. Do not forcibly bend, pull or pinch the cable. This may cause fire or electric shock. Do not remove the motor excitation during operation. This may cause injury or damage to equipment. Do not disassemble or modify the product. This may cause injury or damage to equipment. |
|  | <ul style="list-style-type: none"> Assign qualified personnel to the task of installing, wiring, operating/controlling, inspecting and troubleshooting the product. Failure to do so may result in fire, electric shock, injury or damage to equipment. If this product is used in a vertical application, be sure to provide a measure for the position retention of moving parts. Failure to do so may result in injury or damage to equipment. When the driver generates an alarm (any of the driver's protective functions is triggered), first remove the cause and then clear the protective function. Continuing the operation without removing the cause of the problem may cause malfunction of the motor and driver, leading to injury or damage to equipment. Install the product in an enclosure. Failure to do so may result in electric shock or injury. Keep the driver's input-power voltage within the specified range. Failure to do so may result in fire or electric shock. Connect the cables securely according to the wiring diagram. Failure to do so may result in fire or electric shock. Turn off the main power supply and control power supply of the driver in the event of a power failure. Failure to do so may result in injury or damage to equipment. |

|  CAUTION | |
|--|--|
|  | <ul style="list-style-type: none"> • Do not use the product beyond its specifications. This may cause electric shock, injury or damage to equipment. • Keep your fingers and objects out of the openings in the product. Failure to do so may result in fire or injury. • Do not touch the product during operation or immediately after stopping. This may cause a skin burn(s). • Keep the area around the product free of combustible materials. Failure to do so may result in fire or a skin burn(s). • Do not forcibly bend or pull the cable that was connected to the driver. This may cause damage. • Do not touch the terminals while conducting the insulation resistance measurement or dielectric strength test. This may cause electric shock. • Leave nothing around the product that would obstruct ventilation. Failure to do so may result in damage to equipment. |
|  | <ul style="list-style-type: none"> • Use a motor and driver only in the specified combination. Failure to do so may result in fire. • Take measures against static electricity when operating the switches of the driver. Failure to do so may result in the driver malfunction or damage to equipment. • For the main power supply and control power supply of the driver, use a DC power supply with reinforced insulation on its primary and secondary sides. Failure to do so may result in electric shock. • Before supplying main power supply and control power supply to the driver, turn all input signals to the driver to OFF. Failure to do so may result in injury or damage to equipment. • Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury. • Before you rotate the motor output shaft by hand (manual positioning etc.), check the motor output shaft is in a state of rotating manually. Failure to do so may result in injury. • When an abnormal condition has occurred, immediately stop operation and turn off the main power supply and control power supply of the driver. Failure to do so may result in fire, electric shock or injury. • Dispose the product correctly in accordance with laws and regulations, or instructions of local governments. |

3 Precautions for use

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

- **Use this driver in combination with the AZ Series DC power input type motor.**

Combining motors other than the **AZ** Series DC power input types causes an alarm of the motor combination error. For the products that can be combined, refer to p.13.

- **Always use the cable (accessory) to connect the motor and driver.**

To connect the motor and the driver, an accessory cable is needed. See p.37 for accessory.

- **When conducting the insulation resistance measurement and the dielectric strength test, be sure to separate the connection between the motor and the driver.**

Conducting the insulation resistance measurement or dielectric strength test with the motor and driver connected may result in damage to the equipment.

- **Noise measures**

Refer to "7-9 Noise measures" on p.31.

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

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

- **If vertical drive (gravitational operation) such as elevator applications is performed or if sudden start-stop operation of a large inertial load is repeated frequently, connect an accessory regeneration resistor.**

The overvoltage alarm may generate depending on the operating condition of the motor. When the overvoltage alarm has generated, review the operating conditions or connect an accessory regeneration resistor. Refer to p.30 for connection method. See p.38 for accessory.



It is recommended to use a regeneration resistor since an alarm tends to generate when 48 VDC is used.

- **If an alarm of the main circuit overheat is generated, use an accessory fan.**

An alarm of the main circuit overheat may be generated depending on the operating condition of the motor. When the main circuit overheat alarm was generated, review the operating conditions or connect an accessory fan. Refer to p.30 for connection method. See p.38 for accessory.

4 Regulations and standards

4-1 UL Standards

Check the "APPENDIX UL Standards for **AZ** Series DC power input type" for recognition information about UL Standards.

4-2 EU Directive

This product is affixed the CE Marking under the EMC Directive.

■ CE Marking

● Low Voltage Directive

The input power supply voltage of this product is 24 VDC/48 VDC. Therefore this product is not subject to the Low Voltage Directive, but install and connect it as follows.

- This product is designed and manufactured to be incorporated in equipment. Install the product in an enclosure.
- For the driver power supply, use a DC power supply with reinforced insulation on its primary and secondary sides.

● EMC Directive

This product is conducted EMC testing under the conditions specified in "Example of motor and driver installation and wiring" on p.33. The conformance of your mechanical equipment with the EMC Directive will vary depending on such factors as the configuration, wiring, and layout for other control system devices and electrical parts used with this product. It therefore must be verified through conducting EMC measures in a state where all parts including this product have been installed in the equipment.

Applicable Standards

| | |
|-----|---|
| EMI | EN 55011 Group1 Class A EN 61000-6-4 |
| EMS | EN 61000-6-2 |

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.

4-3 Republic of Korea, Radio Waves Act

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

4-4 RoHS Directive

The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).

5 Preparation

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

5-1 Product type

There are the following 3 types in the **AZ** Series DC power input multi-axis drivers. The model name varies with the number of driver axes.

| Model | Number of axes | Axes used |
|------------------|----------------|----------------|
| AZD2A-KED | 2 axes | AXIS1, AXIS2 |
| AZD3A-KED | 3 axes | AXIS1 to AXIS3 |
| AZD4A-KED | 4 axes | AXIS1 to AXIS4 |

5-2 Checking the product

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

| Included items | Model | | |
|-------------------------|------------------|------------------|------------------|
| | AZD2A-KED | AZD3A-KED | AZD4A-KED |
| Driver | 1 unit | 1 unit | 1 unit |
| CN1 connector (3 pins) | 2 pcs. | 2 pcs. | 2 pcs. |
| CN2 connector (2 pins) | 2 pcs. | 2 pcs. | 2 pcs. |
| CN1, CN2 contact | 10 pcs. | 10 pcs. | 10 pcs. |
| CN9 connector (5 pins) | 2 pcs. | 3 pcs. | 4 pcs. |
| CN10 connector (7 pins) | 2 pcs. | 3 pcs. | 4 pcs. |
| OPERATING MANUAL Driver | 1 copy | 1 copy | 1 copy |

5-3 Products for possible combinations

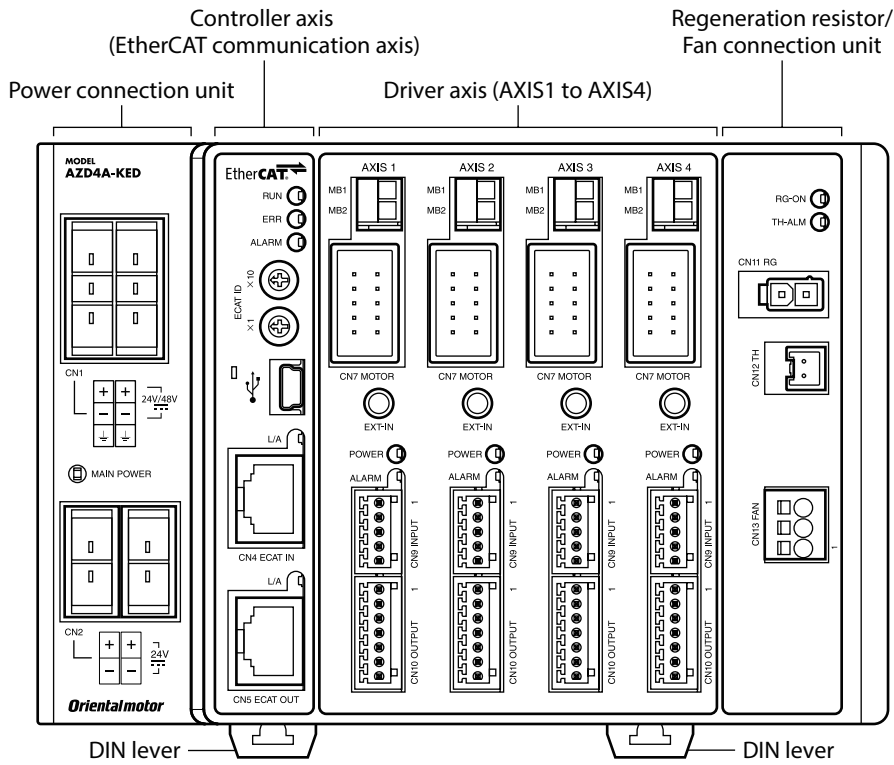
Products with which the driver can be combined are listed below. Check the model name with the nameplate.

| Power supply type | Type | Applicable Series | Model |
|-------------------|--------------------|--|--|
| DC input | Stepping motor | AZ Series | AZM14 *2, AZM15 *2 AZM24 *2, AZM26 *2 AZM46, AZM48 AZM66, AZM69 |
| | | EAS Series *1 EAC Series *1 | AZM24 *2, AZM46, AZM66 |
| | Motorized actuator | EZS Series *1 | AZM46 AZM66 |
| | | DR Series DRS2 Series | DR28 *2, DRSM42, DRSM60 |
| | | DGII Series | DGM60 *2, DGM85, DGM130 |

*1 For these motorized actuators, check the motor model name.

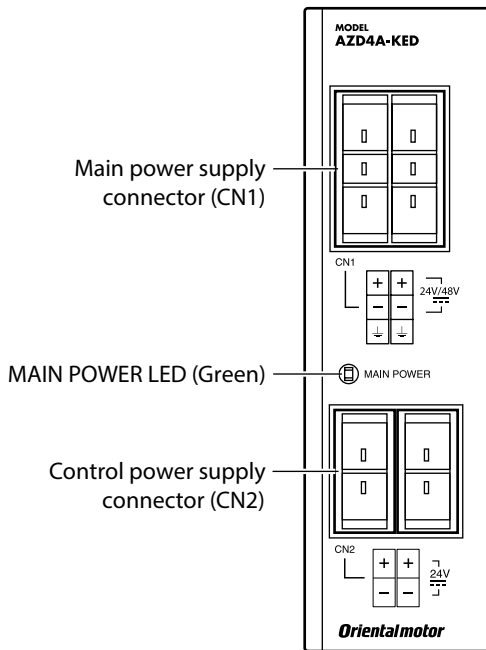
*2 The main power supply of these products are 24 VDC specification. When a product of 24 VDC specification is connected to any of the driver axes, use 24 VDC for the main power supply of the driver. If 48 VDC is used, an alarm of the motor combination error will be generated.

5-4 Names and functions of parts

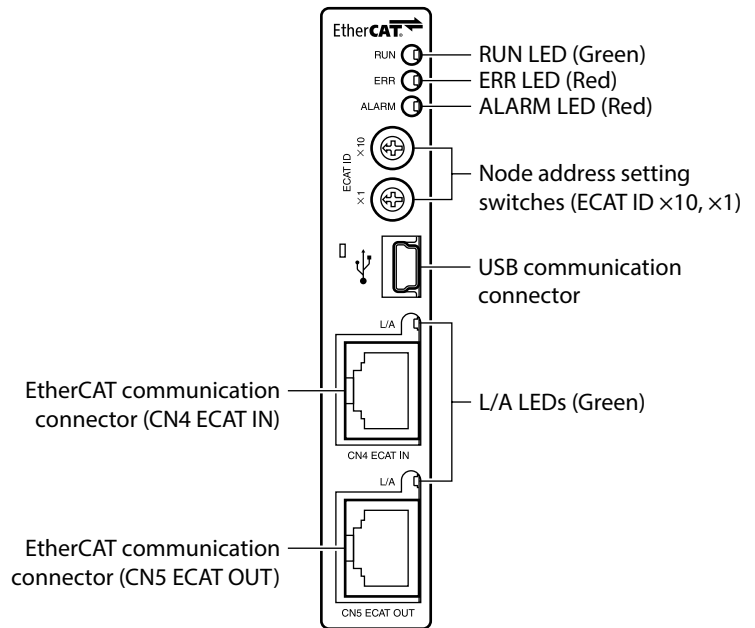


1 Hardware Edition

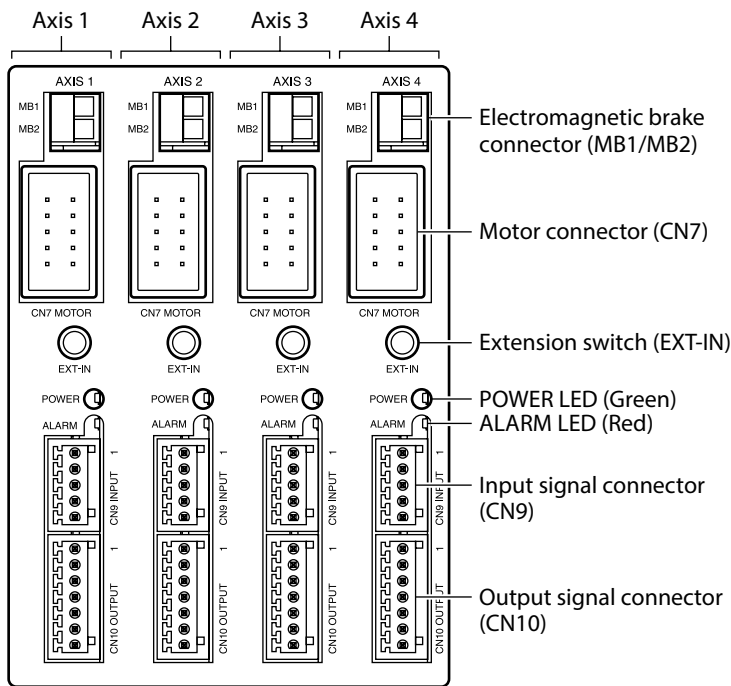
● Power connection unit



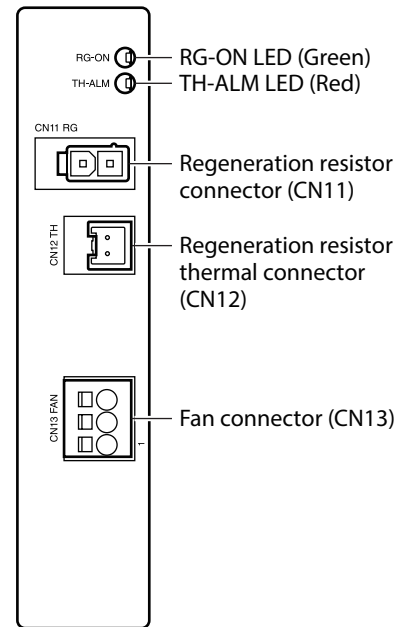
● Controller axis (EtherCAT communication axis)




● Driver axis



● Regeneration resistor • Fan connection unit



* The sign is common to each driver axis.

| Arrangement | Type | Name | Sign | Explanation |
|---|--------------|--|---|--|
| Power connection unit | LED | MAIN POWER LED (Green) | MAIN POWER | This LED is lit while the main power is input. |
| | Connector | Main power supply connector | CN1 | Connects a main power supply. (24 VDC/48 VDC) |
| | | Control power supply connector | CN2 | Connects a control power supply. (24 VDC) |
| Controller axis (EtherCAT communication axis) | LED | RUN LED (Green) | RUN | This LED indicates the communication status of EtherCAT communication. |
| | | ERR LED (Red) | ERR | This LED blinks when an error occurred via EtherCAT communication. |
| | | ALARM LED (Red) | ALARM | This LED blinks or is lit when an alarm generated in the controller axis. |
| | | L/A LEDs (Green) | L/A | These LEDs indicate the LINK/ACT status of EtherCAT communication. |
| | Switch | Node address setting switches | ECAT ID ×10 ECAT ID ×1 | Sets the node address of the driver. Factory setting: 0 (×10: 0, ×1: 0) |
| | Connector | USB communication connector |  | Using a USB cable, connects a PC in which the MEXE02 has been installed. (USB2.0 mini-B port) |
| EtherCAT communication connector | | CN4 ECAT IN | Connects with the upper EtherCAT communication compatible product. | |
| | CN5 ECAT OUT | Connects with the EtherCAT communication compatible product of the following address number. | | |

| Arrangement | Type | Name | Sign | Explanation |
|---|-------------------------|---|------------------------------------|---|
| Driver axis | LED | POWER LED (Green) | POWER | This LED is lit while the internal control power supply is normally operated. |
| | | ALARM LED (Red) | ALARM | This LED blinks when an alarm generated in the driver axis. |
| | Switch | Extension switch | EXT-IN | This switch is used after assigning input signals. The assigned input signal can be executed just pressing the extension switch (EXT-IN). |
| | Connector | Electromagnetic brake connector | MB1/MB2 | Connects the lead wires from the electromagnetic brake. MB1: Electromagnetic brake – (Black) MB2: Electromagnetic brake + (White) |
| | | Motor connector | CN7 MOTOR | Connects the motor and encoder. |
| | | Input signal connector | CN9 INPUT | Connects the input signals cable. |
| | Output signal connector | CN10 OUTPUT | Connects the output signals cable. | |
| Regeneration resistor/ Fan connection unit | LED | RG-ON LED (Green) | RG-ON | This LED is lit in a regeneration state. |
| | | TH-ALM LED (Red) | TH-ALM | This LED is lit when the regeneration resistor is in an overheat state. |
| | Connector | Regeneration resistor connector | CN11 RG | Connects the accessory regeneration resistor. |
| | | Regeneration resistor thermal connector | CN12 TH | Connects the thermal signal of the accessory regeneration resistor. |
| | | Fan connector | CN13 FAN | Connects the accessory fan. |

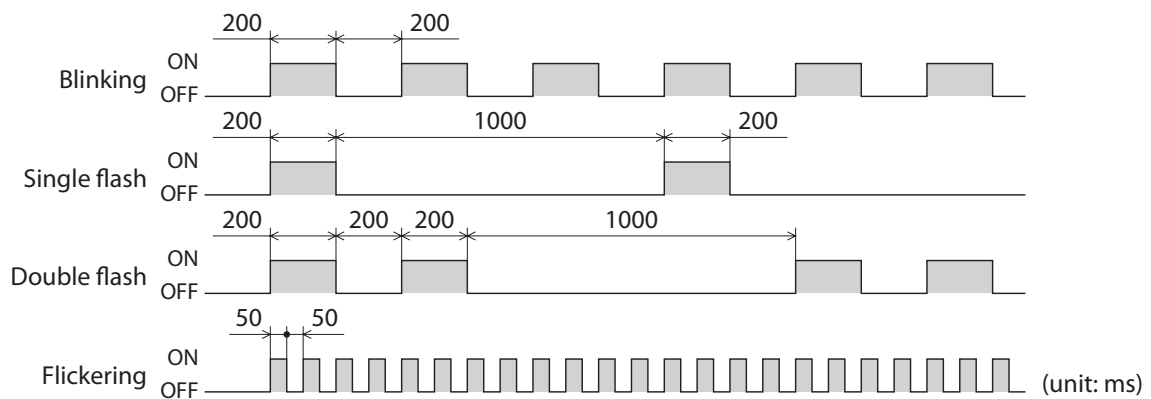


- The power GND of the CN1 and that of the CN2 on the power connection unit are common internally.
- For details about accessory, refer to p.38.

■ LED indicator of controller axis (EtherCAT communication axis)

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

* The timing to blink the LED is as follows.



■ LED indication of the driver axis

| POWER LED (Green) | ALARM LED (Red) | Driver status |
|--|-----------------|---|
| Lit | OFF | Control power supply ON. Under normal operation |
| Lit | Blink | Alarm present |
| At the same time, two times blinking | | <ul style="list-style-type: none"> • Information present • Remote operation is being executed with the MEXE02. |
| POWER LED Lit → ALARM LED Lit → Lit at the same time | | During simulation of the driver operation * |

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

6 Installation

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

6-1 Location for installation

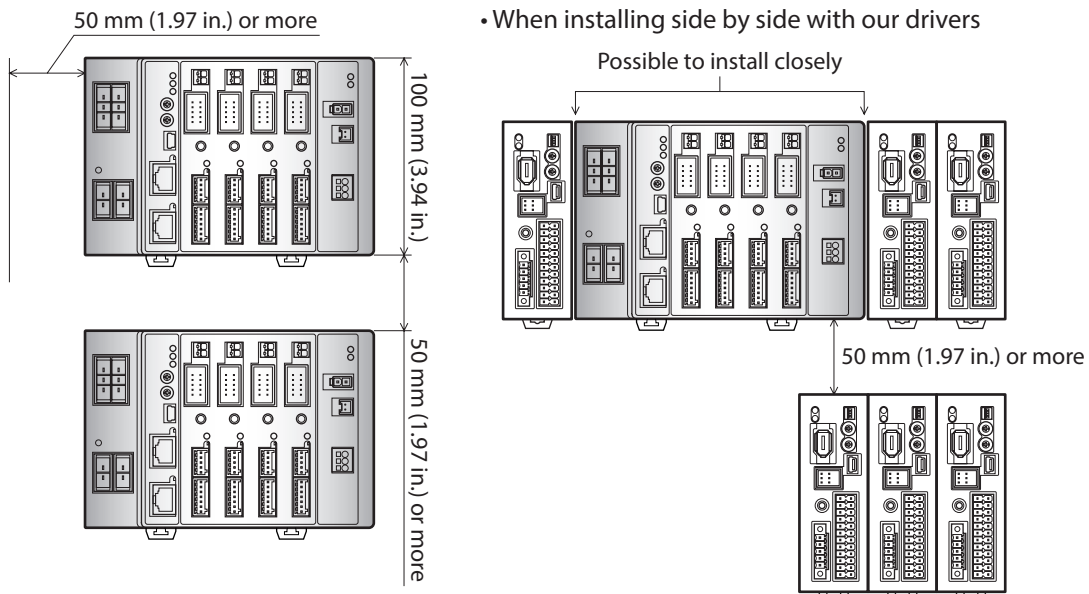
The driver has been designed and manufactured to be incorporated in equipment. Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature 0 to +50 °C (+32 to +122 °F) (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free of explosive atmosphere or 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
- 1,000 m (3,300 ft.) or lower above sea level

6-2 Installation method

To install the driver, there are two methods. One is installing to a DIN rail and the other is installing with screws. There must be a clearance of at least 50 mm (1.97 in.) in the horizontal and vertical directions, between the driver and enclosure or other equipment within the enclosure.

When installing side by side with our drivers, it is possible to install closely in the horizontal direction. Provide a minimum clearance of 50 mm (1.97 in.) in the vertical direction.

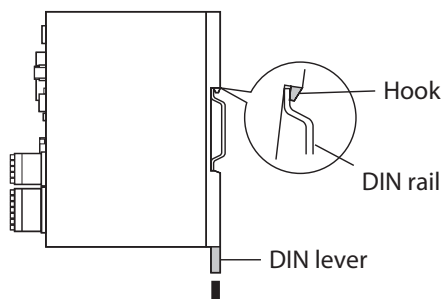


- Install the driver in an enclosure whose pollution degree is 2 or better environment, or whose degree of protection is IP54 minimum.
- Do not install any equipment that generates a large amount of heat or noise near the driver.
- Do not install the driver underneath the controller or other equipment vulnerable to heat.
- If the ambient temperature of the driver exceeds 50 °C (122 °F), improve the ventilation condition such as providing forced cooling with fans or creating spaces between the drivers.
- Install the driver vertically (in vertical position) in a condition where the motor connector (CN7) is faced up. If the driver is installed in the direction other than vertical position, its heat radiation effect will deteriorate.

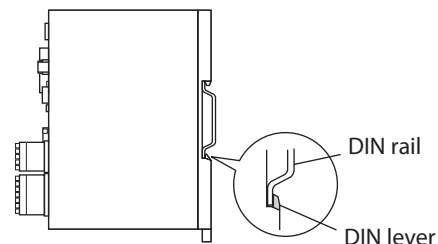
■ Mounting to DIN rail

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

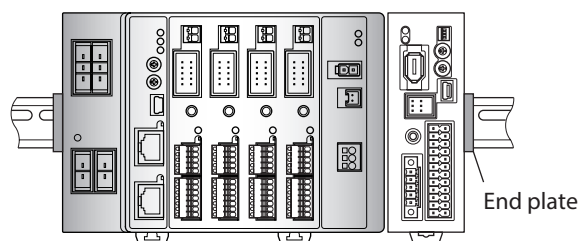
1. Pull down the DIN lever of the driver and lock it. Hang the hook at the rear to the DIN rail.



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

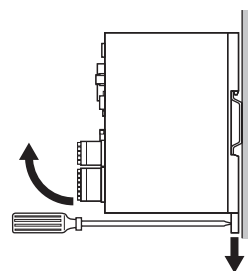


3. Secure both sides using end plates.



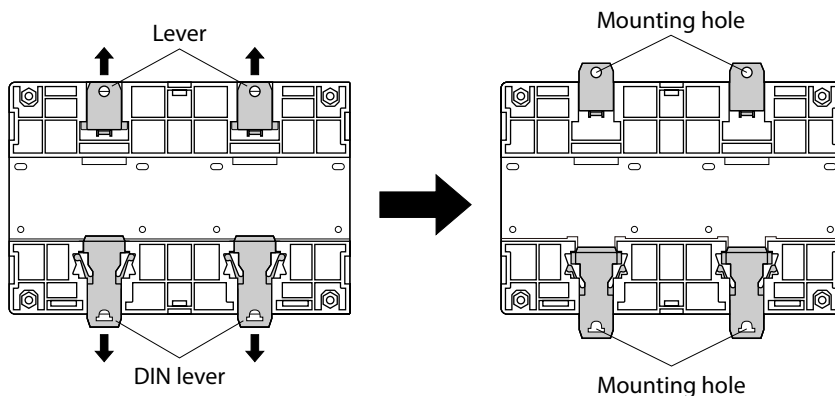
Removing from DIN rail

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



■ Installing with screws

1. Pull up and down the upper and lower levers on the rear side of the driver respectively until each lever clicks.
2. Secure four mounting holes with screws. Use screws and washers for mounting, which sizes are $\varnothing 10$ mm ($\varnothing 0.39$ in.) or less.
 - Screw size: M4 (not included)
 - Tightening torque: 0.7 N·m (99 oz-in)



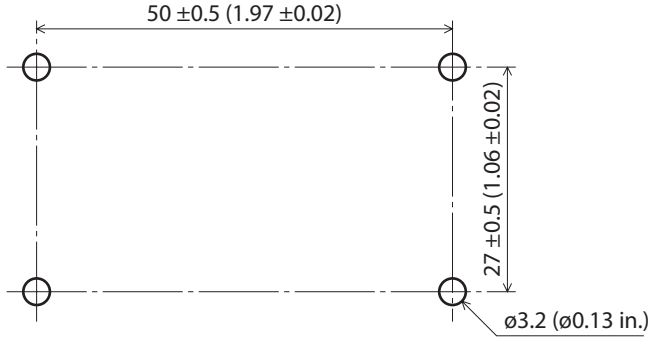
6-3 Installing the regeneration resistor (accessory)

Secure an accessory regeneration resistor on a mounting plate with screws. [Tightening torque: 0.5 N·m (71 oz-in)]
Use the mounting plate which heat dissipation capacity is equivalent to the level achieved with a plate. [made of aluminum, 180×150×2 mm (7.09×5.91×0.08 in.)]

Screw and washer are not included. They must be provided by the customer.

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

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

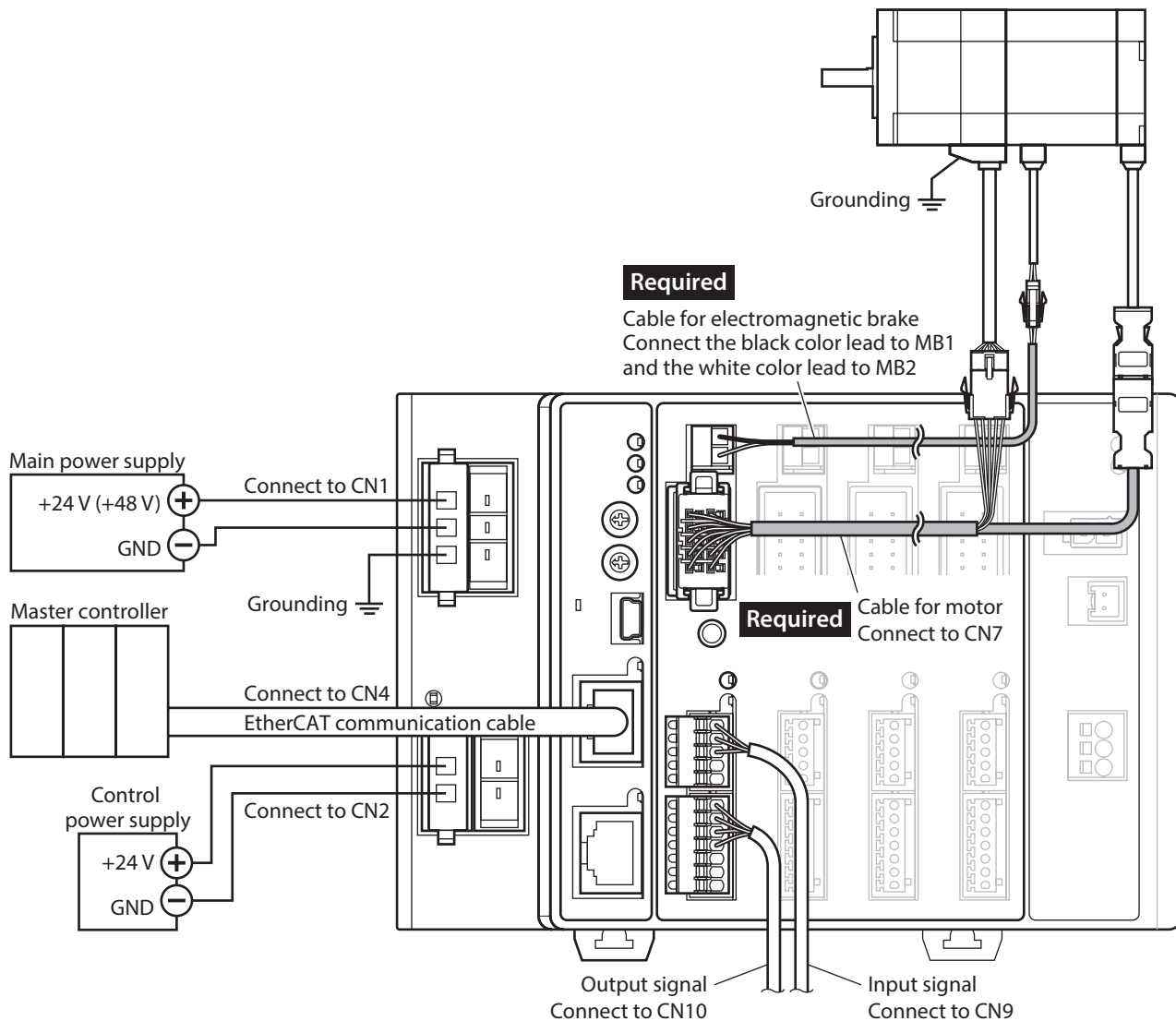


7 Connection

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

7-1 Connection example

The following figure shows models for the electromagnetic brake type.



Cables represented in gray color are required. Provide them separately.

The driver axes that can be used in each product are as follows.

| Model | Axes used |
|------------------|----------------|
| AZD2A-KED | AXIS1, AXIS2 |
| AZD3A-KED | AXIS1 to AXIS3 |
| AZD4A-KED | AXIS1 to AXIS4 |

Note

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

memo

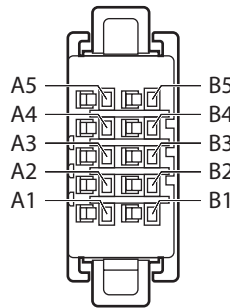
- When installing the motor on a moving part, use a flexible cable having excellent flex resistance.
- When unplugging the motor cable, do so while pressing the latches on the connector.
- It is recommended to separate the control power supply from the main power supply. Even if the main power supply is shut off by an emergency stop or others, the motor position (travel amount) or alarm can be checked if the control power supply is being supplied.

7-2 Connecting the motor

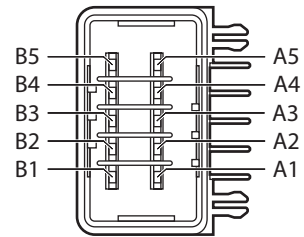
■ **Motor connector (CN7)**

| Pin No. | Color | Lead wire |
|---------|-----------------|------------------------------|
| A1 | Green (FG) | AWG22 (0.3 mm ²) |
| A2 | Brown | |
| A3 | Purple | |
| A4 | Black | |
| A5 | White | |
| B1 | Drain wire (SG) | AWG22 (0.3 mm ²) |
| B2 | Orange | |
| B3 | Blue | |
| B4 | Gray | |
| B5 | Red | |

• Motor side

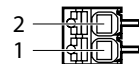


• Driver side



■ **Electromagnetic brake connector (MB1, MB2)**

| Pin No. | Name | Color | Description | Lead wire |
|---------|------|-------|------------------------------|-----------------------------|
| 1 | MB2 | White | Electromagnetic brake + side | AWG20 (0.5mm ²) |
| 2 | MB1 | Black | Electromagnetic brake – side | |



7-3 Applicable connector

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

* The supplied contacts are for the lead wires of AWG20 to AWG16 (0.5 to 1.25 mm²).
When the lead wires of AWG24 to AWG20 (0.2 to 0.5 mm²) are used, provide the following contact and designated crimp tool at customer side.

- Contact: BF3F-01GF-P2.0 (J.S.T. Mfg. Co., Ltd.)
- Designated crimping tool: YRF-881 (J.S.T. Mfg. Co., Ltd.)

7-4 Connecting the power supply and grounding

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

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

■ Selection of power supply

Use a power supply that the overcurrent protection does not activate in an inrush current of 1 ms or less.

Selection example of a power supply

| Power supply | Wiring length | Inrush current |
|---------------------------------|---|----------------------------|
| Main power supply 24 VDC/48 VDC | 1 m (3.3 ft.) [AWG16 (1.25 mm ²)] | Approximately 200 A 300 μs |
| Control power supply 24 VDC | 1 m (3.3 ft.) [AWG20 (0.5 mm ²)] | Approximately 70 A 200 μs |

■ Power supply current capacity for main power supply

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

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

| Type | Applicable Series | Model |
|--------------------|------------------------------|--|
| Stepping motor | AZ Series | AZM14, AZM15 AZM24, AZM26 |
| | EAS Series * EAC Series * | AZM24 |
| Motorized actuator | DR Series | DR28 |
| | DGII Series | DGM60 |

* For these motorized actuators, check the motor model name.



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

■ Power supply current capacity for control power supply

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

● Motor without an electromagnetic brake

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

● Motor with an electromagnetic brake

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

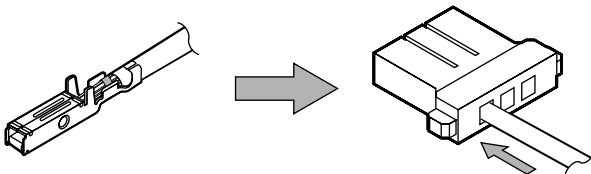
*1 It varies depending on the motor connected. The maximum value is described in the table above. The maximum value of the input current of the electromagnetic brake are as follows.

- **AZM46**: 0.08 A
- **AZM66, AZM69**: 0.25 A

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

■ Wiring method of connectors for CN1 and CN2

- Applicable lead wire For power supply: AWG24 to 16 (0.2 to 1.25 mm²)
For grounding: AWG18 to 16 (0.75 to 1.25 mm²)
 - Length of the insulation cover which can be peeled: 7 mm (0.28 in.)
1. Strip the insulation cover of the lead wire.
 2. Crimp the lead wires and contacts using the designated crimp tool.
 3. Insert the lead wires that have crimped contacts into the connector for CN1 and CN2.

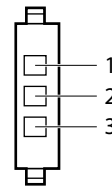


Two entries (connectors) are provided in the CN1 connector. If you connect the power supply of the other driver to the vacant connector on the multi-axis driver by making at transition-wiring (link wiring), the power can be supplied from the main power supply of the multi-axis driver. When you make transition-wiring (link wiring) of the power supply, use lead wires of AWG16 (1.25 mm²), and set the current that flows into the CN1 connector to 13 A or less.

■ Pin assignment

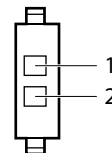
● CN1 connector (main power supply)

| Pin No. | Name | Description |
|---------|------|---|
| 1 | + | Main power supply input (24 VDC/48 VDC) |
| 2 | - | Power supply GND |
| 3 | ⏏ | Frame Ground |



● CN2 connector (control power supply)

| Pin No. | Name | Description |
|---------|------|-------------------------------------|
| 1 | + | Control power supply input (24 VDC) |
| 2 | - | Power supply GND |



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

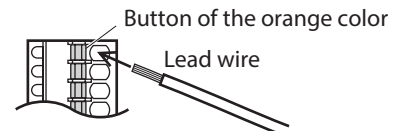
■ Grounding

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

7-5 Connecting the I/O signals

■ Wiring method of connectors for CN9 and CN10

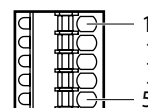
- Applicable lead wire: AWG26 to 20 (0.14 to 0.5 mm²)
 - Length of the insulation cover which can be peeled: 8 mm (0.31 in.)
1. Strip the insulation cover of the lead wire.
 2. Insert the lead wire while pushing the button of the orange color with a slotted screwdriver.
 3. After having inserted, release the button to secure the lead wire.



■ Pin assignment

● Input signal connector (CN9)

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

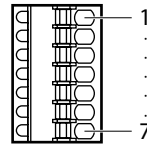


- Input voltage: 24 VDC±10%
- Internal resistor: 4.4 kΩ

* (): Initial value

● **Output signal connector (CN10)**

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



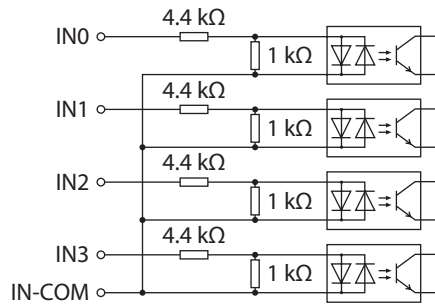
- Output voltage: 4.5 to 26.4 VDC
- Output current: 10 mA or less

* (): Initial value

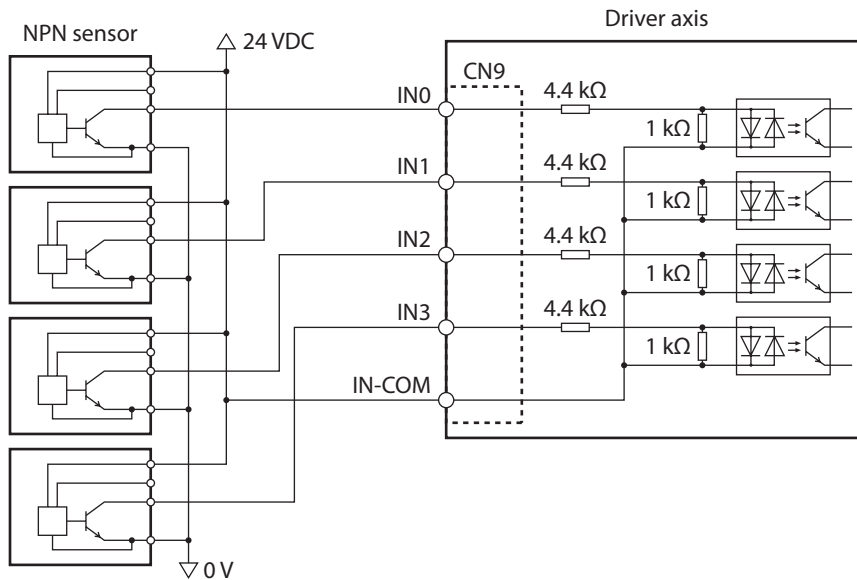
■ **Input signal**

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

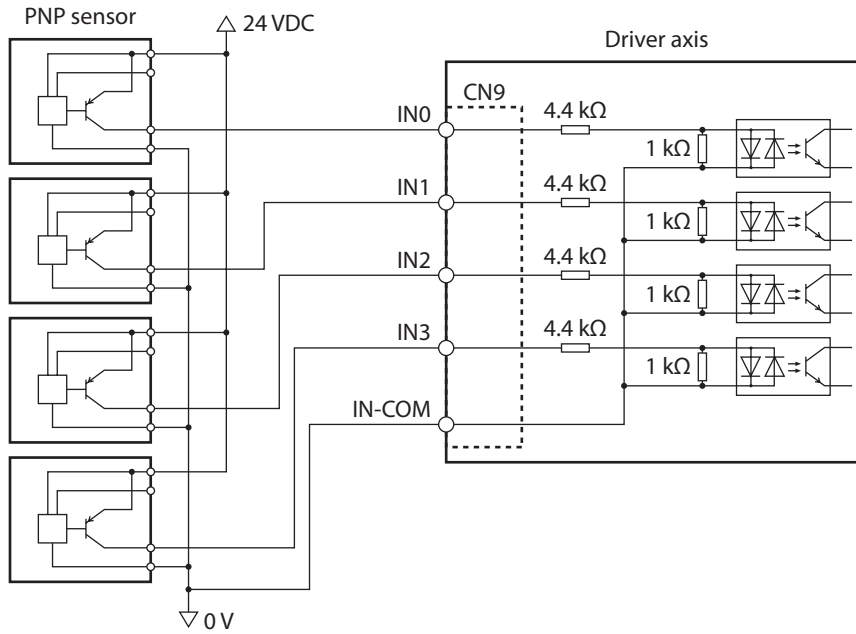
● **Internal input circuit**



● **Sensor connection example with a current sink output circuit**



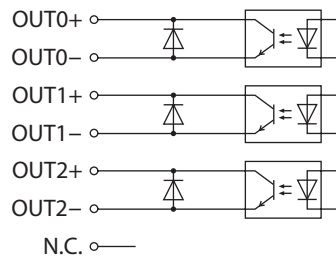
● **Sensor connection example with a current source output circuit**



■ **Output signal**

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

● **Internal output circuit**

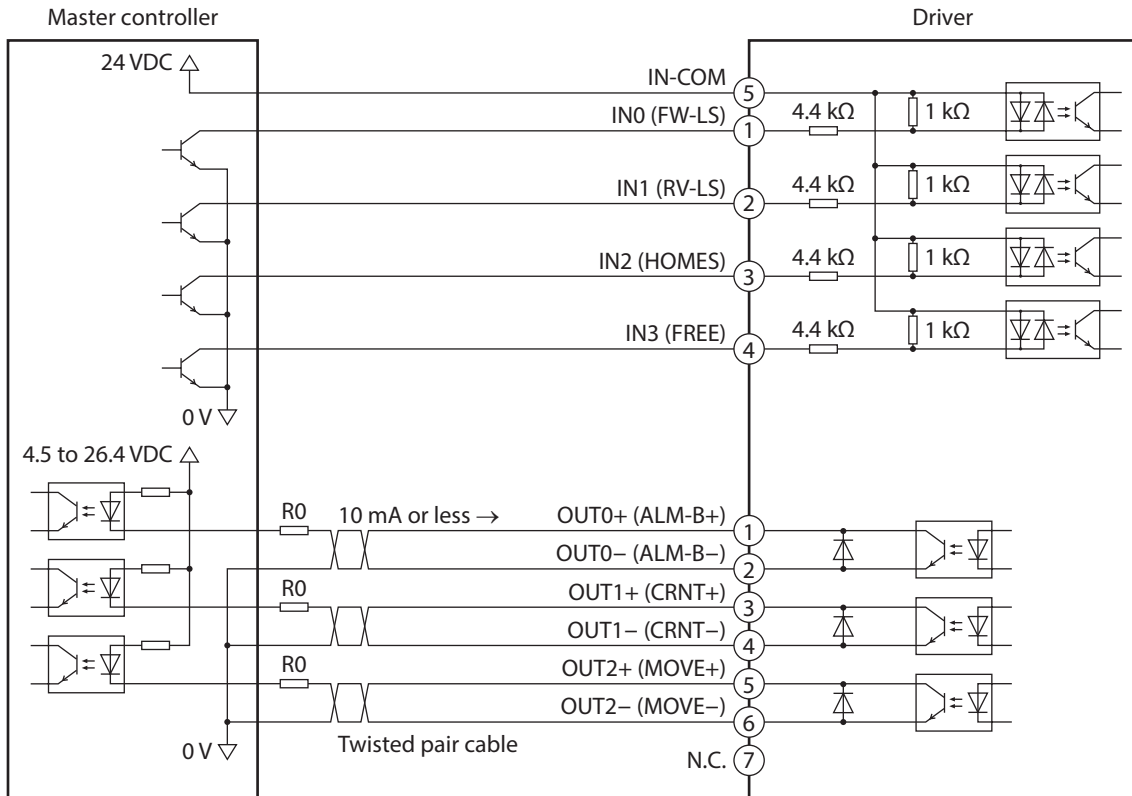


7-6 Connection diagram



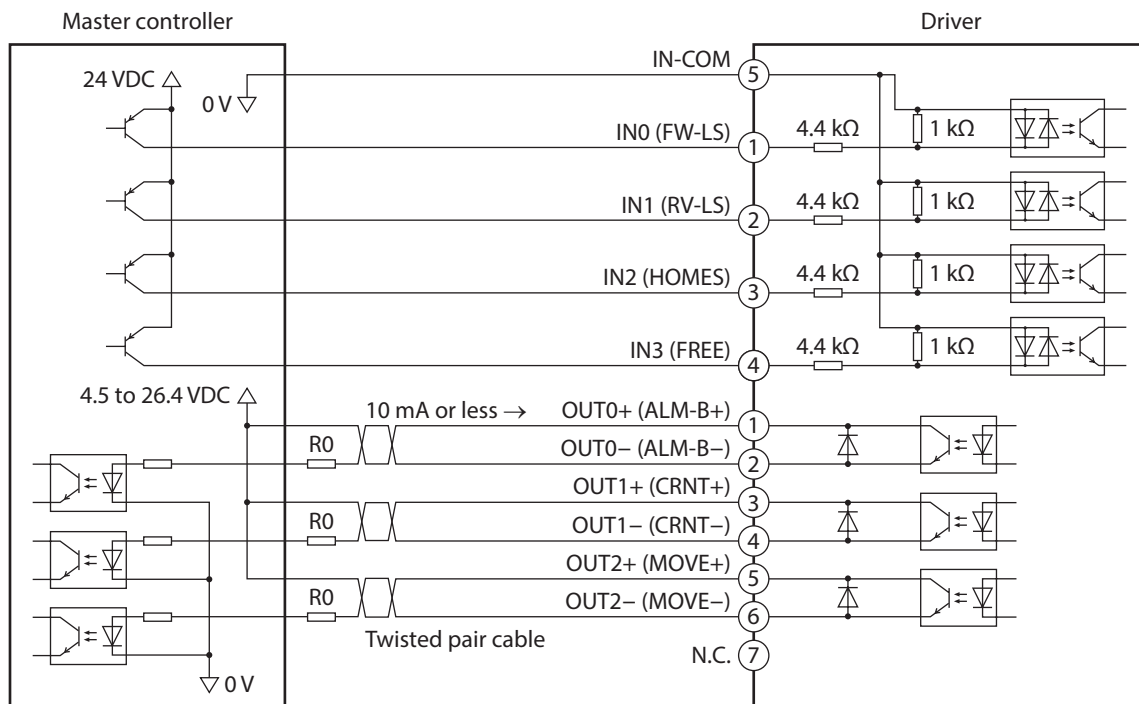
- Use input signals at 24 VDC.
- Use output signals at 4.5 to 26.4 VDC, 10 mA or less. If the current exceeds 10 mA, connect an external resistor R0 so that the current becomes 10 mA or less.

■ Connecting to a current sink output circuit



* (): Initial value

■ Connecting to a current source output circuit

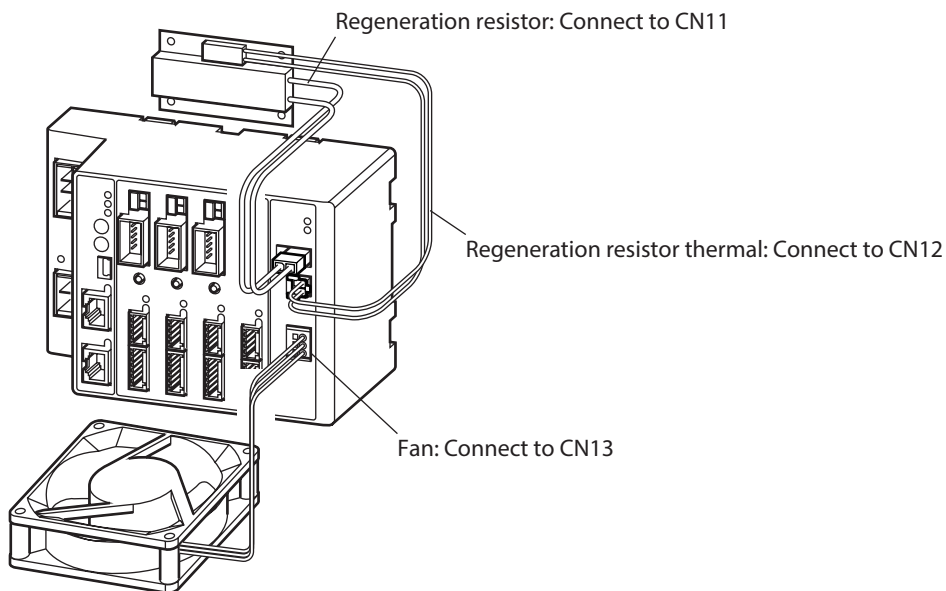


* (): Initial value

7-7 Connecting the regeneration resistor and fan (accessories)

When an accessory regeneration resistor and fan are used, connect as the figure below.

■ Installation example



memo Install the fan on the lower side of the driver so that the wind can blow through in an upward direction.

■ Connecting the regeneration resistor

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

● Connecting method

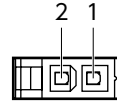
- Regenerative current flows through the two thick lead wires (AWG20: 0.5 mm²) of the regeneration resistor. Connect to the CN11.
- The two thin lead wires (AWG24: 0.2 mm²) of the regeneration resistor are the thermostat outputs. Connect to the CN12.

● Pin assignment

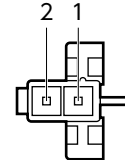
Regeneration resistor connector (CN11)

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

● Regeneration resistor side



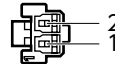
● Driver side



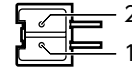
Regeneration resistor thermal connector (CN12)

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

● Regeneration resistor side



● Driver side



● Regeneration resistor specification

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

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



If the allowable power consumption of the regeneration resistor exceeds the allowable level, the thermostat will be triggered and the regeneration resistor overheat alarm of the driver will generate. If the regeneration resistor overheat alarm generates, turn off the power and check the connection or operating condition.

■ Connecting the fan

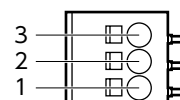
If the driver temperature information generates in any of the driver axes when a fan is connected, the fan automatically starts operating. If the temperature inside the driver falls about 5 °C (9 °F) below the setting value of the "Driver temperature information (41A0h)," the "Driver temperature information"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

● Connecting method

Connect the lead wires of the fan to CN13.

Fan connector (CN13)

| Pin No. | Name | Lead color | Description |
|---------|------|------------|--------------------------|
| 1 | ALM | Orange | Stall alarm input of fan |
| 2 | FAN- | Black | Fan output - side |
| 3 | FAN+ | Red | Fan output + side |



- Output voltage: 24 VDC±5%
- Output current: 0.2 A or less

7-8 Connecting the USB cable

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

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



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

7-9 Noise measures

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

■ Measures against electrical noise

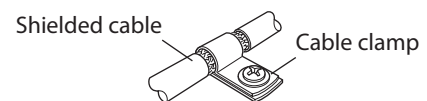
There are the following three methods mainly to take measures against the electrical noise.

● Noise suppression

- When relays or electromagnetic switches are used together with the system, use noise filters and CR circuits to suppress surges generated by them.
- Use an accessory cable when extending a wiring distance between the motor and driver. This is effective in suppressing the electrical noise emitted from the motor.
- Cover the driver by a metal plate such as aluminum. This is effective in shielding the electrical noise emitted from the driver.

● Prevention of noise propagation

- Connect a noise filter on the input side of the DC power supply.
- Place the power lines, such as the motor and power supply cables, keeping a distance of 200 mm (7.87 in.) or more from the signal lines, and also do not bundle them or wire them in parallel. If the power cables and signal cables have to cross, cross them at a right angle.
- Use shielded cables of AWG24 to 16 (0.2 to 1.25 mm²) for power lines and signal lines.
- Keep cables as short as possible without coiling and bundling extra lengths.
- When grounding PE terminals of multiple drivers to a grounding point, it becomes more effective to block the electrical noise since impedance on the grounding point is decreased. However, ground them so that a potential difference does not occur among the grounding points.
- To ground a shielded cable, use a metal cable clamp that will maintain contact with the entire circumference of the cable. Ground the cable clamp near the product.



● Suppression of effect by noise propagation

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

■ **Noise suppression parts**

● **Noise filter**

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

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

- Use the AWG18 (0.75 mm²) or thicker wire for the input and output cables of the noise filter, and secure firmly using a cable clamp etc. so that the cable does not come off the enclosure.
- Place the input cable as far apart as possible from the output cable, and do not wire the cables in parallel. If the input and output cable are placed at a close distance or if they are wired in parallel, the noise in the enclosure affects the power cable through stray capacitance, and the noise suppressing effect will reduce.
- Connect the ground terminal of the noise filter to the grounding point, using as thick and short a wire as possible.
- When connecting a noise filter in an enclosure, wire the input cable of the noise filter as short as possible. Wiring in long distance may reduce the noise suppressing effect.

■ **Noise suppression parts (accessories)**

Refer to p.38 for accessories.

● **Surge suppressor**

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

7-10 Installing and wiring in compliance with EMC Directive

Effective measures must be taken against the EMI that the motor and driver may give to adjacent control-system equipment, as well as the EMS of the motor and driver itself, in order to prevent a serious functional impediment in the machinery. The use of the following installation and wiring methods will enable the motor and driver to be compliant with the EMC directive. Refer to p.12 for the applicable standards.

Oriental Motor conducts EMC measurements on its motors and drivers in accordance with "Example of motor and driver installation and wiring" on p.33. The user is responsible for ensuring the machine's compliance with the EMC Directive, based on the installation and wiring explained below.

● **Connecting the noise filter**

In large electrically noisy environments, connect a noise filter.
Refer to "Noise filter" on p.32.

● **Connecting the power supply**

Use a DC power supply compliant with the EMC Directive.
Use a shielded cable for the wiring, and keep it as short as possible.
Refer to "Prevention of noise propagation" on p.31 for grounding the shielded cable.

● **Connecting the motor cable**

Use an accessory motor connection cable when extending the wiring distance between the motor and driver.

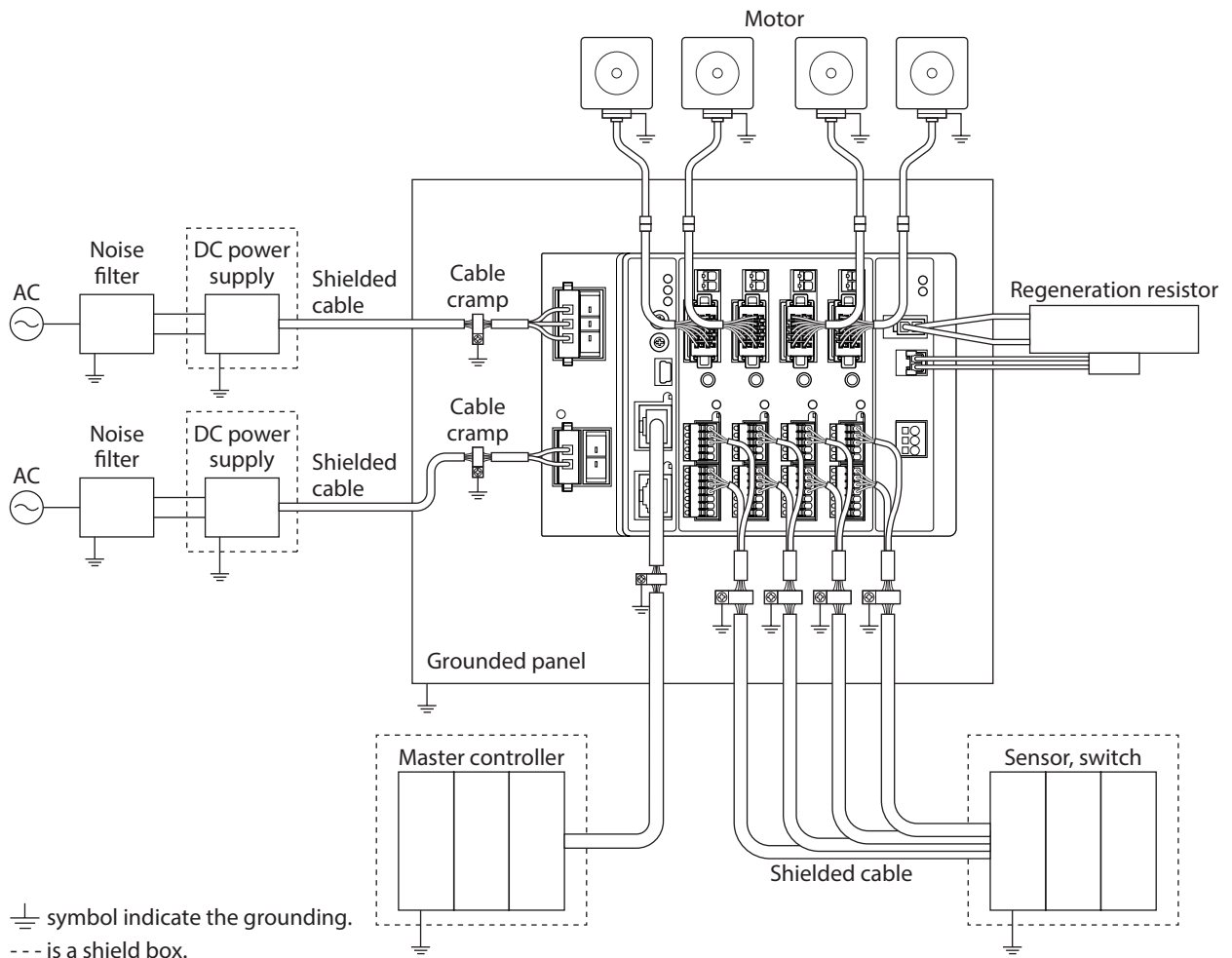
● **Connecting the signal cable**

Refer to "Prevention of noise propagation" on p.31.

● **How to ground**

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

● Example of motor and driver installation and wiring



Note The driver uses parts that are sensitive to electrostatic charge. Take measures against static electricity since static electricity may cause the driver to malfunction or suffer damage.

8 Setting

This chapter explains how to set the driver functions.

8-1 Node address

Set the node address of the driver using the two node address setting switches (ECAT ID ×10 and ×1). The node address setting switches are hexadecimal number. Convert the node address from decimal to hexadecimal to set.

When connecting two or more EtherCAT compatible products, do not set duplicate node address.

Factory setting 0 (×10: 0, ×1: 0)

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



- Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new switch settings will not become effective until the driver power is cycled.
- When the node address is 0, the setting of the master controller is enabled.

8-2 Extension input signals

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

Factory setting P-PRESET

Related parameter

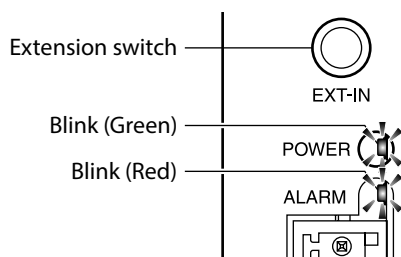
| Parameter name | Description | Initial value |
|--|--|---------------|
| Extended input (EXT-IN) function | Selects the input signal to be assigned to the extension switch(EXT-IN). Setting range Input signal list ⇨ p.95 | 9: P-PRESET |
| Extended input (EXT-IN) inverting mode | Setting range 0: ON/OFF of the input signal assigned to the extension switch(EXT-IN) is not inverted 1: ON/OFF of the input signal assigned to the extension switch(EXT-IN) is inverted | 0 |
| Extended input (EXT-IN) interlock releasing time | Normally, the extension switch(EXT-IN) is interlocked. By holding down the switch for a certain time, interlock is released and the assigned function is enabled. With this parameter, the time to hold down the switch to release interlock is set. Setting range 0: Interlock disabled 1 to 50 (1=0.1 s) | 10 |
| Extended input (EXT-IN) interlock releasing duration | Sets the time to retain the status in which the interlock is released. Setting range 0 to 50 (1=0.1 s) | 30 |
| Extended input (EXT-IN) ON monitor time | When the signal assigned to the extension switch (EXT-IN) is input, the POWER LED and ALARM LED of each driver axis are lit. With this parameter, the time to light the LED is set. Setting range 0 to 50 (1=0.1 s) | 10 |

For the index number of parameters, check "4 Driver objects of the manufacturer-specific area" on p.216.

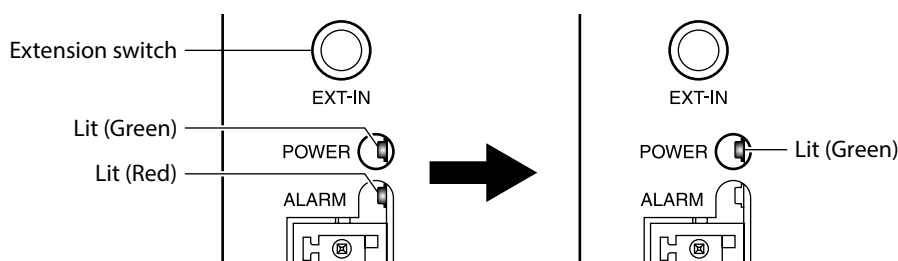
■ How to operate the extension switch (EXT-IN)

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

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



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



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

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

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



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

9 Inspection

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

■ During inspection

- Are the openings in the driver blocked?
- Are any of the mounting screws or connection parts of the driver loose?
- Is there attachment of dust, etc., on the driver?
- Are there any strange smells or appearances within the driver?



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

10 Accessories

■ Cable

Note

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

● Motor connection cable

This cable is used to connect the driver and **AZ** Series motor.

When installing the motor on a moving part, use a flexible connection cable having excellent flex resistance.

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

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

● Connection cable set for electromagnetic brake motor

This cable is used to connect the driver and **AZ** Series electromagnetic brake motor.

It consists of two cables; one is a connection cable for motor and the other is a connection cable for electromagnetic brake.

When installing the motor on a moving part, use a flexible connection cable having excellent flex resistance.

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

■ Power supply cable

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

| Model | Type |
|-----------------|----------------------|
| LC03D06A | Main power supply |
| LC02D06A | Control power supply |

■ Regeneration resistor

Connect the regeneration resistor if gravitational operation or other operations involving up/down movement, or sudden starting/stopping of a large inertial load, will be repeated frequently.

Always connect the regeneration resistor if an overvoltage protection alarm generates.

It is recommended to use the regeneration resistor since an alarm tends to generate when using 48 VDC.

Model: **RGC40**

■ Fan

These are DC axial flow fans to stir the air inside of the control box or to cool locally. Be sure to connect if an alarm of the main circuit overheat was generated.

Model: **V-MD825B24L** (Fan with DIN rail mounting bracket)

MD825B-24L (Fan only)

■ CR circuit for surge suppression

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

Model: **EPCR1201-2**

■ CR circuit module

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

4 pieces of CR circuit for surge suppression are mounted on the compact circuit, and this product can be installed to the DIN rail. This product can make the wiring easily and securely since it also supports terminal block connection.

Model: **VCS02**

2 Communication Specifications Edition

This part explains the communication specifications and supported objects.

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■ Setting of data and parameters

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

■ Update timing of parameters

When a parameter is changed, the timing to enable the new value varies depending on the parameter. In this chapter, each update timing is represented in an alphabetical character.

- A: Effective immediately
- B: Effective after stopping the operation
- C: Effective after executing the configuration, or effective after executing write batch non-volatile memory and cycling the control power supply
- D: Effective after executing write batch non-volatile memory and cycling the control power supply

1 Communication specifications

1-1 EtherCAT communication interface

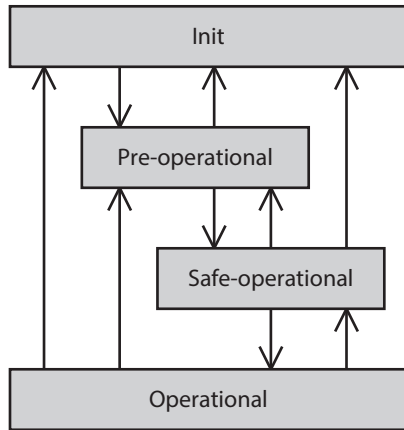
| Item | Description |
|------------------------------|--|
| Communications standards | IEC 61158 Type12 |
| Physical layer/Protocol | 100 BASE-TX (IEEE 802.3) |
| Transmission rate | 100 Mbps |
| Communication cycle | <ul style="list-style-type: none"> • Free run mode: 1 ms or more • SM2 event synchronization mode: 1 ms or more • DC mode: 0.5 ms, 1 ms, 2 ms, 3 ms, 4 ms, 5 ms, 6 ms, 7 ms, 8 ms |
| Communication port/Connector | RJ45×2 (shielded) ECAT IN: EtherCAT input ECAT OUT: EtherCAT output |
| Topology | Daisy chain (Up to 65,535 nodes) |
| Process data | Variable PDO mapping |
| Sync manager | <ul style="list-style-type: none"> • SM0: Mailbox output • SM1: Mailbox input • SM2: Process data output • SM3: Process data input |
| Mailbox (CoE) | <ul style="list-style-type: none"> • Emergency message • SDO request • SDO response • SDO information |
| Synchronization mode | <ul style="list-style-type: none"> • Free run mode (asynchronous) • SM2 event synchronization mode • DC mode (SYNC0 event synchronization) |
| Device profile | IEC 61800-7 CiA402 drive profile |

1-2 CiA402 Drive Profile

| Item | Description |
|----------------|--|
| Operation mode | <p>The following modes are supported.</p> <ul style="list-style-type: none"> • 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 EtherCAT master controller.



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

1-4 Process data object (PDO)

The process data object (PDO) is used in real-time data communication of EtherCAT communication. There are two types of PDO; transmit PDO (TxPDO) and receive PDO (RxPDO). The transmit PDO (TxPDO) is to send data to the master controller from the driver. The receive PDO (RxPDO) is to receive data from the master controller to the driver. Contents, which are sent and received using the PDO, are set by the PDO mapping object and sync manager 2/sync manager 3 PDO assignment object. The PDO mapping is to set the PDO mapping object in each driver axis and controller axis. Sync manager 2/sync manager 3 PDO assignment is to set the PDO mapping object that performs communication actually. The PDO mapping object is consisted of 4 bytes that are indexes of assigned object (Index), sub-index (Sub-index), and data length (Length). Only data of 08h (1 byte), 10h (2 bytes), and 20h (4 bytes) can be set in the data length.

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

■ PDO mapping object of driver axis

In the driver axis, there is a different PDO mapping object per axis. Check in the table below. Up to 8 objects can be mapped in a single PDO.

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

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

| 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 |



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

* The configuration of objects is as follows.

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

■ PDO mapping object of controller axis

There is a PDO mapping object in the controller axis.

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

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

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

■ SM2/SM3 PDO assignment object

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

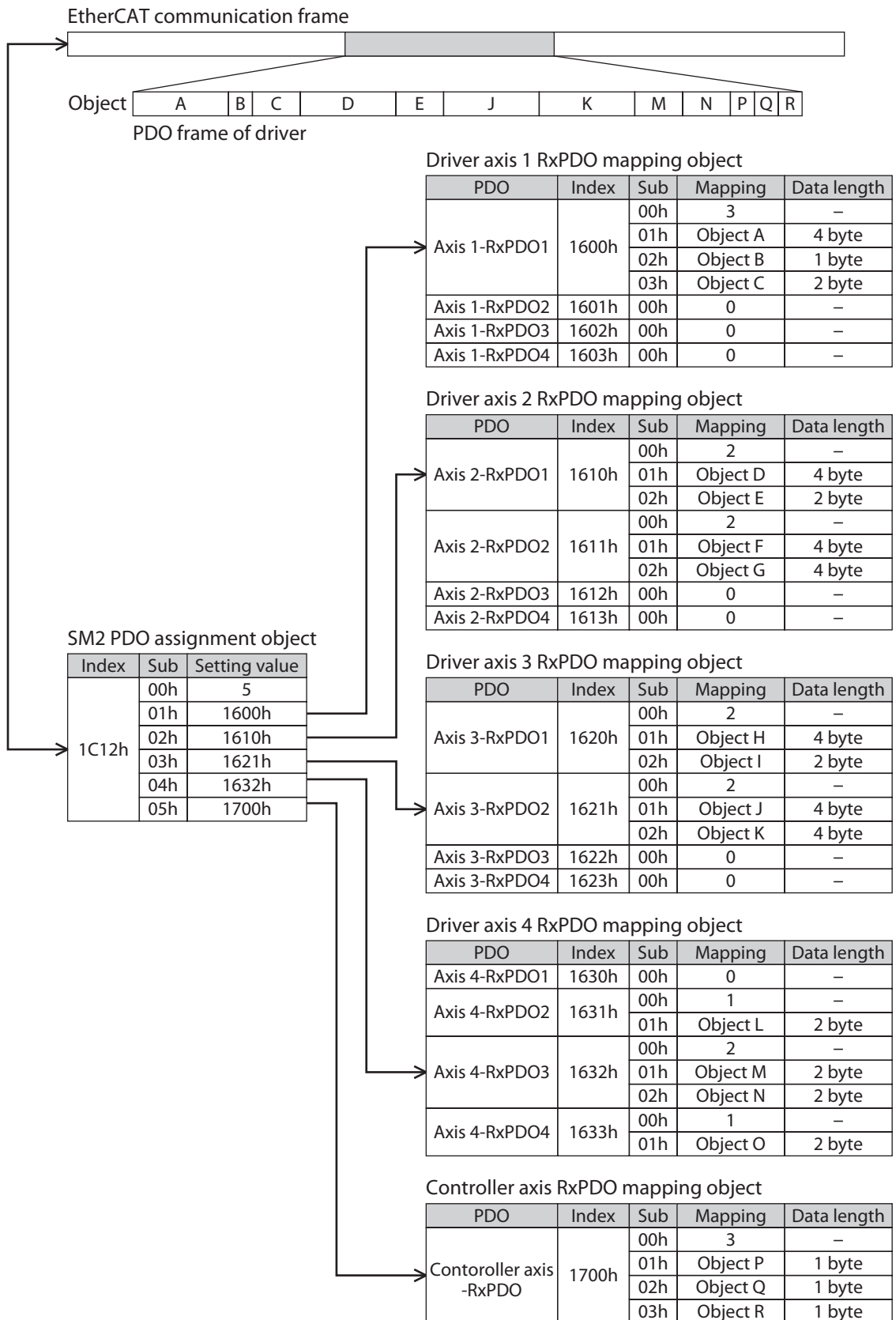
■ Setting of PDO mapping object

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

1. Set the number of entries of the sync manager 2/sync manager 3 PDO assignment object to 0.
2. Set the number of entries of the PDO mapping object to 0.
3. Change the PDO mapping object.
4. Change the number of entries of the PDO mapping object to the number of objects mapped in the step 3.
5. Change the sync manager 2/sync manager 3 PDO assignment object.
6. Change the number of entries of the sync manager 2/sync manager 3 PDO assignment object to the number assigned in the step 5.

■ Example of PDO mapping

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



1-5 Service data object (SDO)

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

■ SDO abort code

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

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

1-6 Synchronous mode of EtherCAT communication

This product is compatible with three modes of EtherCAT communication.

● Free run mode

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

● SM2 event synchronization mode

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

● DC mode (SYNC0 event synchronization)

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

1-7 Distributed clocks

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

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

1-8 Emergency message

If an error occurs in the driver, an emergency message is sent to the master controller using the mailbox communication.

The emergency message is sent only once per error.

The emergency message 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 | | Error register object (1001h) | Manufacturer-specific error definition field | | | | |

■ Emergency message for when an alarm is generated

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

The emergency message for 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.

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

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

The byte 4 is the alarm code. See p.151 for alarm code.

■ Emergency code for 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 status, this emergency code is generated. Check the contents, and review the setting and other conditions.

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

2 Drive profile



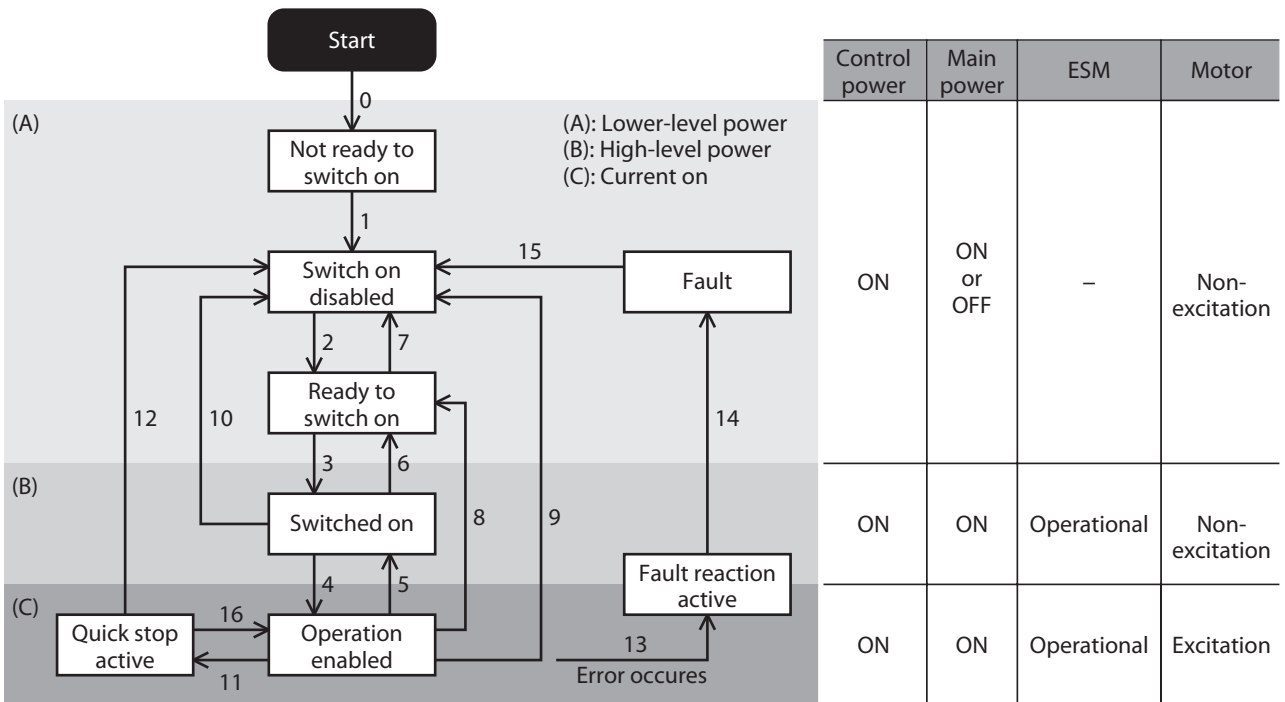
This document describes indexes of the driver axis 1 for the objects of the profile area. Objects of the driver axis 2 to driver axis 4 are indexes to offset each 800h from the previous axis. Refer to examples in the following table.

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

| AXIS | Index | Sub | Name | Type | R/W | PDO | Save | Range | Effective |
|-------|-------|-----|------------|------|-----|-------|------|--|-----------|
| 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 by the "Statusword object (6041h)."



| State | Status | Motor status | Parameter setting |
|------------------------|--|----------------|---------------------|
| Not ready to switch on | The control power supply was turned on, and the initialization processing is executing | Non-excitation | Not possible to set |
| Switch on disabled | The initialization was complete | Non-excitation | Possible to set |
| Ready to switch on | A state that the main power supply is possible to turn on | Non-excitation | Possible to set |
| Switched on | A state that the main power supply was turned on | Non-excitation | Possible to set |
| Operation enabled | The motor is in an excitation state, and the operation function is enabled | Excitation | Possible to set |
| Quick stop active | The Quick stop command was received, and the operation stop is processing | Excitation | Possible to set |

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

■ State transition of the drive state machine

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

● Controlword object (6040h)

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

● State transition commands by the controlword

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

* When the following conditions are not satisfied, the state will not move from "Ready to switch on" to "Switch on" even if the command is received.

- The status of the ESM is operational.
- The main power is turned ON.
- The FREE input is OFF.

● State transition other than the above

| Transition number in the figure | Transition event |
|---------------------------------|---|
| 0 | Moves automatically when the power is turned on. |
| 1 | Moves automatically when the initialization of the driver is complete. |
| 2 | Moves after stopping if the Quick stop action is "Moves to switch on disabled." |
| 13, 14 | Moves if an alarm is generated. |

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

| State | Motor operation | Event | Action |
|-------------------|-----------------|---|---|
| Switched on | During stop | <ul style="list-style-type: none"> • The ESM moves to other than OP. • The main power was cut off. • The FREE input is ON. | Moves to "Ready to switch on." (Transition number 6) |
| Operation enabled | During stop | <ul style="list-style-type: none"> • The ESM moves to other than OP. • The main power was cut off. • The FREE input is ON. | Moves to "Ready to switch on." (Transition number 8) The motor becomes in a non-excitation state. |

| State | Motor operation | Event | Action |
|-------------------|------------------|---|--|
| Operation enabled | During operation | The ESM moves to other than OP. | The network bus error alarm is generated (alarm code 81h). After moving from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14) |
| | | The main power was cut off. | The main power off alarm is generated (alarm code 23h). After moving from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14) |
| | | The FREE input is ON. | Moves to "Ready to switch on." (Transition number 8) The motor becomes in a non-excitation state. |
| Quick stop active | During stop | <ul style="list-style-type: none"> The ESM moves to other than OP. The main power was cut off. The FREE input is ON. | Moves to "Switch on disabled." (Transition number 12) The motor becomes in a non-excitation state. |
| | During operation | The ESM moves to other than OP. | The network bus error alarm is generated (alarm code 81h). After moving from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14) |
| | | The main power was cut off. | The main power off alarm is generated (alarm code 23h). After moving from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14) |
| | | The FREE input is ON. | Moves to "Switch on disabled." (Transition number 12) The motor becomes in a non-excitation state. |

■ **Status output of the drive state machine**

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

● **Statusword object (6041h)**

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

● **Status output of the Statusword**

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

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

2-2 Operation mode

The driver supports the operation modes listed below.

- Cyclic synchronous position mode (CSP)
- Profile position mode (PP)
- Cyclic synchronous velocity mode (CSV)
- Profile velocity mode (PV)
- Homing mode (HM)

■ Switching of operation modes

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

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

Switch the operation mode while an operation is stopped. When it was switched during operation, the new operation mode will be enabled after the operation is stopped.

The operation mode which is enabled can be checked in the "Modes of operation display (6061h)."

2-3 Cyclic synchronous position mode (CSP)

In the cyclic synchronous position mode, a path generation (profile generation) is performed by the master controller. By cyclic synchronous communication, when the "Target position (607Ah)" is sent from the master controller to the driver, the driver performs position controls.

Use the cyclic synchronous position mode when EtherCAT communication is performed in the DC mode. If the cyclic synchronous position mode is used in the free run mode or SM2 event synchronization mode, the speed fluctuation or vibration may increase.

Note

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

Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------------------------|-------|--------|-------|------|--|-----------|
| 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.51) | 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 | – | – | – |

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------------|-------|--------|-------|------|--|-----------|
| 607Ah | 00h | Target position [step] | INT32 | RW | RxPDO | – | –2,147,483,648 to 2,147,483,647 (Initial value: 0) | A |
| 607Dh | 01h | Min. position limit [step] | INT32 | RW | No | ○ | –2,147,483,648 to 2,147,483,647 (Initial value: –2,147,483,648) | A |
| | 02h | Max. position limit [step] | INT32 | RW | No | ○ | –2,147,483,648 to 2,147,483,647 (Initial value: 2,147,483,647) | A |

■ **Controlword of the cyclic synchronous position mode**

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

Details of controlword

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

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.49.

■ **Statusword of the cyclic synchronous position mode**

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

Details of statusword

| Bit | Name | Value | Description |
|-----|-----------------|-------|---|
| 15 | TLC | 0 | A load does not reach the upper limit of the motor output torque. |
| | | 1 | A load reached the upper limit of the motor output torque. |
| 13 | Following error | 0 | Position deviation error not present |
| | | 1 | Position deviation error present The position deviation exceeded the value set in the "Following error window (6065h)." The value changes to 0 when the "Excessive position deviation alarm (alarm code 10h)" or "Overload alarm (alarm code 30h)" is cleared. |

| Bit | Name | Value | Description |
|-----|-------------------------|-------|--|
| 12 | Target position ignored | 0 | Target position command disable When the state is any of the followings, the value is 0, and the target position is disabled. <ul style="list-style-type: none"> • The drive state machine is other than "Operation enabled." • The motor is in a non-excitation state. • "Halt (6040h: Bit8)" has been 1. • The STOP input is ON. • The internal limit is in an active state. |
| | | 1 | Target position command enable |
| 11 | Internal limit active | 0 | The function limitation by the internal limit is not in an active state. |
| | | 1 | The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. <ul style="list-style-type: none"> • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit |
| 9 | Remote | 1 | The value becomes 1 when the initialization is complete. |
| 7 | Warning | 0 | Information not present When the causes of information are cleared, the warning is automatically cleared to 0. |
| | | 1 | Information present. |

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

2-4 Profile position mode (PP)

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

Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------------------------|-------|--------|-------|------|--|-----------|
| 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.51) | 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 |

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|-------|--------|-------|------|---|-----------|
| 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 the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ Controlword of the profile position mode

| Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
|----------------------------|-------------------------------|------------------------|----------------------|------------------|------------|---------------------|-----------|
| Manufacturer specific (ms) | | | | | Reserved | oms | Halt |
| – | Wrap | Push | Base position of Rel | – | | Change on set point | |
| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| Fault reset | Operation mode specific (oms) | | | Enable operation | Quick stop | Enable voltage | Switch on |
| | Abs/Rel | Change set immediately | New set point | | | | |

Details of controlword

| Bit | Name | Value | Description |
|-----|----------------------|-------|---|
| 14 | Wrap | 1 | Wrap absolute positioning operation After the "Wrap" is set to 1, when an operation is started by setting the "New set point (6040h: Bit4)" to 1, wrap absolute positioning operation is performed. The operating method is in accordance with the setting of the "Wrap positioning mode (414Fh)." |
| 13 | Push | 1 | Push-motion positioning operation After the "Push" is set to 1, when an operation is started by setting the "New set point (6040h: Bit4)" to 1, push-motion positioning operation is performed. The "Push current (4121h)" is applied to the motor current. When the "Halt (6040h: Bit8)" is set to 1, or when the STOP input is turned ON, the operation is stopped. The "Stop current (4128h)" is applied to the motor current at standstill. |
| 12 | Base position of Rel | 0 | Incremental positioning operation (based on command position) Positioning operation of the set travel amount is performed from the present command position. The travel amount is set with the "Target position (607Ah)." |
| | | 1 | Incremental positioning operation (based on feedback position) Positioning operation of the set travel amount is performed from the present actual position. The travel amount is set with the "Target position (607Ah)." |
| 10 | Reserved | – | Reserved |
| 9 | Change on set point | – | Not supported. |
| 8 | Halt | 0 | Operation allowed |
| | | 1 | Stop operation. The stopping method is in accordance with the setting of the "Halt option code (605Dh)." |

| Bit | Name | Value | Description |
|-----|------------------------|--------|---|
| 6 | Abs/Rel | 0 | Absolute positioning operation The "Target position (607Ah)" is the target position of absolute positioning operation. |
| | | 1 | Incremental positioning operation The "Target position (607Ah)" is the target position of incremental positioning operation. |
| 5 | Change set immediately | 0 | When the "New set point (6040h: Bit4)" is changed from 0 to 1 during operation, the new operation command is stored. When the present operation is complete, the stored new operation command is started. |
| | | 1 | When the "New set point (6040h: Bit4)" is changed from 0 to 1 during operation, the new operation command is immediately applied. |
| 4 | New set point | 0 to 1 | <p>Starting of positioning operation Before starting the operation, select the "Wrap(6040h: Bit14)", "Push (6040h: Bit13)", "Base position of Rel(6040h: Bit12)" and "Abs/Rel (6040h: Bit6)."</p> <p>If positioning operation is executed in a state where the operation is stopped by changing the "Halt (6040h: Bit8)" to 1, change the "Halt (6040h: Bit8)" from 1 to 0 first, and then leave an interval at more than double of the communication cycle before changing the "New set point (6040h: Bit4)" from 0 to 1. The operation may not be started unless the interval at more than double of the communication cycle is left.</p> <p>The command cannot be received in the following status, and the operation is not started.</p> <ul style="list-style-type: none"> • "Halt (6040h: Bit8)" has been 1. • The STOP input is ON. • The drive state machine is other than "Operation enabled." • The motor is in a non-excitation state. |

For the Bit 7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.49.

■ Statusword of the profile position mode

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

Details of statusword

| Bit | Name | Value | Description |
|-----|-----------------|-------|---|
| 15 | TLC | 0 | A load does not reach the upper limit of the motor output torque. |
| | | 1 | A load reached the upper limit of the motor output torque. When push-motion operation is performed, use this signal as the completion signal of push-motion operation. |
| 13 | Following error | 0 | Position deviation error not present |
| | | 1 | Position deviation error present The position deviation exceeded the value set in the "Following error window (6065h)." The value changes to 0 when the "Excessive position deviation alarm (alarm code 10h)" or "Overload alarm (alarm code 30h)" is cleared. |

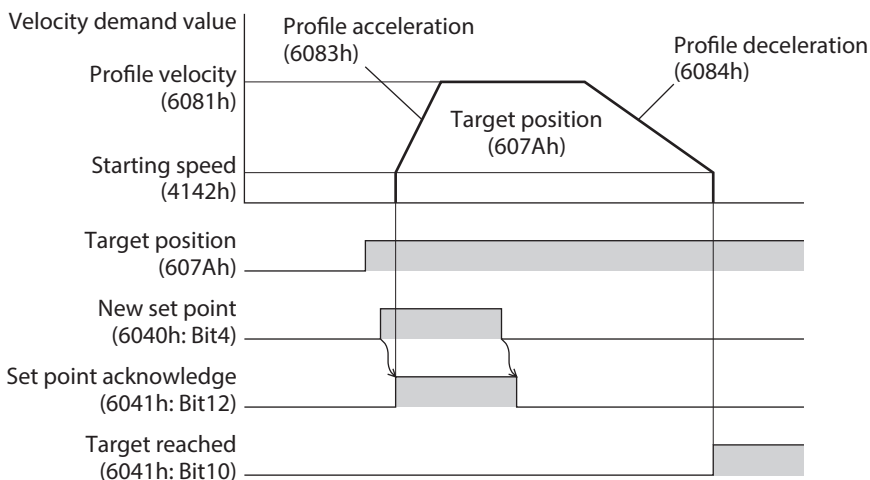
| Bit | Name | Value | Description |
|-----|-----------------------|-------|---|
| 12 | Set point acknowledge | 0 | The operation start by the "New set point (6040h: Bit4)" has not been received. |
| | | 1 | The operation start by the "New set point (6040h: Bit4)" was received. When the "New set point (6040h: Bit4)" is set to 1 and the operation start is received, the "Set point acknowledge" changes to 1. When the "New set point (6040h: Bit4)" is set to 0, the "Set point acknowledge" also changes to 0. Also, when the drive state machine was moved to other than "Operation enabled," the "Set point acknowledge" changes to 0. |
| 11 | Internal limit active | 0 | The function limitation by the internal limit is not in an active state. |
| | | 1 | The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. <ul style="list-style-type: none"> • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit |
| 10 | Target reached | 0 | <ul style="list-style-type: none"> • When the "Halt (6040h: Bit8)" is 0: The positioning operation is not complete. • When the "Halt (6040h: Bit8)" is 1: During deceleration stop. |
| | | 1 | <ul style="list-style-type: none"> • When the "Halt (6040h: Bit8)" is 0: The value changes to 1 when the positioning operation is properly complete. It does not change to 1 when the positioning operation was interrupted on the way. It changes to 0 if the operation is started from a state where the positioning was complete. • When the "Halt (6040h: Bit8)" is 1: The value changes to 1 when the operation command speed becomes 0. |
| 9 | Remote | 1 | The value becomes 1 when the initialization is complete. |
| 7 | Warning | 0 | Information not present When the causes of information are cleared, the warning is automatically cleared to 0. |
| | | 1 | Information present. |

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

■ Operation in the profile position mode

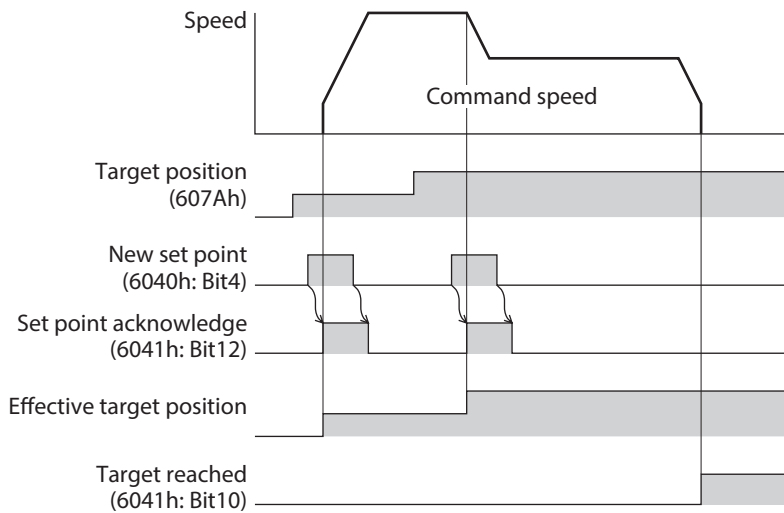
● Positioning operation

Positioning operation is started when the "Target position (607Ah)" is set and the "New set point (6040h: Bit4)" is set to 1.



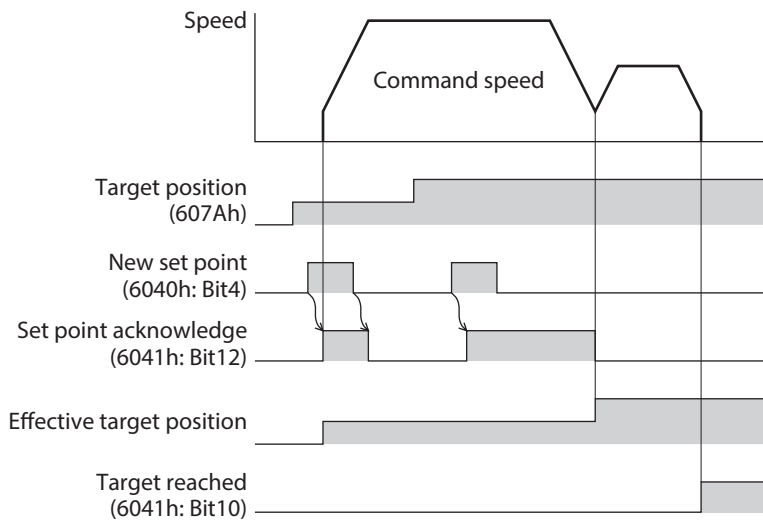
Single set-point [When the "Change set immediately (6040h: Bit5)" is 1]

If the "New set point (6040h: Bit4)" is set during operation, the new operation command is applied immediately.



Set of set-points [When the "Change set immediately (6040h: Bit5)" is 0]

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



● **Push-motion positioning operation**

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

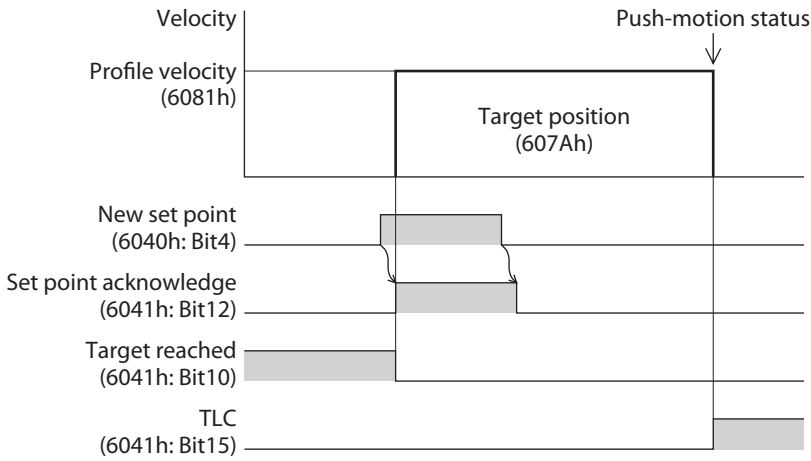


- When a mechanism installed to the motor pressed against a load, push-motion operation is performed while a position deviation of 2.7° generates. An overload alarm may be generated if the operation is stopped in this state, so perform operation to return the detection position by 3.6° before push-motion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

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

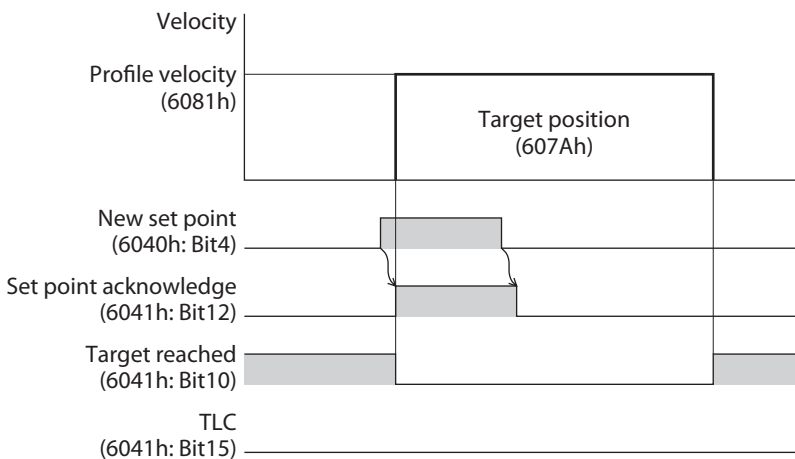
When a load is pressed, the "TLC (6041h: Bit15)" of the statusword changes to 1.

If the "Halt (6040h: Bit8)" of the controlword is set to 1 or the STOP input is turned ON, the operation is stopped and the push-motion status is canceled.



When a mechanism installed to the motor had not presses against a load

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

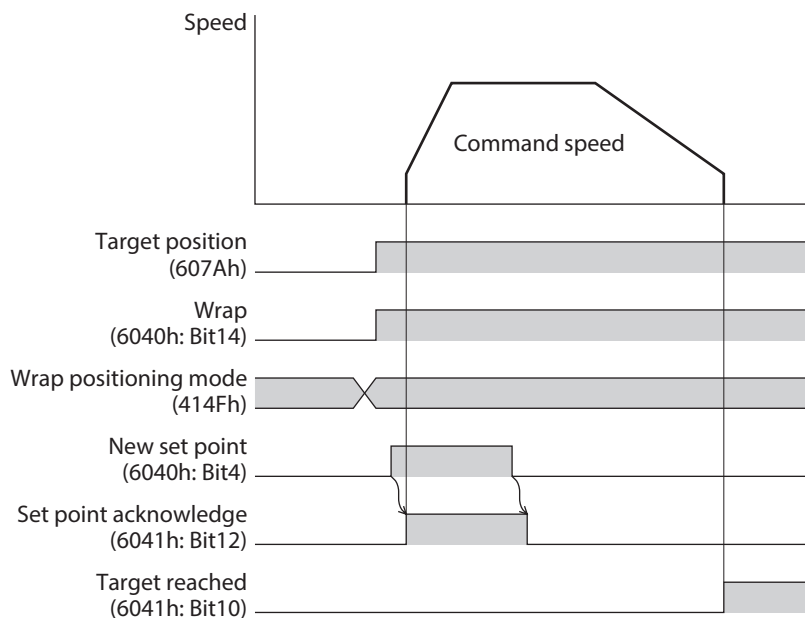


● Wrap absolute positioning operation

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



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



■ Operation mode of the profile position mode

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

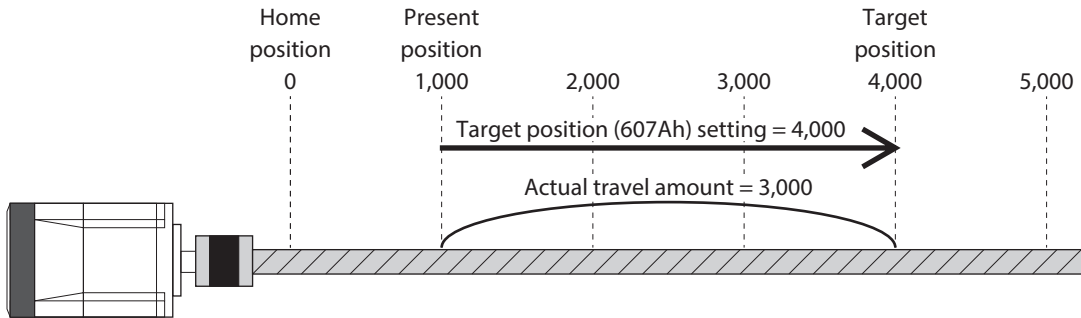
| Operation mode | Wrap positioning mode (414Fh) | Controlword (6040h) | | | |
|--|-------------------------------|---------------------|--------------|------------------------------|----------------|
| | | Wrap (Bit14) | Push (Bit13) | Base position of Rel (Bit12) | Abs/Rel (Bit6) |
| Absolute positioning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

● **Absolute positioning**

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

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

Set 4,000 steps in the "Target position (607Ah)" to start absolute positioning operation.

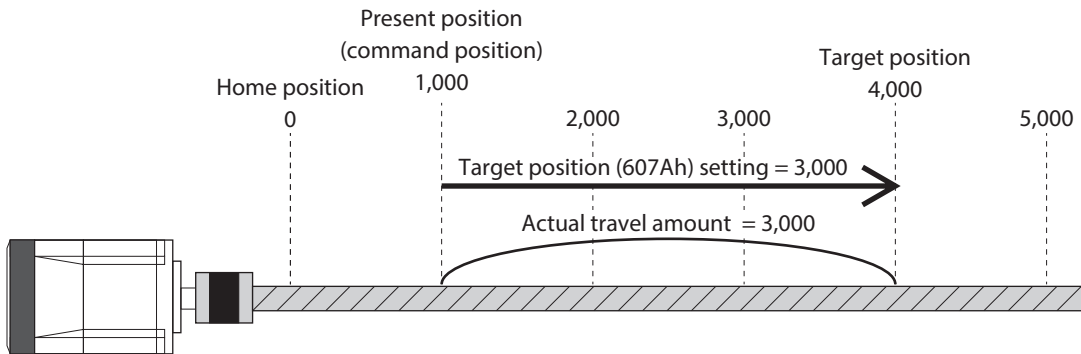


● **Incremental positioning (based on command position)**

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

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

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

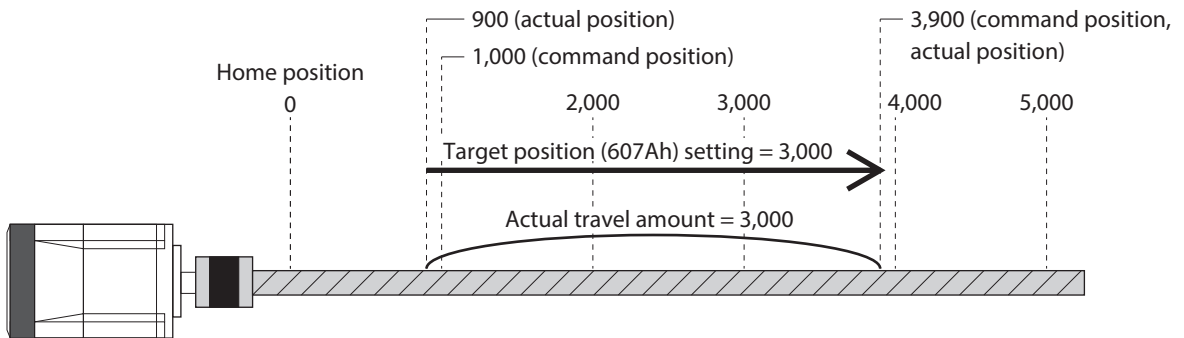


● **Incremental positioning (based on feedback position)**

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

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

Set 3,000 steps in the "Target position (607Ah)" to start incremental positioning (based on feedback position) operation. The command position and the actual position after completing the operation will be "3,900."



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

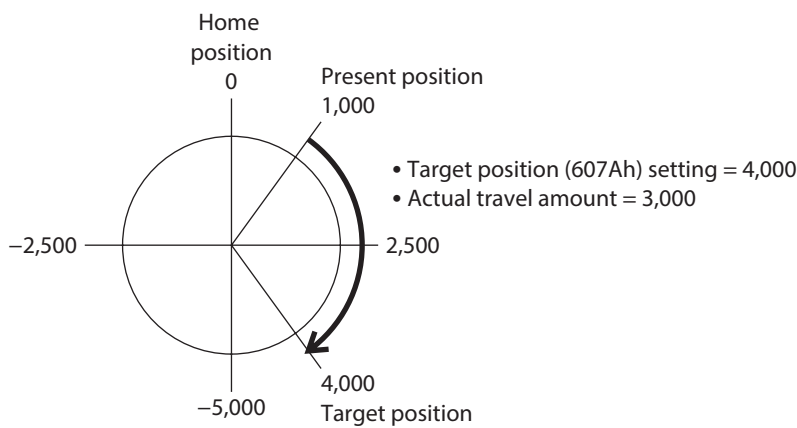
● **Wrap absolute positioning**

Positioning operation is performed to the target position within the wrap range. In the "Target position (607Ah)," set the target position within the wrap range. Refer to p.88 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 |



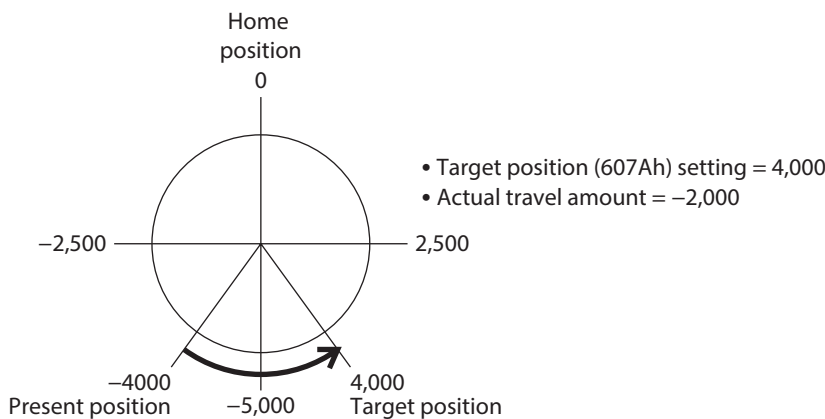
● **Wrap proximity positioning**

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.88 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 |



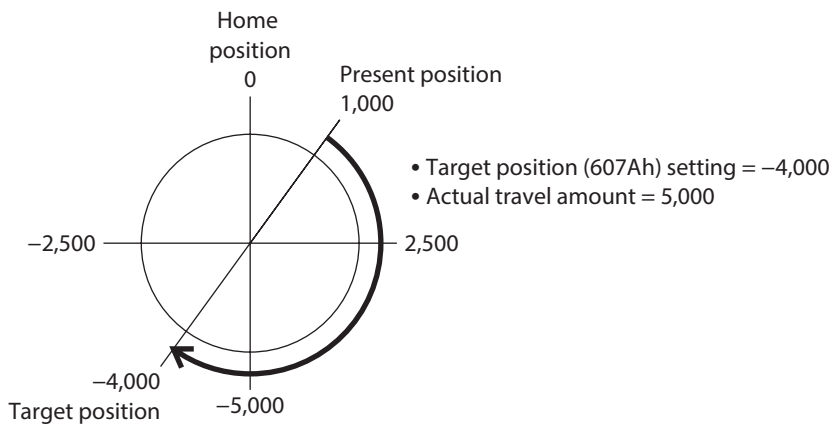
● **Wrap forward direction absolute positioning**

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.88 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 |



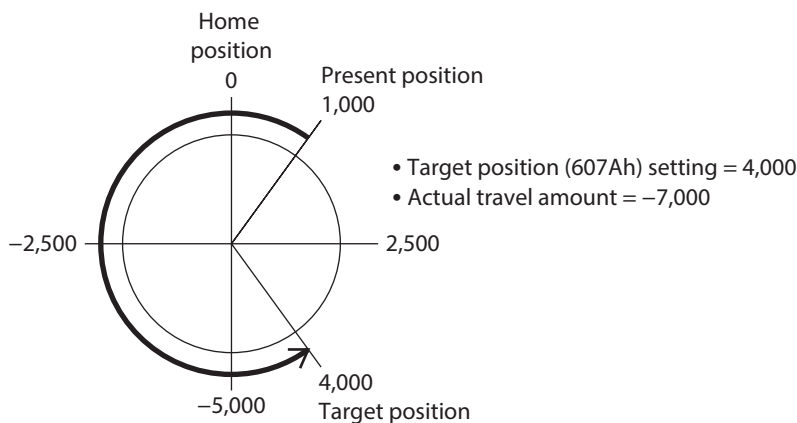
● **Wrap reverse direction absolute positioning**

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.88 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 for 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 |
| <ul style="list-style-type: none"> • Absolute positioning <p>* Sets the coordinate of the target position from the home position</p> | | |
| <ul style="list-style-type: none"> • Incremental positioning (based on command position) • Incremental positioning (based on feedback position) <p>* Sets the travel amount from the command position or the actual position to the target position.</p> | | |
| <ul style="list-style-type: none"> • Wrap absolute positioning <p>* Sets the target position on coordinates with the home position as a reference. Operation is performed within the wrap range.</p> | | |
| <ul style="list-style-type: none"> • Wrap proximity positioning <p>* Sets the target position on coordinates with the home position as a reference. Operation in the shortest distance is performed to the target position within the wrap range.</p> | | |
| <ul style="list-style-type: none"> • Wrap forward direction absolute positioning <p>* Sets the target position on coordinates with the home position as a reference. Operation in the forward direction is performed to the target position within the wrap range.</p> | | |
| <ul style="list-style-type: none"> • Wrap reverse direction absolute positioning <p>* Sets the target position on coordinates with the home position as a reference. Operation in the reverse direction is performed to the target position within the wrap range.</p> | | |

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

2-5 Cyclic synchronous velocity mode (CSV)

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

Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------------|-------|--------|-------|------|---|-----------|
| 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.51) | B |
| 6061h | 00h | Modes of operation display | INT8 | RO | TxPDO | – | – | – |
| 606Bh | 00h | Velocity demand value [Hz] | INT32 | RO | TxPDO | – | – | – |
| 606Ch | 00h | Velocity actual value [Hz] | INT32 | RO | TxPDO | – | – | – |
| 60FFh | 00h | Target velocity [Hz] | INT32 | RW | RxPDO | – | –4,000,000 to 4,000,000 (Initial value: 0) | A |

■ Controlword of the cyclic synchronous velocity mode

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

Details of Controlword

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

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.49.

■ Operation mode of the cyclic synchronous velocity mode

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

| Bit13 | Bit12 | Operation mode | Explanation |
|-------|-------|---|--|
| 0 | 0 | Continuous operation (Position control) | Continuous operation is executed at the "Target velocity (60FFh)." Operation is executed while the position deviation is monitored, so when a load exceeding the torque of the motor is applied, an alarm of overload or excessive position deviation is generated. If sudden position deviation occurs, for example, when a large load is removed, the motor accelerates suddenly or has overspeed to remove deviation. |
| 0 | 1 | Continuous operation (Speed control) | Continuous operation is executed at the "Target velocity (60FFh)." When a load exceeding the torque of the motor is applied, an alarm of overload is generated. |

| Bit13 | Bit12 | Operation mode | Explanation |
|-------|-------|---|--|
| 1 | 0 | Continuous operation (Push-motion) * | Continuous operation is executed at the "Target velocity (60FFh)." When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load. |
| 1 | 1 | Continuous operation (Torque control) * | In the cyclic synchronous velocity mode, it is the same movement as continuous operation (push-motion) and continuous operation (torque control). |



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

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

■ Statusword of the cyclic synchronous velocity mode

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

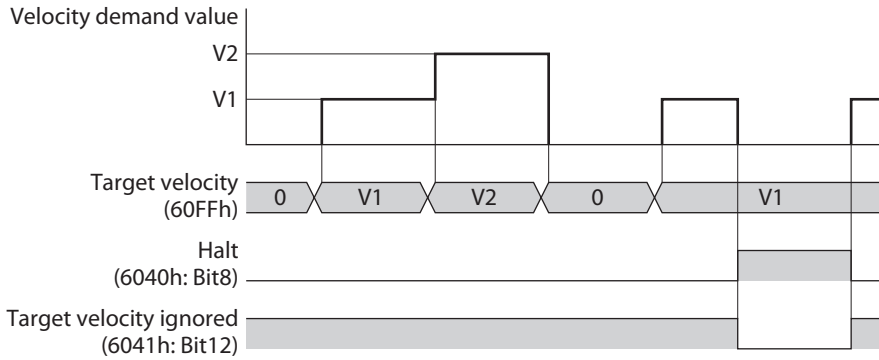
Details of statusword

| Bit | Name | Value | Description |
|-----|-------------------------|-------|--|
| 15 | TLC | 0 | A load does not reach the upper limit of the motor output torque. |
| | | 1 | A load reached the upper limit of the motor output torque. |
| 13 | Reserved | 0 | Reserved |
| 12 | Target velocity ignored | 0 | Target speed command disable When the state is any of the followings, the value is 0, and the target speed is disabled. <ul style="list-style-type: none"> • The drive state machine is other than "Operation enabled." • The motor is in a non-excitation state. • "Halt (6040h: Bit8)" has been 1. • The STOP input is ON. • The internal limit is in an active state. |
| | | 1 | Target speed command enable |
| 11 | Internal limit active | 0 | The function limitation by the internal limit is not in an active state. |
| | | 1 | The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. <ul style="list-style-type: none"> • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit |
| 10 | Reserved | 0 | Reserved |
| 9 | Remote | 1 | The value becomes 1 when the initialization is complete. |

| Bit | Name | Value | Description |
|-----|---------|-------|---|
| 7 | Warning | 0 | Information not present When the causes of information are cleared, the warning is automatically cleared to 0. |
| | | 1 | Information present. |

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

■ Operation in the cyclic synchronous velocity mode



2-6 Profile velocity mode (PV)

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

Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|-------|--------|-------|------|--|-----------|
| 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.51) | 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 the axis number (1 to 4) in the Sub-index because of the driver object in the manufacturer-specific area.

■ Controlword of the profile velocity mode

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

Details of controlword

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

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.49.

■ Operation mode of the profile velocity mode

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

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

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

■ Statusword of the profile velocity mode

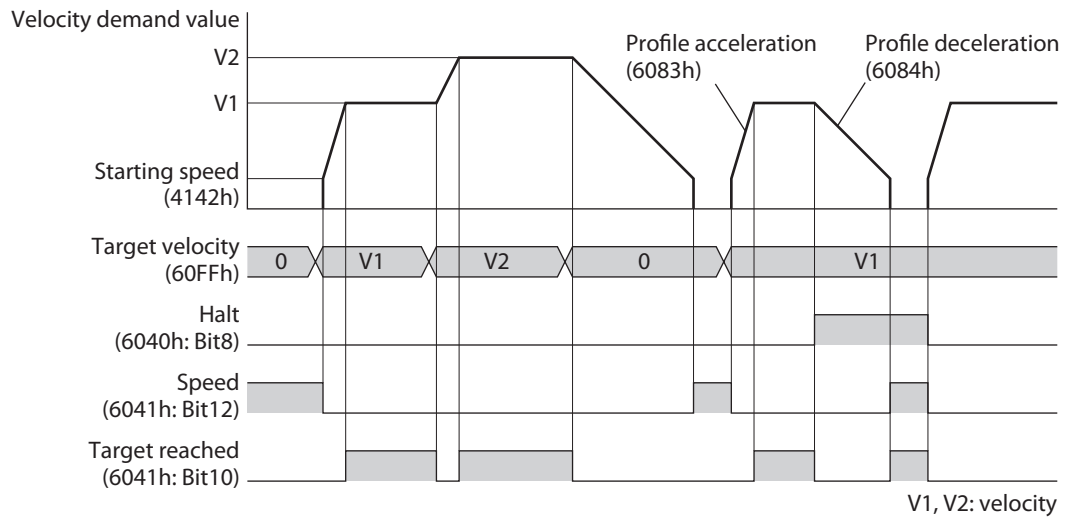
| Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
|-----------------------|--------------------|-------------------------|-----------------|-----------------------|-------------------|-------------|--------------------|
| Manufacturer specific | | Operation mode specific | | Internal limit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

Details of statusword

| Bit | Name | Value | Description |
|-----|-----------------------|-------|--|
| 15 | TLC | 0 | A load does not reach the upper limit of the motor output torque. |
| | | 1 | A load reached the upper limit of the motor output torque. |
| 12 | Speed | 0 | Internal speed command is other than 0. |
| | | 1 | Internal speed command is 0. |
| 11 | Internal limit active | 0 | The function limitation by the internal limit is not in an active state. |
| | | 1 | The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. <ul style="list-style-type: none"> • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit |
| 10 | Target reached | 0 | <ul style="list-style-type: none"> • When the "Halt (6040h: Bit8)" is 0: The internal command speed does not reach the "Target velocity (60FFh)." • When the "Halt (6040h: Bit8)" is 1: During deceleration stop. (Internal speed command is other than 0.) |
| | | 1 | <ul style="list-style-type: none"> • When the "Halt (6040h: Bit8)" is 0: The internal command speed reached the "Target velocity (60FFh)." When the Halt is 0, the status of the VA output signal is output. The judgment level of the target speed reached can be set in the "VA mode selection (4718h)" and "VA detection speed range (4719h)." • When the "Halt (6040h: Bit8)" is 1: Internal speed command is 0. |
| 9 | Remote | 1 | The value becomes 1 when the initialization is complete. |
| 7 | Warning | 0 | Information not present When the causes of information are cleared, the warning is automatically cleared to 0. |
| | | 1 | Information present. |

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

■ Operation in the profile velocity mode



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

2-7 Homing mode (HM)

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

● **Related object**

Refer to "Selection of return-to-home method" on p.72.

■ **Before starting operation; When the motorized actuator is used**

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

Since parameters stored in the driver are prioritized in the homing mode, change the setting according to the following steps.

1. Copy the fixed value (parameters) of the ABZO sensor to the driver. (⇒ p.170)
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. Cycle the control power supply of the driver.
With these steps, the driver parameters will be prioritized.

■ **Controlword of the homing mode**

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

Details of controlword

| Bit | Name | Value | Description |
|-----|------------------------|--------|--|
| 8 | Halt | 0 | Operation allowed |
| | | 1 | Stop operation. The stopping method is in accordance with the setting of the "Halt option code (605Dh)." |
| 4 | Homing operation start | 0 to 1 | Start of return-to-home operation If the Homing operation start is set to 0 during return-to-home operation, the motor decelerates to a stop. When the state is any of the followings, the command is not received, and an operation does not start. <ul style="list-style-type: none"> • During operation • "Halt (6040h: Bit8)" has been 1. • The STOP input is ON. • The drive state machine is other than "Operation enabled." • The motor is in a non-excitation state. |

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.49.

■ Statusword of the homing mode

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

● Details of statusword

| Bit | Name | Value | Description |
|-----|-----------------------|-------|--|
| 15 | TLC | 0 | A load does not reach the upper limit of the motor output torque. |
| | | 1 | A load reached the upper limit of the motor output torque. |
| 13 | Homing error | 0/1 | The status of the motor is output by combining the values in the "Homing error (6041h: Bit13)," "Homing attained (6041h: Bit12)" and "Target reached (6041h: Bit 10)." For details, refer to table below. |
| 12 | Homing attained | 0/1 | The status of the motor is output by combining the values in the "Homing error (6041h: Bit13)," "Homing attained (6041h: Bit12)" and "Target reached (6041h: Bit10)." For details, refer to table below. |
| 11 | Internal limit active | 0 | The function limitation by the internal limit is not in an active state. |
| | | 1 | The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. <ul style="list-style-type: none"> • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit |
| 10 | Target reached | 0/1 | The status of the motor is output by combining the values in the "Homing error (6041h: Bit13)," "Homing attained (6041h: Bit12)" and "Target reached (6041h: Bit10)." For details, refer to table below. |
| 9 | Remote | 1 | The value becomes 1 when the initialization is complete. |
| 7 | Warning | 0 | Information not present When the causes of information are cleared, the warning is automatically cleared to 0. |
| | | 1 | Information present. |

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

● Status output of motor

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

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

■ Selection of return-to-home method

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

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

* 35 and 37 perform the same action.

● Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|-------|--------|-----|------|--|-----------|
| 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 (⇒ p.72) | 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 [I=0.1%] | INT16 | RW | No | ○ | 0 to 1,000 (Initial value: 1,000) | B |
| 4163h | * | (HOME) Starting speed [Hz] | INT32 | RW | No | ○ | 1 to 4,000,000 (Initial value: 5,000) | B |
| 4169h | * | (HOME) Backward steps in 2 sensor home-seeking [step] | INT32 | RW | No | ○ | 0 to 8,388,607 (Initial value: 5,000) | B |
| 41C6h | * | Preset position [step] | INT32 | RW | No | ○ | -2,147,483,648 to 2,147,483,647 (Initial value: 0) | A |

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

● Return-to-home operation of our specifications

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

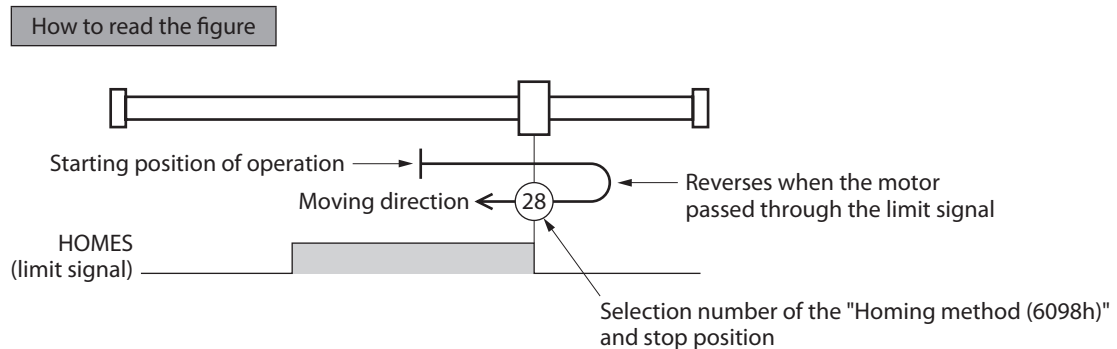
Related object (our specifications)

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|-------|--------|-----|------|---|-----------|
| 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 [I=0.1%] | INT16 | RW | No | ○ | 0 to 1,000 (Initial value: 1,000) | B |

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|-------|--------|-----|------|--|-----------|
| 4160h | * | (HOME) Home-seeking mode | U8 | RW | No | ○ | 0: 2-sensor mode 1: 3-sensor mode (Initial value) 2: One-way rotation mode 3: Push mode | B |
| 4161h | * | (HOME) Starting direction | U8 | RW | No | ○ | 0: Negative direction 1: Positive direction (Initial value) | B |
| 4163h | * | (HOME) Starting speed [Hz] | INT32 | RW | No | ○ | 1 to 4,000,000 (Initial value: 5,000) | B |
| 4166h | * | (HOME) SLIT detection | U8 | RW | No | ○ | 0: Disable (Initial value) 1: Enable | B |
| 4167h | * | (HOME) TIM/ZSG signal detection | U8 | RW | No | ○ | 0: Disable (Initial value) 1: TIM output 2: ZSG output | B |
| 4168h | * | (HOME) Position offset [Hz] | INT32 | RW | No | ○ | -2,147,483,647 to 2,147,483,647 (Initial value: 0) | B |
| 4169h | * | (HOME) Backward steps in 2 sensor home-seeking [step] | INT32 | RW | No | ○ | 0 to 8,388,607 (Initial value: 5,000) | B |
| 416Ah | * | (HOME) Operating amount of 1-sensor home-seeking [step] | INT32 | RW | No | ○ | 0 to 8,388,607 (Initial value: 5,000) | B |
| 416Bh | * | (HOME) Operating current for push-home-seeking [1=0.1%] | INT16 | RW | No | ○ | 0 to 1,000 (Initial value: 1,000) | B |
| 416Ch | * | (HOME) Backward steps after first entry in push-home-seeking [step] | INT32 | RW | No | ○ | 0 to 8,388,607 (Initial value: 0) | B |
| 416Dh | * | (HOME) Pushing-time in push-home-seeking [ms] | U16 | RW | No | ○ | 0 to 65,535 (Initial value: 200) | B |
| 416Eh | * | (HOME) Backward steps in push-home-seeking [step] | INT32 | RW | No | ○ | 0 to 8,388,607 (Initial value: 5,000) | B |
| 41C6h | * | Preset position [step] | INT32 | RW | No | ○ | -2,147,483,648 to 2,147,483,647 (Initial value: 0) | A |

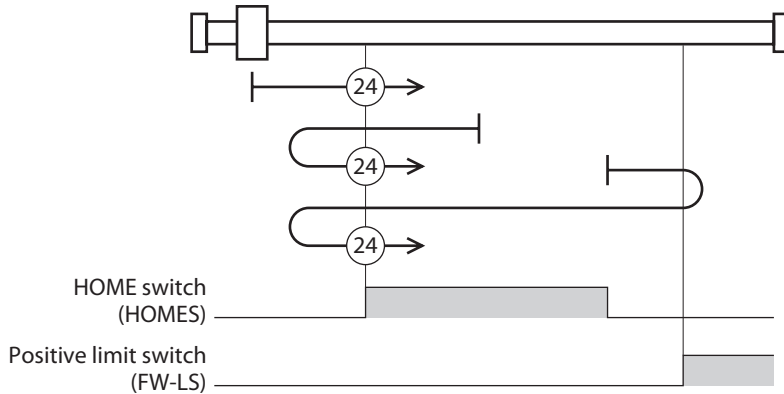
* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

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



● **Homing method: 24 [Return-to-home by the home position sensor (HOMES), starts in the positive direction]**

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

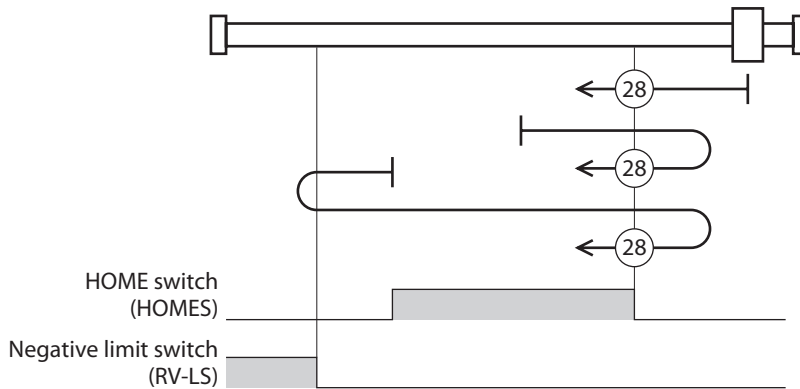


In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.

- (HOME) Home-seeking mode (4160h): 1 [3-sensor]
- (HOME) Starting direction (4161h): 1 [positive direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

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

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

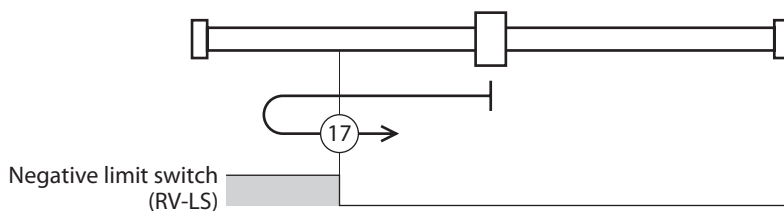


In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.

- (HOME) Home-seeking mode (4160h): 1 [3-sensor]
- (HOME) Starting direction (4161h): 0 [negative direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

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

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

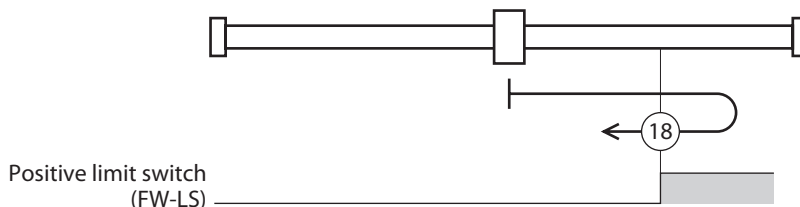


In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.

- (HOME) Home-seeking mode (4160h): 0 [2-sensor]
- (HOME) Starting direction (4161h): 0 [negative direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

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

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



In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.

- (HOME) Home-seeking mode (4160h): 0 [2-sensor]
- (HOME) Starting direction (4161h): 1 [positive direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

- **Homing method: 35, Homing method: 37 (home position preset)**

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

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

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

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

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

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

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

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

| | |
|-----------------------|---|
| Explanation of labels | <ul style="list-style-type: none"> • VR: Speed during search for switch (6099h-01h) • VS: (HOME) Starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when a home offset is set |
|-----------------------|---|

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

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

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

| | |
|-----------------------|---|
| Explanation of labels | <ul style="list-style-type: none"> ● VR: Speed during search for switch (6099h-01h) ● VS: (HOME) Starting speed (4163h) ● VL: Speed during search for zero (6099h-02h) ● - - -: Orbit when a home offset is set |
|-----------------------|---|

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

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

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

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

| | |
|-----------------------|---|
| Explanation of labels | <ul style="list-style-type: none"> • VR: Speed during search for switch (6099h-01h) • VS: (HOME) Starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when a home offset is set |
|-----------------------|---|

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

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

● **One-way rotation mode**

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

After pulling out, motor operates according to the value of "(HOME) Operating amount of 1 sensor home-seeking (416Ah)," and stops. The position at which the motor stopped becomes the home position.

| | |
|-----------------------|---|
| Explanation of labels | <ul style="list-style-type: none"> ● VR: Speed during search for switch (6099h-01h) ● VS: (HOME) Starting speed (4163h) ● VL: Speed during search for zero (6099h-02h) ● - - -: Orbit when a home offset is set |
|-----------------------|---|

| Starting position of return-to-home operation | Starting direction of return-to-home operation: Positive side | Starting direction of return-to-home operation: Negative side |
|---|---|---|
| HOMES | <p style="text-align: center;">HOMES</p> | <p style="text-align: center;">HOMES</p> |
| Other than HOMES | <p style="text-align: center;">HOMES</p> | <p style="text-align: center;">HOMES</p> |

* After pulling out of the HOME sensor, the motor rotates to stop according to the value set in the "(HOME) Operating amount of 1 sensor home-seeking (416Ah)."



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

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

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

| | |
|-----------------------|---|
| Explanation of labels | <ul style="list-style-type: none"> • VR: Speed during search for switch (6099h-01h) • VS: (HOME) Starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when a home offset is set |
|-----------------------|---|

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

* After pulling out of the HOME sensor, the motor rotates to stop according to the value set in the "(HOME) Operating amount of 1 sensor home-seeking (416Ah)."

● **Push-motion mode**

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



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

| | |
|-----------------------|---|
| Explanation of labels | <ul style="list-style-type: none"> ● VR: Speed during search for switch (6099h-01h) ● VS: (HOME) Starting speed (4163h) ● VL: Speed during search for zero (6099h-02h) ● - - -: Orbit when a home offset is set |
|-----------------------|---|

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

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

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

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

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

| | |
|-----------------------|---|
| Explanation of labels | <ul style="list-style-type: none"> • VR: Speed during search for switch (6099h-01h) • VS: (HOME) Starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when a home offset is set |
|-----------------------|---|

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

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

3 Function

3-1 Touch probe

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

The Touch probe has the Touch probe 1 and Touch probe 2.

● Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|-------|--------|-------|------|---|-----------|
| 60B8h | 00h | Touch probe function | U16 | RW | RxPDO | – | 0000h to FFFFh (Initial value: 0000h) | A |
| 60B9h | 00h | Touch probe status | U16 | RO | TxPDO | – | – | – |
| 60BAh | 00h | Touch probe position 1 positive value [step] | INT32 | RO | TxPDO | – | – | – |
| 60BBh | 00h | Touch probe position 1 negative value [step] | INT32 | RO | TxPDO | – | – | – |
| 60BCh | 00h | Touch probe position 2 positive value [step] | INT32 | RO | TxPDO | – | – | – |
| 60BDh | 00h | Touch probe position 2 negative value [step] | INT32 | RO | TxPDO | – | – | – |
| 44B0h | * | Touch probe 1 latch position | U8 | RW | No | – | 0: Latches the feedback position (Initial value) 1: Latches the command position | A |
| 44B1h | * | Touch probe 2 latch position | U8 | RW | No | – | 0: Latches the 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 the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

● Related signal

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

■ Details of touch probe function

The action of the touch probe is set in the "Touch probe function (60B8h)"

The action of the touch probe 1 is set in the lower 8 Bits, and that of the touch probe 2 is set in the upper 8 Bits.

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

■ Details of touch probe status

The status of the touch probe is output by the "Touch probe status (60B9h)."

The status of the touch probe 1 is output by the lower 8 Bits, and that of the touch probe 2 is output by the upper 8 Bits.

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

■ Trigger and latch position

A signal that is set as a trigger is selected by the trigger selection (Bit2/Bit10) of the "Touch probe function (60B8h)."

The ZSG output and TIM output can be selected by the "Touch probe TIM/ZSG signal select (44B2h/44B3h)."

The latch position varies depending on the signal that was set as the trigger. When the external latch input (EXT1 input, EXT2 input) is set as the trigger, the latch position can be set to either of the feedback position (actual position) or internal command position.

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

Related object

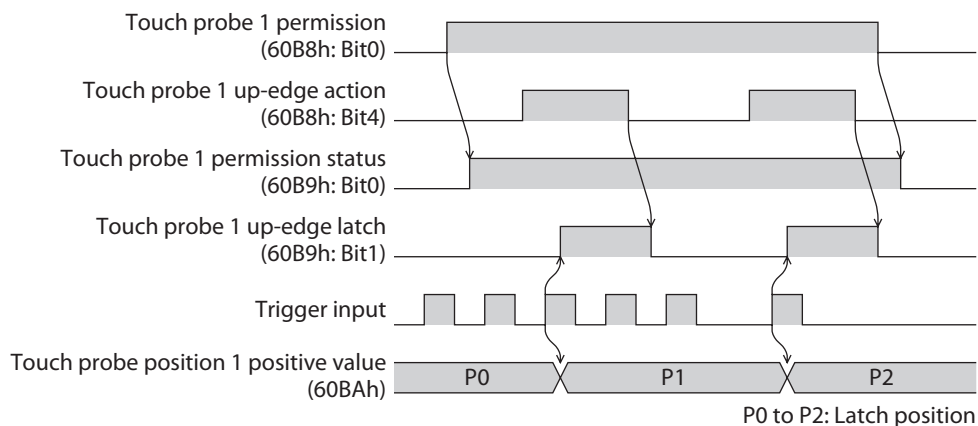
| Index | Sub | Object name | Initial value | Description |
|-------|-----|-------------------------------------|---------------|---|
| 44B0h | * | Touch probe 1 latch position | 0 | 0: Latches the feedback position (actual position) 1: Latches the command position |
| 44B1h | * | Touch probe 2 latch 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 the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

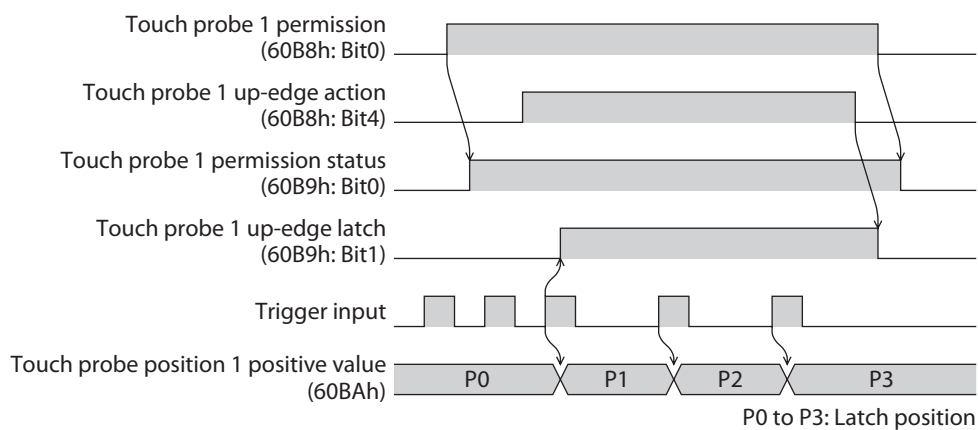
■ Operation sequence of the touch probe

The operation examples of touch probe 1 are shown below.

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



- If the trigger action is "Continuous operation (60B8h: Bit1 is 1)"



3-2 Resolution

When the "Gear ratio (6091h)" is set, the resolution per one rotation of the motor output shaft can be set.

- Resolution of the motor output shaft = $10,000 \times \text{"Electronic gear B (6091h-02h)"} / \text{"Electronic gear A (6091h-01h)"}$
- Factory setting: 10,000 P/R
- Setting range: 100 to 10,000 P/R

Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|-----------------------------------|-----------|
| 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 |



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

3-3 Wrap function

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

Related object

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

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

3-4 Operating current and standstill current

Set the base current rate (%) for the operating current and standstill current by the "Base current (4126h)."

- Operating current = Maximum output current × "Base current (4126h)" × "Operating current (4120h)"
- Standstill current = Maximum output current × "Base current (4126h)" × "Stop current (4128h)"
- Push current = Maximum output current × "Base current (4126h)" × "Push current (4121h)"



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

Related object

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

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

*2 With the profile position mode, it will become effective at start of operation.

3-5 Maintenance commands

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



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

Related object

| Index | Sub | Name | Description |
|-------|-----|-------------------------|--|
| 40C0h | * | Alarm reset | Resets the alarm that is present. Some alarms cannot be reset. |
| 40C2h | * | Clear alarm histories | Clears alarm history. |
| 40C5h | * | P-PRESET execution | Presets the command position. |
| 40C6h | * | Configuration | Executes the parameter recalculation and the setup. |
| 40C8h | * | Read batch NV memory | Reads the parameters saved in the non-volatile memory to the RAM. All parameters saved in the RAM are overwritten. |
| 40C9h | * | Write batch NV memory | Writes the parameters saved in the RAM to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times. |
| 40CAh | * | All data initialization | Resets the parameters saved in the non-volatile memory to their initial values. |
| 40CBh | * | Read from backup | Reads all the data from the backup area. |
| 40CCh | * | Write to backup | Writes all the data to the backup area. |

| Index | Sub | Name | Description |
|-------|-----|-----------------------------|--|
| 40CDh | * | Clear latch information | Clears the latch information of the cumulative load. This can be used when the "Cumulative load value auto clear (41B3h)" is set to "0: Does not clear." |
| 40CFh | * | Clear tripmeter | Clears the tripmeter. |
| 40D1h | * | ZSG-PRESET | Resets the position of the Z-phase. |
| 40D2h | * | Clear ZSG-PRESET | Clears the position data of the Z-phase reset by the "ZSG-PRESET (40D1h)" command. |
| 40D3h | * | Clear information | Clears information. |
| 40D4h | * | Clear information histories | Clears information history. |

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

■ How to execute maintenance commands

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

● Writing 1 to data (recommended)

When data is changed from 0 to 1 after 1 is written to it, the command is executed.

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

● Writing 2 to data

When 2 is written to data, the command is executed. After execution, the data is restored to 1 automatically.

Data does not need to restore to 1, and it can be written consecutively.

If commands which take time to write to the non-volatile memory such as "Write batch NV memory (40C9h)" are executed consecutively, increase the length of the intervals between commands.

■ Configuration

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

- An alarm is not present.
- The motor is not operating.
- I/O test, remote operation and downloading are not executed with the **MEXE02**.

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

| Item | Configuration is ready to execute | Configuration is being executed | After execution of configuration |
|--|---|---|----------------------------------|
| POWER LED/ALARM LED of the driver axis | POWER LED: Green lit ALARM LED : Off | POWER LED: Green blink ALARM LED : Red blink | Depends on the driver condition. |
| Electromagnetic brake | Hold/release | Hold | |
| Motor excitation | Excitation/non-excitation | Non-excitation | |
| Output signal | Enable | Disable | Enable |
| Input signal | Enable | Disable | Enable |



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

3-6 Assignment of I/O function

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

■ Assignment to input terminals

Input signals can be assigned to the input terminals IN0 to IN3 of the driver axis. For input signals that can be assigned, refer to p.95.

Related object

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

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

■ Assignment to the output terminals

Output signals can be assigned to the output terminals OUT0 to OUT2 of the driver axis. For output signals that can be assigned, refer to p.97.

Related object

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

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

■ Direct I/O

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

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

Related object

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

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

■ I/O status

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

| Driver object | Description | | | | | | | |
|-------------------------|-------------|-----------|----------|----------|--------|--------|-----------|----------|
| I/O status 1 (40B8h) | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| | SLIT | HOMES | RV-LS | FW-LS | RV-BLK | FW-BLK | – | – |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | SPD-LMT | CRNT-LMT | T-MODE | – | – | CCM | – | HMI |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | – | INFO-CLR | LAT-CLR | – | – | – | P-PRESET | ALM-RST |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| – | – | STOP | – | CLR | – | FREE | Not used | |
| I/O status 2 (40B9h) | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| | – | – | – | – | – | – | – | – |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | – | – | – | – | – | – | – | – |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | – | – | – | – | – | – | – | – |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| – | – | – | – | – | – | – | – | |
| I/O status 3 (40BAh) | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| | R15 | R14 | R13 | R12 | R11 | R10 | R9 | R8 |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | – | – | – | – | – | – | – | – |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| – | – | – | – | – | – | – | – | |
| I/O status 4 (40BBh) | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| | – | – | – | – | – | – | – | – |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | – | – | – | – | – | – | – | – |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | – | – | – | – | – | – | EXT2 | EXT1 |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| – | – | – | – | – | – | – | – | |
| I/O status 5 (40BCh) | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| | – | – | TIM | RND-ZERO | ZSG | RV-SLS | FW-SLS | RND-OVF |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | ORGN-STLD | PRST-STLD | PRST-DIS | – | – | – | ABSPEN | HOME-END |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | AUTO-CD | CRNT | VA | TLC | – | IN-POS | – | SYS-BSY |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| INFO | MOVE | – | READY | SYS-RDY | ALM-B | ALM-A | CONST-OFF | |

| Driver object | Description | | | | | | | |
|-------------------------|-------------|------------|-------------|-------------|-------------|-------------|------------|------------|
| | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| I/O status 6 (40BDh) | – | – | – | – | – | – | – | – |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | – | – | USR-OUT1 | USR-OUT0 | – | – | – | – |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | – | – | – | – | – | – | MBC | MPS |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| | AREA7 | AREA6 | AREA5 | AREA4 | AREA3 | AREA2 | AREA1 | AREA0 |
| I/O status 7 (40BEh) | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| | – | – | – | – | – | – | – | – |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | – | – | – | – | – | – | – | – |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | – | – | DCMD-FULL | DCMD-RDY | – | – | – | – |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| – | – | – | OPE-BSY | – | – | SPD-LMTD | CRNT-LMTD | |
| I/O status 8 (40BFh) | Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| | INFO-RBT | INFO-CFG | INFO-IOTEST | INFO-DSLMTD | – | – | – | – |
| | Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| | – | – | INFO-ODO | INFO-TRIP | INFO-CULD1 | INFO-CULD0 | INFO-RV-OT | INFO-FW-OT |
| | Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| | – | INFO-RND-E | INFO-EGR-E | – | INFO-PR-REQ | INFO-ZHOME | INFO-START | INFO-SPD |
| | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| – | INFO-OLTIME | INFO-UVOLT | INFO-OVOLT | INFO-MTRTMP | INFO-DRVTMP | INFO-POSERR | INFO-USRIO | |

Related object

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

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

■ Driver input command

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

(): Initial value

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

Related object

For input signals that can be assigned, refer to p.95.

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

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

■ Driver status

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

(): Initial value

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

Related object

For output signals that can be assigned, refer to p.97.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------------------|------|--------|-----|------|---|-----------|
| 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 | Effective |
|-------|-----|-------------------------|------|--------|-----|------|---|-----------|
| 4914h | * | R-OUT4 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 144 [HOME-END]) | C |
| 4915h | * | R-OUT5 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 204 [DCMD-RDY]) | C |
| 4916h | * | R-OUT6 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 135 [INFO]) | C |
| 4917h | * | R-OUT7 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 129 [ALM-A]) | C |
| 4918h | * | R-OUT8 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 136 [SYS-BSY]) | C |
| 4919h | * | R-OUT9 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 160 [AREA0]) | C |
| 491Ah | * | R-OUT10 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 161 [AREA1]) | C |
| 491Bh | * | R-OUT11 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 162 [AREA2]) | C |
| 491Ch | * | R-OUT12 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 157 [TIM]) | C |
| 491Dh | * | R-OUT13 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 134 [MOVE]) | C |
| 491Eh | * | R-OUT14 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 138 [IN-POS]) | C |
| 491Fh | * | R-OUT15 output function | U8 | RW | No | ○ | 0 to 255 (Initial value: 140 [TLC]) | C |

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

■ Input signal list

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

| Assignment No. | Signal name | Function | Status |
|----------------|-------------|---|---|
| 0 | Not used | Set when the input terminal is not used. | — |
| 1 | FREE | Cut off the current of the motor not to excite it. When an electromagnetic brake motor is used, the electromagnetic brake is released. | 0: No motion 1: Electromagnetic brake release+motor non-excitation |
| 3 | CLR | Clear the deviation (position deviation) between the command position and actual position to zero. | 0: No motion 1: Clear deviation |
| 5 | STOP | Stop the motor. | 0: No motion 1: Stop operation |
| 8 | ALM-RST | Release the alarm that is present. | 0: No motion 1: Reset alarm |
| 9 | P-PRESET | Rewrite the mechanical home position to the current position. | 0: No motion 1: Execute preset |
| 13 | LAT-CLR | Clear the latch information of the cumulative load value. This can be used when the "Cumulative load value auto clear (41B3h)" is set to "0: Does not clear." | 0: No motion 1: Clear latch information |
| 14 | INFO-CLR | Release the information status. | 0: No motion 1: Release information status |
| 16 | HMI | Release the function limitation of the MEXE02 . | 0: Function limitation 1: Release the function limitation |
| 18 | CCM | Change the control mode from the normal mode to the current control mode. | 0: Normal mode 1: Current control mode |
| 21 | T-MODE | Disable the overload alarm. | 0: No motion 1: Disable the overload alarm |

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

Note

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

■ Output signals list

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

| Assignment No. | Signal name | Function | Status |
|----------------|-----------------------------------|--|--|
| 0 | Not used | Set when the output terminal is not used. | – |
| 1 to 127 | Response signals (input signal_R) | Output in response to the corresponding input signal. | 0: Input signal is OFF 1: Input signal is ON |
| 128 | CONST-OFF | The output function is not used. | – |
| 129 | ALM-A | Output the alarm status of the driver (normally open). | 0: Alarm not present 1: Alarm present |
| 130 | ALM-B | Output the alarm status of the driver (normally closed). | 0: Alarm present 1: Alarm not present |
| 131 | SYS-RDY | Output when the control power supply of the driver is turned on. | 0: Normal 1: System preparation is complete |
| 132 | READY | Output when the driver is ready to operate. | 0: Not ready 1: Ready for operation |
| 134 | MOVE | Output when the motor operates. | 0: Motor stopped 1: Motor operating |
| 135 | INFO | Output the information status of the driver. | 0: Information not present 1: Information present |
| 136 | SYS-BSY | Output when the driver is in internal processing status. | 0: No internal processed 1: During internal processing |
| 138 | IN-POS | Output when the positioning operation is complete. This signal is not output in the cyclic synchronous position mode (CSP). | 0: During positioning operation 1: Positioning operation is complete |
| 140 | TLC | Output when the output torque reaches the upper limit value. | 0: Inside torque range 1: Outside torque range |
| 141 | VA | Output when the operating speed reaches the target speed. This signal is not output in the cyclic synchronous position mode (CSP). | 0: Not reach the target speed 1: Reach the target speed |
| 142 | CRNT | Output while the motor is excited. | 0: Motor non-excitation 1: Motor excitation |
| 143 | AUTO-CD | Output when the motor is in automatic current cutback status. | 0: Normal 1: Automatic current cutback status |
| 144 | HOME-END | Output upon completion of return-to-home operation and when position preset is executed. | 0: Not home position 1: Home position |
| 145 | ABSPEN | Output when the position coordinate is set. | 0: Position coordinate is not set 1: Position coordinate is set |
| 149 | PRST-DIS | Output when preset is required again to operate the motor after preset. | 0: Normal 1: Preset is not set |
| 150 | PRST-STLD | Output when the mechanical home position is set. | 0: Mechanical home position is not set 1: Mechanical home position has set |
| 151 | ORGN-STLD | Output when a mechanical home position suitable to the product is set at the time of factory shipment. | 0: Mechanical home position is not set 1: Mechanical home position has set |
| 152 | RND-OVF | Output is inverted when the wrap range is exceeded. (Toggle action) | 0 and 1 are switched every time the wrap range is exceeded. |
| 153 | FW-SLS | Output when the software limit in the forward direction is reached. | 0: Not reached the software limit in the forward direction 1: Reached the software limit in the forward direction |
| 154 | RV-SLS | Output when the software limit in the reverse direction is reached. | 0: Not reached the software limit in the reverse direction 1: Reached the software limit in the reverse direction |

| Assignment No. | Signal name | Function | Status |
|----------------|-------------|--|---|
| 155 | ZSG | Output every time the actual position of the motor rotates one revolution from the preset position. | 0: Normal 1: Motor one revolution |
| 156 | RND-ZERO | Output if the motor is at the home position of wrap range when the "Wrap setting (41C7h)" is set to "Enable." | 0: Not wrap home position 1: Wrap home position |
| 157 | TIM | Output every time the motor output shaft rotates 7.2° with reference to the command position. | 0: OFF 1: ON |
| 160 | AREA0 | Output when the motor is within the AREA0. | 0: Outside AREA 1: Inside AREA |
| 161 | AREA1 | Output when the motor is within the AREA1. | |
| 162 | AREA2 | Output when the motor is within the AREA2. | |
| 163 | AREA3 | Output when the motor is within the AREA3. | |
| 164 | AREA4 | Output when the motor is within the AREA4. | |
| 165 | AREA5 | Output when the motor is within the AREA5. | |
| 166 | AREA6 | Output when the motor is within the AREA6. | |
| 167 | AREA7 | Output when the motor is within the AREA7. | |
| 168 | MPS | Output when the main power supply is turned on. | 0: Main power supply OFF 1: Main power supply ON |
| 169 | MBC | Output when the electromagnetic brake is in release status. | 0: Electromagnetic brake hold 1: Electromagnetic brake release |
| 180 | USR-OUT0 | Output AND or OR of two types of output signals. | 0: OFF 1: ON |
| 181 | USR-OUT1 | | |
| 192 | CRNT-LMTD | Output when current limiting is executed. | 0: Without current limitation 1: With current limitation |
| 193 | SPD-LMTD | Output when speed limiting is executed. | 0: Without speed limiting 1: With speed limiting |
| 196 | OPE-BSY | Output when internal oscillation is executed. This signal is not output in the cyclic synchronous position mode (CSP). | 0: No internal oscillation 1: During internal oscillation |
| 204 | DCMD-RDY | Output when the driver is ready to operate. | 0: Not ready 1: Ready for operation |
| 205 | DCMD-FULL | Output when data is written in the buffer area. If an operation of Set of Set-points is performed in the Profile position mode, the operation command is written in the buffer area. | 0: No data in buffer 1: Data in buffer |
| 224 | INFO-USRIO | Output when corresponding information is generated. | 0: Information not present 1: Information present |
| 225 | INFO-POSERR | | |
| 226 | INFO-DRVTMP | | |
| 227 | INFO-MTRTMP | | |
| 228 | INFO-OVOLT | | |
| 229 | INFO-UVOLT | | |
| 230 | INFO-OLTIME | | |
| 232 | INFO-SPD | | |
| 233 | INFO-START | | |
| 234 | INFO-ZHOME | | |
| 235 | INFO-PR-REQ | | |
| 237 | INFO-EGR-E | | |
| 238 | INFO-RND-E | | |
| 240 | INFO-FW-OT | | |
| 241 | INFO-RV-OT | | |

| Assignment No. | Signal name | Function | Status |
|----------------|-------------|---|--|
| 242 | INFO-CULDO | Output when corresponding information is generated. | 0: Information not present 1: Information present |
| 243 | INFO-CULD1 | | |
| 244 | INFO-TRIP | | |
| 245 | INFO-ODO | | |
| 252 | INFO-DSLMTD | | |
| 253 | INFO-IOTEST | | |
| 254 | INFO-CFG | | |
| 255 | INFO-RBT | | |

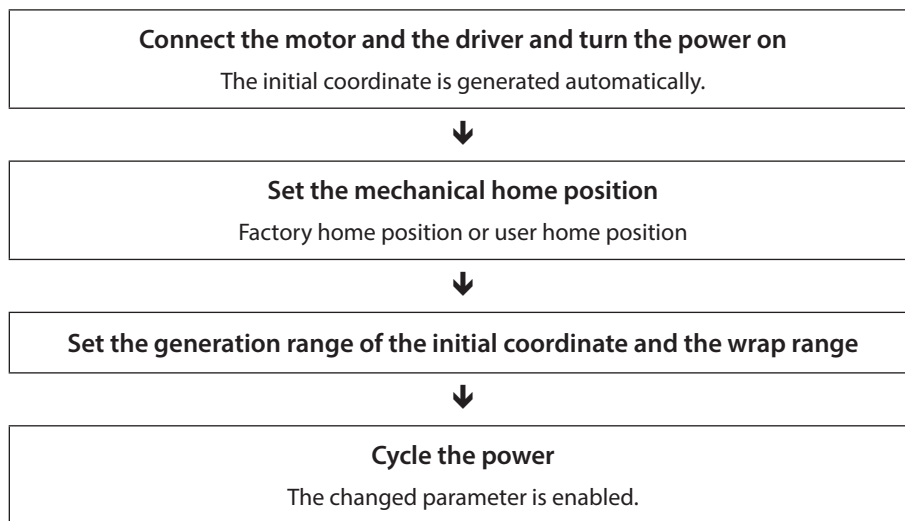
4 Position coordinate management

This chapter explains setting methods using the MEXE02.

4-1 Overview of position coordinate management

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

The coordinate is set in the following flow.



■ About ABZO sensor

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

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

Multi-rotation amount of ABZO sensor

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

■ About initial coordinate generation

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

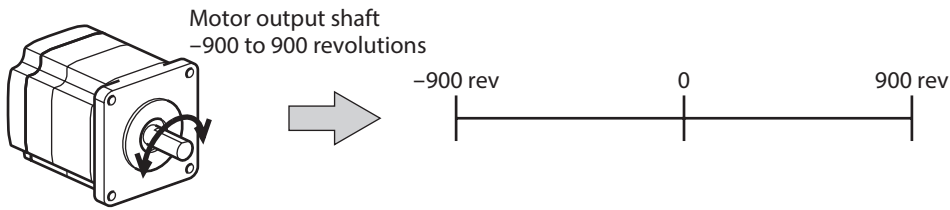
- Initial coordinate generation & wrap coordinate setting
- Initial coordinate generation & wrap setting range
- Initial coordinate generation & wrap range offset ratio
- Initial coordinate generation & wrap range offset value

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

● **Factory setting example of the motor**

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

To use coordinates both in forward and reverse directions, 1,800 revolutions are divided into positive and negative revolutions, 50% for each direction.



● **Setting example of motorized actuator**

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

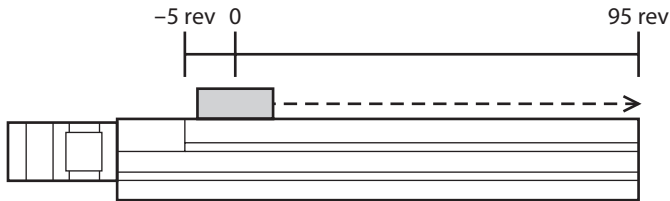
- Model of motorized actuator: 4
- Stroke of motorized actuator: 600 mm
- Pitch of motorized actuator: 6 mm/rev

Concept of initial coordinate

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

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

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



Setting examples of parameters

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

■ Wrap function

The wrap function is a function to automatically preset the position information of the current position when the number of revolutions of the motor output shaft exceeds the set range. Setting of wrap offset allows you to limit the operation area of the equipment and control the index table with coordinates on the positive and negative sides. For the specific setting methods, refer to p.107. (⇒p.107)

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

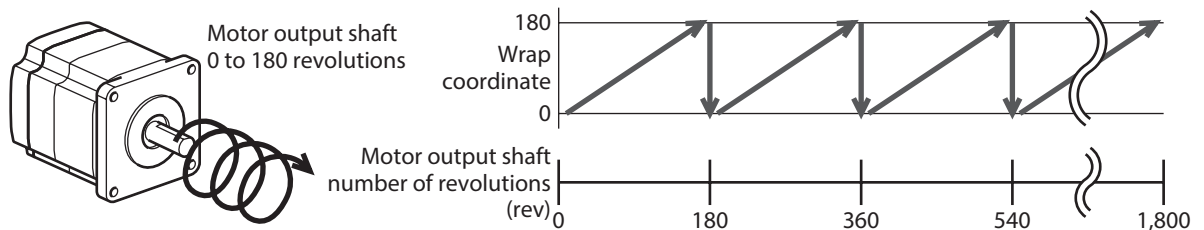
● Concept of wrap setting

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

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

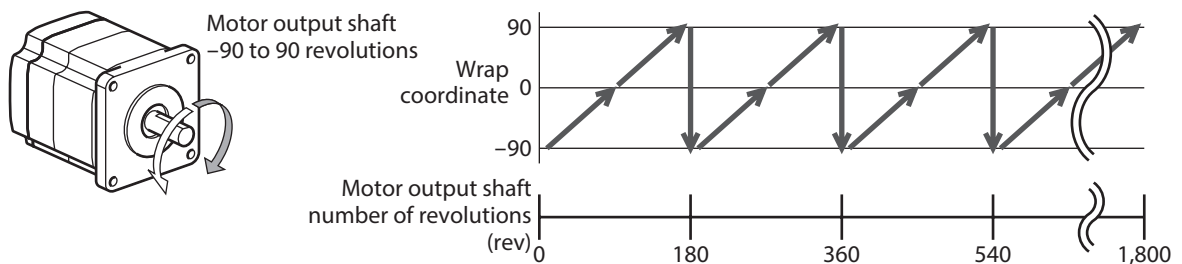
Therefore, set a value by which 1,800 can exactly be divided.

Example: When the wrap function executes if the motor rotates 180 times in the same direction



The present position of the motor is preset every 180 revolutions, however, the 32 bit counter in the driver is not preset.

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

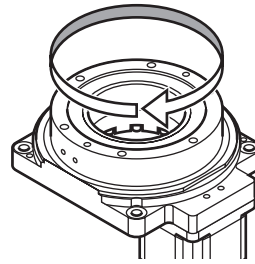


When the wrap setting range is exceeded, the symbol is reversed.

● **Setting example of index table**

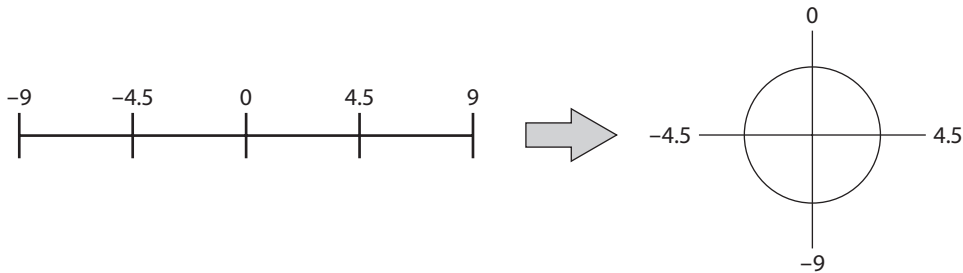
The following is an example in which the index table is made rotate once when the motor output shaft rotates 18 times.

- Gear ratio of motor: 18



Concept of initial coordinate

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



Setting examples of parameters

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

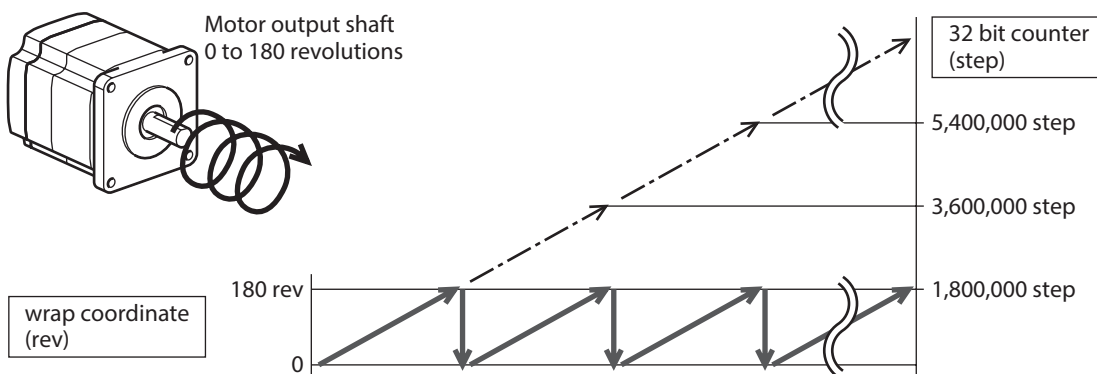
● **Relationship between the wrap function and the 32 bit counter inside the driver**

The 32 bit counter inside the driver outputs the position information of the motor as the number of steps regardless of whether the wrap function is enabled or disabled.

When the wrap function is enabled, the relationship between the wrap coordinate and 32 bit counter are as follows.

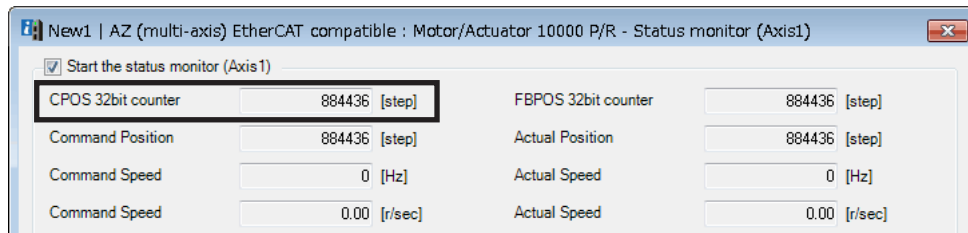
Example:

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

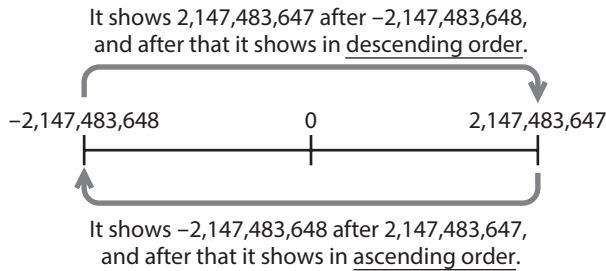


The present position of the motor is preset by 180 revolutions, but the 32 bit counter is not preset.

The value of the 32 bit counter can be checked on the status monitor (Axis1 to Axis4) screen of the **MEXE02**.



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



4-2 Position coordinate origin

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

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

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

Related parameters

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

■ Mechanical home position

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

● Factory home position

The factory home position is set in products with which the mechanism is pre-assembled to the motor, such as motorized actuators. It cannot be changed.

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

● User home position

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

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

■ Setting of mechanical home position

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

● Position preset

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

Related parameters

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

● Return-to-home operation

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

■ Cases in which the position coordinate is not set

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

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

4-3 Parameters related to ABZO sensor

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

Related parameters

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

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

■ **When the parameter of the wrap function is set**

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

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

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

4-4 Mechanism settings parameter

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

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

■ Motor rotation direction

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

Related parameters

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

4-5 Initial coordinate generation & wrap coordinate parameter

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

■ Wrap function

For the wrap function, refer to p.102. (⇒ p.102)

● Related operation mode

When the following operations are performed with the profile position mode (PP), set the wrap function.

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

Related parameters

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

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|---|---------------|
| Motor and mechanism | Initial coordinate generation & wrap setting range | Sets the wrap range. The command position returns to 0 when the motor has rotated for the number of times set here. Setting range Refer to the next table. | 1.0 |
| | Initial coordinate generation & wrap range offset ratio | Sets the offset ratio of the wrap range. Setting range 0 to 10,000 (1=0.01%) | 5,000 |
| | Initial coordinate generation & wrap range offset value | Sets the amount of offset of the wrap range. Setting range -536,870,912 to 536,870,911 steps | 0 |

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

Since the internal coordinate of the ABZO sensor is 1,800 rev (or 900 rev), select a value from the table below, and set in the "Initial coordinate generation & wrap setting range" parameter.

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

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

● **Setting example**

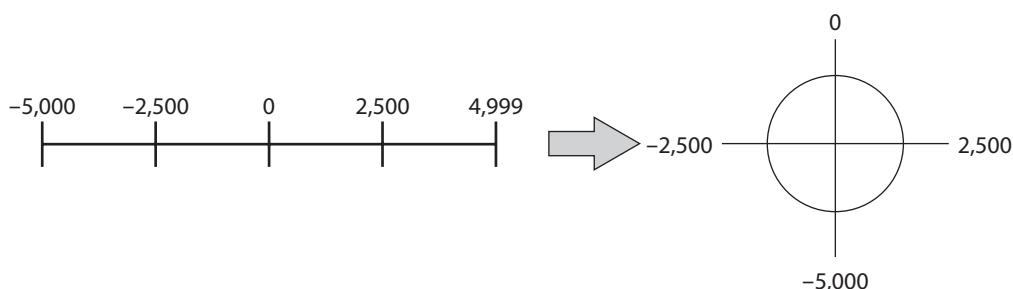
When "Initial coordinate generation & wrap range offset ratio" is set to "50%" and "Initial coordinate generation & wrap range offset value" to "0"

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

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

Position coordinate image

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

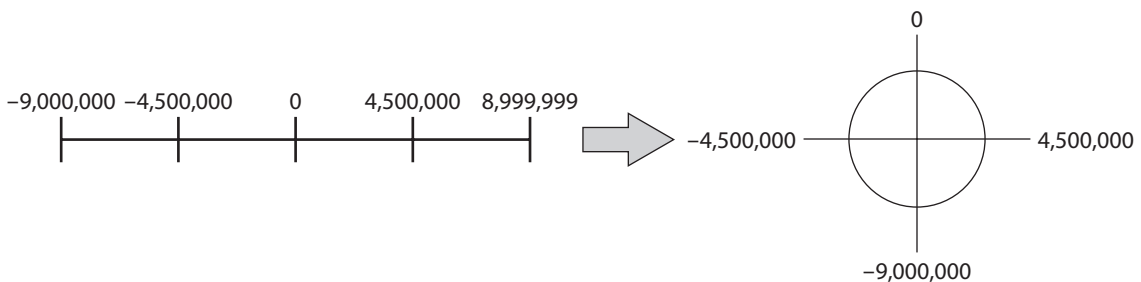


Example 2: Coordinate when the wrap setting range is 1,800 rev and the resolution is 10,000 P/R

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

Position coordinate image

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



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

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

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

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

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



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

Setting example 1

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

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

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

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

Setting example 2

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

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

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

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

Setting example 3

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

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

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

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

Setting example 4

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

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

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

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

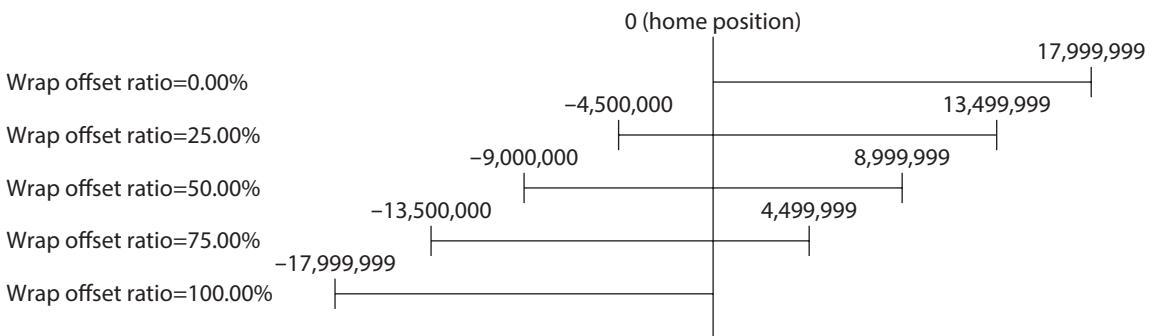
■ Wrap offset function

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

● Wrap offset ratio setting

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

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



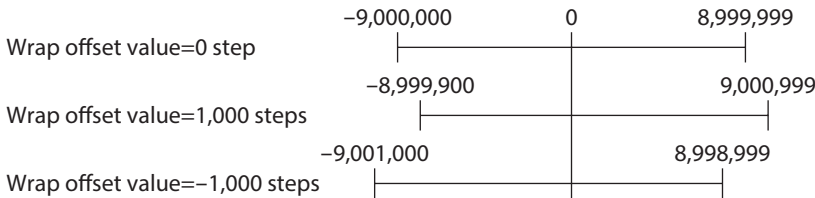
● Wrap range offset value setting

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

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

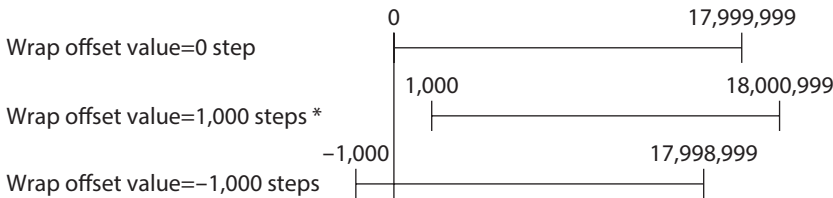
Setting example 1:

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



Setting example 2:

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



* Information of wrap setting error is generated

■ RND-ZERO output

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

● Usage example 1

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

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

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

● Usage example 2

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

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

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

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

Related parameters

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

5 Save of parameters

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

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

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

memo The non-volatile memory can be rewritten approximately 100,000 times.

■ How to execute maintenance commands

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

● Writing 1 to data (recommended)

When data is changed from 0 to 1 after 1 is written to it, the command is executed.

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

● Writing 2 to data

When 2 is written to data, the command is executed. After execution, the data is restored to 1 automatically.

Data does not need to restore to 1, and it can be written consecutively.

If commands which take time to write to the non-volatile memory such as "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 the object dictionary

Objects are constructed as follows.

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



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

■ Object dictionary item

| Item | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|--|----------------------|---------------------------------|-------------|----------------|------|---------|---------------------|------|------|----------|-------------------|-------------|-------|-----------|--------------------|-------------------|-------|-----------|--------------------|---------------------------------|----|-----------|---------------------|----------|-----|------------|----------------------|-------------|-----|------------|----------------------|--------------------|--------|----------------|------------------|---|
| Index, Sub, Name | Index, Sub-Index, and name of objects | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type | <p>Definition objects of data type. Abbreviations described in the table below are used in this manual.</p> <table border="1"> <thead> <tr> <th>Abbreviation</th> <th>Data type</th> <th>Description</th> <th>Range of value</th> </tr> </thead> <tbody> <tr> <td>BOOL</td> <td>Boolean</td> <td>1-bit unsigned data</td> <td>0, 1</td> </tr> <tr> <td>INT8</td> <td>Integer8</td> <td>8-bit signed data</td> <td>-128 to 127</td> </tr> <tr> <td>INT16</td> <td>Integer16</td> <td>16-bit signed data</td> <td>-32,768 to 32,767</td> </tr> <tr> <td>INT32</td> <td>Integer32</td> <td>32-bit signed data</td> <td>-2,147,483,648 to 2,147,483,647</td> </tr> <tr> <td>U8</td> <td>Unsigned8</td> <td>8-bit unsigned data</td> <td>0 to 255</td> </tr> <tr> <td>U16</td> <td>Unsigned16</td> <td>16-bit unsigned data</td> <td>0 to 65,535</td> </tr> <tr> <td>U32</td> <td>Unsigned32</td> <td>32-bit unsigned data</td> <td>0 to 4,294,967,295</td> </tr> <tr> <td>STRING</td> <td>Visible String</td> <td>Character string</td> <td>-</td> </tr> </tbody> </table> | Abbreviation | Data type | Description | Range of value | BOOL | Boolean | 1-bit unsigned data | 0, 1 | INT8 | Integer8 | 8-bit signed data | -128 to 127 | INT16 | Integer16 | 16-bit signed data | -32,768 to 32,767 | INT32 | Integer32 | 32-bit signed data | -2,147,483,648 to 2,147,483,647 | U8 | Unsigned8 | 8-bit unsigned data | 0 to 255 | U16 | Unsigned16 | 16-bit unsigned data | 0 to 65,535 | U32 | Unsigned32 | 32-bit unsigned data | 0 to 4,294,967,295 | STRING | Visible String | Character string | - |
| Abbreviation | Data type | Description | Range of value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOOL | Boolean | 1-bit unsigned data | 0, 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| INT8 | Integer8 | 8-bit signed data | -128 to 127 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| INT16 | Integer16 | 16-bit signed data | -32,768 to 32,767 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| INT32 | Integer32 | 32-bit signed data | -2,147,483,648 to 2,147,483,647 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| U8 | Unsigned8 | 8-bit unsigned data | 0 to 255 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| U16 | Unsigned16 | 16-bit unsigned data | 0 to 65,535 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| U32 | Unsigned32 | 32-bit unsigned data | 0 to 4,294,967,295 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STRING | Visible String | Character string | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Access | <p>Access method of objects.</p> <ul style="list-style-type: none"> • RW: Read and write of values are possible. • RO: Only read of values is possible. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PDO | <p>Indicates whether the PDO mapping of objects is possible.</p> <ul style="list-style-type: none"> • RxPDO: Mapping to RxPDO is possible. • TxPDO: Mapping to TxPDO is possible. • No: Mapping to PDO is not possible. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Item | Description |
|-----------|---|
| Save | Indicates whether data is saved in the non-volatile memory when the batch non-volatile memory write was executed. <ul style="list-style-type: none"> • O: Saved in the non-volatile memory. • -: Not saved in the non-volatile memory. |
| Effective | Indicates the timing to reflect the change when a value in the object was changed. <ul style="list-style-type: none"> • A: Effective immediately • B: Effective after stopping the operation • C: Effective after executing the configuration • D: Effective after turning the control power ON again |

6-2 Objects of the CoE communication area

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

● Device type (1000h)

Indicates the device profile.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------|------|--------|-----|------|------------|-----------|
| 1000h | 00h | Device type | U32 | RO | No | - | FFFF 0192h | - |

Details of range

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

● Error register (1001h)

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

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

● Manufacturer device name (1008h)

Indicates the product model name.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--------------------------|--------|--------|-----|------|---------------------------------|-----------|
| 1008h | 00h | Manufacturer device name | STRING | RO | No | - | AZD2A-KED, AZD3A-KED, AZD4A-KED | - |

● Manufacturer hardware version (1009h)

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------|--------|--------|-----|------|------------------|-----------|
| 1009h | 00h | Manufacturer hardware version | STRING | RO | No | - | Hardware version | - |

● Manufacturer software version (100Ah)

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------|--------|--------|-----|------|------------------|-----------|
| 100Ah | 00h | Manufacturer software version | STRING | RO | No | - | Software version | - |

- **Identity object (1018h)**

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

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

- **Axis1 receive PDO mapping 1 (1600h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 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 |

- **Axis1 receive PDO mapping 2 (1601h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 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 |

- **Axis1 receive PDO mapping 3 (1602h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis1 receive PDO mapping 4 (1603h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 1603h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 | | |

- **Axis2 receive PDO mapping 1 (1610h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis2 receive PDO mapping 2 (1611h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis2 receive PDO mapping 3 (1612h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | |

- **Axis2 receive PDO mapping 4 (1613h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 1613h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 | | |

- **Axis3 receive PDO mapping 1 (1620h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | |

- **Axis3 receive PDO mapping 2 (1621h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | |

- **Axis3 receive PDO mapping 3 (1622h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | |

- **Axis3 receive PDO mapping 4 (1623h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 1623h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 |

- **Axis4 receive PDO mapping 1 (1630h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 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 |

- **Axis4 receive PDO mapping 2 (1631h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 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 |

- **Axis4 receive PDO mapping 3 (1632h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis4 receive PDO mapping 4 (1633h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 1633h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 | | |

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

Sets the receive PDO mapping in the controller area.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis1 transmit PDO mapping 1 (1A00h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis1 transmit PDO mapping 2 (1A01h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis1 transmit PDO mapping 3 (1A02h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis1 transmit PDO mapping 4 (1A03h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 1A03h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 |

- **Axis2 transmit PDO mapping 1 (1A10h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 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 |

- **Axis2 transmit PDO mapping 2 (1A11h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 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 |

- **Axis2 transmit PDO mapping 3 (1A12h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis2 transmit PDO mapping 4 (1A13h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 1A13h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 | | |

- **Axis3 transmit PDO mapping 1 (1A20h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis3 transmit PDO mapping 2 (1A21h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis3 transmit PDO mapping 3 (1A22h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis3 transmit PDO mapping 4 (1A23h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 1A23h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 | | |

- **Axis4 transmit PDO mapping 1 (1A30h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis4 transmit PDO mapping 2 (1A31h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis4 transmit PDO mapping 3 (1A32h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----------------|-------------------|------|--------|-----|------|---|-----------|
| 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 | | |

- **Axis4 transmit PDO mapping 4 (1A33h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-----|------|---|-----------|
| 1A33h | 00h | Number of entries | U8 | RW | No | – | 0 to 8 (Initial value: 0) | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | | 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 |

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

Sets the transmit PDO mapping in the controller area.

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

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

Sets the communication type of sync manager (SM).

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

● Sync manager 2 PDO assignment (1C12h)

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

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

● Sync manager 3 PDO assignment (1C13h)

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

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

● Sync manager 2 synchronization (1C32h)

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

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

Details of sync manager 2 synchronization object

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

● Sync manager 3 synchronization (1C33h)

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

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

Details of sync manager 3 synchronization object

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

6-3 Objects of the profile area

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

- **Error code (603Fh)**

Indicates the error code being generated in the driver.

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



If an alarm is generated in the driver, the error code is indicated. The lower 8 Bits of the error code represents the alarm code, and the upper 8 Bits represents FFh. When an alarm is not present, "0000h" is indicated. See p.151 for alarm code.

- **Controlword (6040h)**

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------|------|--------|-------|------|--|-----------|
| 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 the drive state machine" on p.49 for details. |
| 1 | Enable voltage | |
| 2 | Quick stop | |
| 3 | Enable operation | |
| 4 | Operation mode specific | It varies according to the operation mode. For details, refer to each operation mode of the "drive profile." |
| 5 | | |
| 6 | | |
| 7 | Fault reset | Resets the alarm by changing from 0 to 1. |
| 8 | Halt | For details, refer to each operation mode of the "drive profile." |
| 9 | Operation mode specific | |
| 10 | Reserved | Reserved |
| 11 | Manufacturer specific | Manufacturer-specific bit. For details, refer to each operation mode of the "drive profile." |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |

● Statusword (6041h)

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------|------|--------|-------|------|-------|-----------|
| 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 the drive state machine" 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 is generated. When the information status is resolved, it is automatically cleared to 0. |
| 8 | Manufacturer specific | Manufacturer-specific bit. For details, refer to each operation mode of the "drive profile." |
| 9 | Remote | Changes to 1 when the driver initialization is complete. |
| 10 | Target reached | It varies according to the operation mode. For details, refer to each operation mode of the "drive profile." |
| 11 | Internal limit active | Indicates the status of the function limitation by the internal limit. For details, refer to each operation mode of the "drive profile." |
| 12 | Operation mode specific | It varies according to the operation mode. For details, refer to each operation mode of the "drive profile." |
| 13 | | |
| 14 | Manufacturer specific | Manufacturer-specific bit. For details, refer to each operation mode of the "drive profile." |
| 15 | | |

● Quick stop option code (605Ah)

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------------------|-------|--------|-----|------|--|-----------|
| 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 at the "Profile deceleration (6084h)." Moves to "Switch on disabled" after stop. |
| 2 | Decelerates to a stop at the "Quick stop deceleration (6085h)." Moves to "Switch on disabled" after stop. |
| 3 | Stops immediately. Moves to "Switch on disabled" after stop. |
| 5 | Decelerates to a stop at the "Profile deceleration (6084h)." Keeps "Quick stop active" after stop. |
| 6 | Decelerates to a stop at the "Quick stop deceleration (6085h)." Keeps "Quick stop active" after stop. |
| 7 | Stops immediately. Keeps "Quick stop active" after stop. |



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

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

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

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

Details of range

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

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

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

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

Details of range

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

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

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------------|-------|--------|-----|------|-------------------------|-----------|
| 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 at the "Profile deceleration (6084h)." Keeps "Operation enabled" after stop. |
| 2 | Decelerates to a stop at the "Quick stop deceleration (6085h)." Keeps "Operation enabled" after stop. |
| 3 | Stops immediately. Keeps "Operation enabled" after stop. |

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

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

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--------------------|------|--------|-------|------|----------------------------------|-----------|
| 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)**

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

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

- **Position demand value (6062h)**

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

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

- **Position actual value (6064h)**

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

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

- **Following error window (6065h)**

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

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

- **Position window (6067h)**

Sets the output range of the positioning completion output (IN-POS). It is the same as the "IN-POS positioning completion signal range" parameter of the **AZ** Series.

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 | Effective |
|-------|-----|--------------------------|------|--------|-----|------|---------------------------------|-----------|
| 6067h | 00h | Position window [1=0.1°] | U32 | RW | No | ○ | 0 to 180 (Initial value: 18) | A |

- **Velocity demand value (606Bh)**

Indicates the present command speed. (Hz)

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

- **Velocity actual value (606Ch)**

Indicates the present feedback speed. (Hz)

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

- **Target position (607Ah)**

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

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

- **Home offset (607Ch)**

Offsets the home position after completing return-to-home operation in the homing mode. The command position and the actual position after completing return-to-home will be the value set in the home offset.

Since the offset value is written to the same register as the "Preset position (41C6h)," if the "Home offset (607Ch)" is changed, the "Preset position (41C6h)" will be the same value.

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

- **Software position limit (607Dh)**

Sets the software limit. The negative software position limit represents the limit of the reverse direction, and the positive software position limit represents the limit of the forward direction.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------------|-------|--------|-----|------|--|-----------|
| 607Dh | 00h | Number of entries | U8 | RO | No | - | 2 | - |
| | 01h | Min. position limit [step] | INT32 | RW | No | ○ | -2,147,483,648 to 2,147,483,647 (Initial value: -2,147,483,648) | A |
| | 02h | Max. position limit [step] | INT32 | RW | No | ○ | -2,147,483,648 to 2,147,483,647 (Initial value: 2,147,483,647) | A |

- **Profile velocity (6081h)**

Sets the operating speed of the profile position mode.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-----------------------|------|--------|-------|------|---|-----------|
| 6081h | 00h | Profile velocity [Hz] | U32 | RW | RxPDO | ○ | 0 to 4,000,000 (Initial value: 10,000) | A |

- **Profile acceleration (6083h)**

Sets the acceleration rate for the profile position mode and profile velocity mode.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|------|--------|-------|------|--|-----------|
| 6083h | 00h | Profile acceleration [step/s ²] | U32 | RW | RxPDO | ○ | 1 to 1,000,000,000 (Initial value: 300,000) | B |

- **Profile deceleration (6084h)**

Sets the deceleration rate for the profile position mode and profile velocity mode.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|------|--------|-------|------|--|-----------|
| 6084h | 00h | Profile deceleration [step/s ²] | U32 | RW | RxPDO | ○ | 1 to 1,000,000,000 (Initial value: 300,000) | B |

- **Quick stop deceleration (6085h)**

Sets the deceleration rate for the quick stop. This is the deceleration rate for 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 | Effective |
|-------|-----|--|------|--------|-------|------|--|-----------|
| 6085h | 00h | Quick stop deceleration [step/s ²] | U32 | RW | RxPDO | ○ | 1 to 1,000,000,000 (Initial value: 1,000,000) | B |

- **Gear ratio (6091h)**

Sets the electronic gear. The electronic gear A is the denominator of the electronic gear, and the electronic gear B is the numerator of the electronic gear.

If the electronic gear is set, the resolution per revolution of the motor output shaft can be changed. Refer to "3-2 Resolution" on p.88 for details.

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

- **Homing method (6098h)**

Sets the return-to-home method for return-to-home operation. Refer to p.72 for details.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---------------|------|--------|-----|------|---|-----------|
| 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 by the limit sensor (FW-LS/RV-LS), starts in the negative direction |
| 18 | Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the positive direction |
| 24 | Return-to-home by the home position sensor (HOMES), starts in the positive direction |
| 28 | Return-to-home by the home position sensor (HOMES), starts in the negative direction |
| 35, 37 * | Home position preset |
| –1 | Return-to-home operation of our specifications |

* 35 and 37 perform the same action.

- **Homing speed (6099h)**

Sets the operating speed and actual speed for return-to-home operation. The actual speed is the operating speed for when aligning with the home position finally.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------------|------|--------|-----|------|---|-----------|
| 6099h | 00h | Number of entries | U8 | RO | No | – | 2 | – |
| | 01h | Speed during search for switch [Hz] | U32 | RW | No | ○ | 1 to 4,000,000 (Initial value: 10,000) | B |
| | 02h | Speed during search for zero [Hz] | U32 | RW | No | ○ | 1 to 10,000 (Initial value: 5,000) | B |

- **Homing acceleration (609Ah)**

Sets the acceleration and deceleration rate for return-to-home operation.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|------|--------|-----|------|--|-----------|
| 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)**

Sets the action of the touch probe. Refer to p.84 for details.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------|------|--------|-------|------|--|-----------|
| 60B8h | 00h | Touch probe function | U16 | RW | RxPDO | – | 0000h to FFFFh (Initial value: 0000h) | A |

Details of range

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

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

Indicates the status of the touch probe. Refer to p.84 for details.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--------------------|------|--------|-------|------|-------|-----------|
| 60B9h | 00h | Touch probe status | U16 | RO | TxPDO | – | – | – |

Details of range

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

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

Indicates the position latched at the up-edge of the touch probe 1.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|-------|--------|-------|------|-------|-----------|
| 60BAh | 00h | Touch probe position 1 positive value [step] | INT32 | RO | TxPDO | – | – | – |

- **Touch probe position 1 negative value (60BBh)**

Indicates the position latched at the down-edge of the touch probe 1.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|-------|--------|-------|------|-------|-----------|
| 60BBh | 00h | Touch probe position 1 negative value [step] | INT32 | RO | TxPDO | – | – | – |

- **Touch probe position 2 positive value (60BCh)**

Indicates the position latched at the up-edge of the touch probe 2.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|-------|--------|-------|------|-------|-----------|
| 60BCh | 00h | Touch probe position 2 positive value [step] | INT32 | RO | TxPDO | – | – | – |

- **Touch probe position 2 negative value (60BDh)**

Indicates the position latched at the down-edge of the touch probe 2.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|-------|--------|-------|------|-------|-----------|
| 60BDh | 00h | Touch probe position 2 negative value [step] | INT32 | RO | TxPDO | – | – | – |

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

Indicates the method of return-to-home supported by the driver.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-----------------------------|------|--------|-----|------|-------|-----------|
| 60E3h | 00h | Number of entries | U8 | RO | No | – | 6 | – |
| | 01h | 1st supported homing method | U16 | RO | No | – | 17 | – |
| | 02h | 2nd supported homing method | U16 | RO | No | – | 18 | – |
| | 03h | 3rd supported homing method | U16 | RO | No | – | 24 | – |
| | 04h | 4th supported homing method | U16 | RO | No | – | 28 | – |
| | 05h | 5th supported homing method | U16 | RO | No | – | 35 | – |
| | 06h | 6th supported homing method | U16 | RO | No | – | 37 | – |

Details of range

| Setting value | Description |
|---------------|--|
| 17 | Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the negative direction |
| 18 | Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the positive direction |
| 24 | Return-to-home by the home position sensor (HOMES), starts in the positive direction |
| 28 | Return-to-home by the home position sensor (HOMES), starts in the negative direction |
| 35, 37 * | Home position preset |

* 35 and 37 perform the same action.

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

Indicates the deviation between the command position and feedback position (actual position).

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

● Digital inputs (60FDh)

Indicates the direct I/O status.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------|------|--------|-------|------|-------|-----------|
| 60FDh | 00h | Digital inputs | U32 | RO | TxPDO | – | – | – |

Details of range

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

*1 To acquire the status, input signals are required to assign to the input terminals IN0 to IN3 of the input signal connector (CN9). Assign using the DIN0 input function (4840h) to DIN3 input function (4843h).

*2 Normally open; ON: Carrying current, OFF: Not carrying current
Normally closed; ON: Not carrying current, OFF: Carrying current

*3 Carrying current or "Not carrying current" state of the internal photocoupler is represented.

● Digital outputs (60FEh)

Controls the electromagnetic brake.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------|------|--------|-------|------|---|-----------|
| 60FEh | 00h | Number of entries | U8 | RO | No | – | 2 | – |
| | 01h | Physical outputs | U32 | RW | RxPDO | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |
| | 02h | Bit mask | U32 | RW | No | – | 0000 0000h to FFFF FFFFh (Initial value: 0000 0000h) | A |

Details of the physical outputs

| Bit | Name | Description |
|---------|-------------------------------|---|
| 0 | Electromagnetic brake control | 0: Electromagnetic brake release 1: Electromagnetic brake hold |
| 1 to 31 | – | Reserved |

Details of the bit mask

| Bit | Name | Description |
|---------|--------------|---|
| 0 | Mask of Bit0 | 0: Brake control of physical outputs disable 1: Brake control of physical outputs enable |
| 1 to 31 | – | Reserved |

- **Target velocity (60FFh)**

Sets the operating speed for the cyclic synchronous velocity mode and Profile velocity mode.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------|-------|--------|-------|------|---|-----------|
| 60FFh | 00h | Target velocity [Hz] | INT32 | RW | RxPDO | – | –4,000,000 to 4,000,000 (Initial value: 0) | A |

- **Supported drive modes (6502h)**

Indicates the operation mode supported by the product.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-----------------------|------|--------|-----|------|------------|-----------|
| 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)**

Indicates the device type and profile number.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-----------------------|------|--------|-----|------|------------|-----------|
| 67FFh | 00h | Device profile number | U32 | RO | No | – | 0004 0192h | – |

Details of range

| Bit | Name | Description |
|----------|----------------|-----------------------|
| 0 to 15 | Device profile | 0192h: DS402 |
| 16 to 31 | Device type | 0004h: Stepping motor |

6-4 Objects of the manufacturer-specific area

These are our specific objects.

■ Controller objects

Indicates the status of the entire driver, and perform the control.

● Controller status 1 (2E31h)

Indicates the status of the controller axis.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---------------------|------|--------|-------|------|-------|-----------|
| 2E31h | 00h | Controller status 1 | U8 | RO | TxPDO | – | – | – |

Details of range

| Bit | Name | Value | Description |
|-----|----------|-------|---|
| 0 | ALM | 0 | An alarm is not generated in the controller axis. |
| | | 1 | An alarm is being generated in the controller axis. |
| 1 | Reserved | 0 | Reserved |
| 2 | C-SUC | 0 | An error occurs in communication between the controller axis and driver axis. Communication is normally started after about 2 seconds when the control power supply is turned on. The value is 0 during initialization of communication. |
| | | 1 | Communication between the controller axis and driver axis is being performed normally. The value is 1 when communication is being performed normally in all axes that request the connection of the driver axis. The connection request of the driver axis can be checked by the "Controller status 5 (2E35h)," and the communication response can be checked with the "Controller status 6 (2E36h)." |
| 3 | Reserved | 0 | Reserved |
| 4 | TH-ALM | 0 | The accessory regeneration resistor is not overheating. |
| | | 1 | The accessory regeneration resistor is overheating. Or thermal input signal of the regeneration resistor is not connected. |
| 5 | Reserved | 0 | Reserved |
| 6 | FAN-ALM | 0 | A standstill state of the accessory fan is not detected. |
| | | 1 | A standstill state of the accessory fan was detected. Or a fan is not connected. If a standstill state of the fan was detected for 10 consecutive seconds during the operation command of the fan, the value changes to 1. |
| 7 | OH | 0 | The operation command of the accessory fan is OFF. |
| | | 1 | The operation command of the accessory fan is performed. If information of an overheat in the driver axis is generated, the value changes to 1. |

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

Indicates the status of the alarm generation in the driver axis.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---------------------|------|--------|-------|------|-------|-----------|
| 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 controller axis 1. |
| 1 | ALM-Axis2 | 0 | An alarm is not generated in the driver axis 2. |
| | | 1 | An alarm is being generated in the controller axis 2. |
| 2 | ALM-Axis3 | 0 | An alarm is not generated in the driver axis 3. |
| | | 1 | An alarm is being generated in the controller axis 3. |
| 3 | ALM-Axis4 | 0 | An alarm is not generated in the driver axis 4. |
| | | 1 | An alarm is being generated in the controller axis 4. |
| 4 to 7 | Reserved | 0 | Reserved |

- **Controller status 3 (2E33h)**

The Controller status 3 is reserved.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---------------------|------|--------|-------|------|-------|-----------|
| 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 | Effective |
|-------|-----|---------------------|------|--------|-------|------|-------|-----------|
| 2E34h | 00h | Controller status 4 | U8 | RO | TxPDO | – | – | – |

- **Controller status 5 (2E35h)**

Indicates the connection request of internal communication.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---------------------|------|--------|-------|------|-------|-----------|
| 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. |

| Bit | Name | Value | Description |
|--------|----------|-------|--|
| 2 | REQ3 | 0 | The status is disabled since there is no communication request with the driver axis 3. |
| | | 1 | The status is enabled since there is a communication request with the driver axis 3. |
| 3 | REQ4 | 0 | The status is disabled since there is no communication request with the driver axis 4. |
| | | 1 | The status is enabled since there is a communication request with the driver axis 4. |
| 4 to 7 | Reserved | 0 | Reserved |

- **Controller status 6 (2E36h)**

Indicates the connection response of internal communication.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---------------------|------|--------|-------|------|-------|-----------|
| 2E36h | 00h | Controller status 6 | U8 | RO | TxPDO | – | – | – |

Details of range

| Bit | Name | Value | Description |
|--------|----------|-------|--|
| 0 | LINK1 | 0 | Communication with the driver axis 1 is not established. |
| | | 1 | Communication with the driver axis 1 has been established. |
| 1 | LINK2 | 0 | Communication with the driver axis 2 is not established. |
| | | 1 | Communication with the driver axis 2 has been established. |
| 2 | LINK3 | 0 | Communication with the driver axis 3 is not established. |
| | | 1 | Communication with the driver axis 3 has been established. |
| 3 | LINK4 | 0 | Communication with the driver axis 4 is not established. |
| | | 1 | Communication with the driver axis 4 has been established. |
| 4 to 7 | Reserved | 0 | Reserved |

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

Controls the status of the controller axis.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------|------|--------|-------|------|------------|-----------|
| 2F01h | 00h | Controller command 1 | U8 | RW | RxPDO | – | 00h to FFh | A |

Details of range

| Bit | Name | Value | Description |
|--------|----------|--------|---|
| 0 | ALM-RST | 0 to 1 | Reset the alarm of the controller axis. |
| 1 to 7 | Reserved | 0 | Reserved |

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

Controls the status of the driver axis.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------|------|--------|-------|------|------------|-----------|
| 2F02h | 00h | Controller command 2 | U8 | RW | RxPDO | – | 00h to FFh | A |

Details of range

| Bit | Name | Value | Description |
|--------|-------------|--------|---|
| 0 | ALM-RST-DRV | 0 to 1 | Resets alarms in all driver axes at a time. |
| 1 | STOP-DRV | 0 | The operation of the driver axis does not stop. |
| | | 1 | Stops the operations for all driver axes. The stop action is followed by the "STOP input action (4700h)." |
| 2 to 7 | Reserved | 0 | Reserved |

● Controller command 3 (2F03h)

Executes the position preset (P-PRESET) of the driver axis. If the position preset is performed, the command position and actual position becomes the value set in the "Home offset (607Ch)," and the home position is set. Set the "Home offset (607Ch)" per axis.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------|------|--------|-------|------|------------|-----------|
| 2F03h | 00h | Controller command 3 | U8 | RW | RxPDO | – | 00h to FFh | A |

Details of range

| Bit | Name | Value | Description |
|--------|--------------|--------|---|
| 0 | PRESET-Axis1 | 0 to 1 | Performs the position preset for the driver axis 1. |
| 1 | PRESET-Axis2 | 0 to 1 | Performs the position preset for the driver axis 2. |
| 2 | PRESET-Axis3 | 0 to 1 | Performs the position preset for the driver axis 3. |
| 3 | PRESET-Axis4 | 0 to 1 | Performs the position preset for the driver axis 4. |
| 4 to 7 | Reserved | 0 | Reserved |

■ Driver objects

These are objects for the driver axis 1 to driver axis 4.

This document describes the sub-index as " * ." Access after setting the axis number (1 to 4) in the sub-index of each object. Refer to the "[AZ Series Function Edition](#)" for driver objects that are not described in this document.

● Operation voltage mode (40B7h)

Indicates the voltage mode of the actual main power supply. Sets the voltage mode of the main power supply using the "Main power mode (41FAh)."

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------|------|--------|-----|------|-------|-----------|
| 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)

Setting method of the current of push-motion operation is selected.

When "0: Push current" is selected, set with the push current (4121h). Set the current value other than push-motion operation with the Operating current (4120h).

When "1: Operating current" is selected, set the current value for all operation with the Operating current (4120h).

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|------|--------|-----|------|----------------------|-----------|
| 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 | ○ | | A |
| | 03h | Axis 3 Current setting during push-motion | U8 | RW | No | ○ | | A |
| | 04h | Axis 4 Current setting during push-motion | U8 | RW | No | ○ | | A |

Details of range

| Setting value | Description |
|---------------|-------------------|
| 0 | Push current |
| 1 | Operating current |

- **Non-excitation mode selection (413Dh)**

Selects whether to enable the dynamic brake status or the free-run status when the motor is in a non-excitation state. In the dynamic brake status, the motor windings will be in a state of being short-circuited inside the driver, and the braking torque will generate. In the free-run status, the dynamic brake will be disabled, and the braking torque will not generate.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--------------------------------------|------|--------|-----|------|----------------------|-----------|
| 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)**

Sets the operation mode for wrap positioning operation.

For details about operation mode, refer to "Operation mode of the profile position mode" on p.59.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------------------------|------|--------|-------|------|----------------------------|-----------|
| 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 | B |
| | 03h | Axis 3 Wrap positioning mode | U8 | RW | RxPDO | ○ | 0 (Initial value), 1, 2, 3 | B |
| | 04h | Axis 4 Wrap positioning mode | U8 | RW | RxPDO | ○ | 0 (Initial value), 1, 2, 3 | B |

Details of range

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

- **RG overheat alarm (4185h)**

Sets the action for when the overheat status was detected by an accessory regeneration resistor. If any of the driver axes is set to enable, all driver axes are enabled.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--------------------------|------|--------|-----|------|----------------------|-----------|
| 4185h | 00h | Number of entries | U8 | RO | No | – | 4 | – |
| | 01h | Axis 1 RG overheat alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |
| | 02h | Axis 2 RG overheat alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |
| | 03h | Axis 3 RG overheat alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |
| | 04h | Axis 4 RG overheat alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |

Details of range

| Setting value | Description |
|---------------|--|
| 0 | Disable: Even if an overheat of the regeneration resistor was detected, an alarm is not generated. |
| 1 | Enable: If an overheat of the regeneration resistor is detected, an alarm is generated. |

- **FAN low speed alarm (4186h)**

Sets the action for when the standstill state of the accessory fan was detected. If any of the driver axes is set to enable, all driver axes are enabled.

If the driver temperature information is generated in the driver axis, the operation command is sent from the driver to the fan. If a standstill state of the fan was detected for 10 consecutive seconds during the operation command of the fan, an alarm of the fan low-speed is generated.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|----------------------------|------|--------|-----|------|----------------------|-----------|
| 4186h | 00h | Number of entries | U8 | RO | No | – | 4 | – |
| | 01h | Axis 1 FAN low speed alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |
| | 02h | Axis 2 FAN low speed alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |
| | 03h | Axis 3 FAN low speed alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |
| | 04h | Axis 4 FAN low speed alarm | U8 | RW | No | ○ | 0 (Initial value), 1 | A |

Details of range

| Setting value | Description |
|---------------|--|
| 0 | Disable: Even if a standstill state of the fan is detected, an alarm is not generated. |
| 1 | Enable: If a standstill state of the fan is detected, an alarm is generated. |

● Other axis alarm (4187h)

When an alarm is detected in any of the driver axes, it causes the alarm to generate in all other driver axes. If any of the driver axes is set to enable, all driver axes are enabled.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------|------|--------|-----|------|----------------------|-----------|
| 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 was detected in any of the driver axes, it is not generated in other driver axes. |
| 1 | Enable: If an alarm is detected in any of the driver axes, it is generated in all other driver axes. |

● Main power mode (41FAh)

Sets the voltage mode of the main power supply. Apply the same setting for all the driver axes.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|------------------------|------|--------|-----|------|--------------------------|-----------|
| 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. Unless the voltage mode is set correctly, the torque may decrease or vibration may increase.
- If –1 is set, after the control power supply is supplied, the voltage value is automatically discriminated when the main power supply is turned on first. Be sure to shut off the control power supply before changing the voltage of the main power supply.
- When 48 VDC is used, if the rise time of 50 ms or more is needed while the driver input voltage rises to 32 V from 10 V, set the value to 1 instead of –1 (automatic discrimination). If the rise time is slow, the voltage mode may wrongly be recognized as 24 VDC, resulting in torque deterioration or vibration.
- The voltage mode actually operated can be checked by the "Operation voltage mode (40B7h)."

- **Touch probe 1 latch position (44B0h)**

Sets the position to latch by the external latch input (EXT1). The changed value is applied when the "Touch probe 1 permission (60B8h: bit0)" is changed from 0 to 1.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------------|------|--------|-----|------|----------------------|-----------|
| 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 feedback position (actual position). |
| 1 | Latches the command position. |

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

Sets the position to latch by the external latch input (EXT2). The changed value is applied when the "Touch probe 2 permission (60B8h: bit0)" is changed from 0 to 1.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------------|------|--------|-----|------|----------------------|-----------|
| 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 feedback position (actual position). |
| 1 | Latches the command position. |

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

Sets the ZGS output or TIM output as a trigger. The changed value is applied when the "Touch probe 1 permission (60B8h: bit0)" is changed from 0 to 1.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|------|--------|-----|------|----------------------|-----------|
| 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)**

Sets the ZGS output or TIM output as a trigger. The changed value is applied when the "Touch probe 2 permission (60B8h: bit8)" is changed from 0 to 1.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|------|--------|-----|------|----------------------|-----------|
| 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)**

Indicates the CPU number of the software of the driver axis.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------|------|--------|-----|------|-------|-----------|
| 4642h | 00h | Number of entries | U8 | RO | No | – | 4 | – |
| | 01h | Axis 1 Driver axis CPU number | U16 | RO | No | – | – | – |
| | 02h | Axis 2 Driver axis CPU number | U16 | RO | No | – | – | – |
| | 03h | Axis 3 Driver axis CPU number | U16 | RO | No | – | – | – |
| | 04h | Axis 4 Driver axis CPU number | U16 | RO | No | – | – | – |

- **Driver axis software version (4643h)**

Indicates the software version of the driver. 0100h is indicated when the version is 1.00.

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|-------------------------------------|------|--------|-----|------|-------|-----------|
| 4643h | 00h | Number of entries | U8 | RO | No | – | 4 | – |
| | 01h | Axis 1 Driver axis software version | U16 | RO | No | – | – | – |
| | 02h | Axis 2 Driver axis software version | U16 | RO | No | – | – | – |
| | 03h | Axis 3 Driver axis software version | U16 | RO | No | – | – | – |
| | 04h | Axis 4 Driver axis software version | U16 | RO | No | – | – | – |

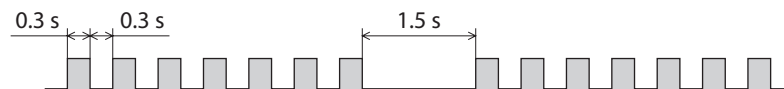
7 Alarm and information

This chapter explains the alarm function and the information function.

7-1 Alarms

The driver is equipped with an alarm function that protects it from temperature rise, connection failure, erroneous operation, etc. When an alarm is generated, the ALM-A output is turned ON and the ALM-B output OFF, and the motor stops. At the same time, the ALARM LED blinks in red. The cause of the alarm can be checked by counting the number of times the ALARM LED blinks.

Example of the ALARM LED blinking (Seven times blinking)



■ Alarm reset

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

- Set the "Fault reset (6040h: Bit7)" of the controlword to 1. (It is enabled when changing from 0 to 1.)
- Set the "ALM-RST-DRV (Bit0)" of the "Controller command 2 (2F02h)" to 1. (It is enabled when changing from 0 to 1.)
- Turn the ALM-RST input from OFF to ON. (The alarm will be reset at the ON edge of the ALM-RST input.)
- Perform an alarm reset using the **MEXE02**.
- Cycle the power.



When turning on the control power supply again, turn off the control power supply and wait for at least 5 seconds before doing so. Turning on the control power supply again immediately after turning off may cause damage to the driver.



- Some alarms cannot be reset other than cycling the power. Check with the "Alarm list" on p.151.
- An alarm of the absolute position error can be reset if the power supply is cycled after the position preset is executed. If it cannot be reset with these methods, the ABZO sensor may be damaged.

■ Alarm records

Up to 10 generated alarms are saved in the non-volatile memory in order of the latest to oldest. Alarm records stored in the non-volatile memory can be read or cleared when performing any of the following operations.

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

■ Alarm list

● Alarms for the controller axis

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset operation |
|------------|----------------------|---------------------------------------|---|---|-----------------------------|
| 41h | 9 | EEPROM error | Data stored in the controller axis was damaged. | Initialize all parameters. | Cycle the power |
| 4Ch | 7 | Network initialization error | An error was detected during initialization of the EtherCAT module. | Cycle the power. If the problem persists, contact your nearest Oriental Motor sales office. | Cycle the power |
| 82h | 7 | Driver internal communication error 1 | An error was detected via communication with the network CPU. | Execute the alarm reset. If the problem persists, contact your nearest Oriental Motor sales office. | Any of the reset operations |
| 84h | 7 | Driver internal communication error 2 | An error was detected in internal RS-485 communication. | Cycle the power. If the problem persists, contact your nearest Oriental Motor sales office. | Cycle the power |
| F0h | Lit | CPU error | CPU malfunctioned. | Cycle the power. | Cycle the power |

● Alarms of the driver axis



If an alarm is generated in the driver axis, the motor will put into a non-excitation state.

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset operation |
|------------|----------------------|------------------------------|--|---|-----------------------------|
| 10h | 4 | Excessive position deviation | <ul style="list-style-type: none"> When the motor was in a state of current ON, the deviation between the command position and actual position exceeded the setting value of the "Following error window (6065h)" in the motor shaft. The load is large, or the acceleration/deceleration is too short for the load. The operation range of push-motion positioning operation was exceeded. | <ul style="list-style-type: none"> Decrease the load. Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. Increase the operating current. Review the operation data. | Any of the reset operations |
| 20h | 5 | Overcurrent | The motor, cable and driver output circuit was shorted. | Turn off the power supply, and check the motor, the cable, and the driver are not damaged before turning the power again. | Cycle the power |
| 21h | 2 | Main circuit overheat | The internal temperature of the driver reached the upper limit of the specified value. | Review the ventilation condition. | Any of the reset operations |
| 22h | 3 | Overvoltage | <ul style="list-style-type: none"> The power supply voltage exceeded the allowable value. A large inertial load was suddenly stopped. Vertical operation was performed. | <ul style="list-style-type: none"> Check the input voltage of the power supply. Decrease the load. Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. Connect the accessory regeneration resistor. | Any of the reset operations |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset operation |
|------------|----------------------|---------------------------------|---|---|-----------------------------|
| 23h | 3 | Main power off | <ul style="list-style-type: none"> The main power supply was shut off while operating. The temperature of the power supply circuit inside the driver reached the upper limit of the specifications. | <ul style="list-style-type: none"> Check if the main power supply is applied normally. Review the load condition or operating condition so that the input current of the main power supply is the average of 4.0 A (maximum of 7.0 A) or less. Review the ventilation condition. | Any of the reset operations |
| 25h | 3 | Undervoltage | The main power was cut off momentarily or the voltage became low. | Check the input voltage of the main power supply. | Any of the reset operations |
| 26h | 8 | Motor overheat | The detection temperature of the ABZO sensor reached the upper limit of the specified value. | <ul style="list-style-type: none"> Check the heat radiating status of the motor. Review the ventilation condition. | Any of the reset operations |
| 28h | 8 | Sensor error | An error of the sensor was detected during operation. | Turn off the power and check the connection of the motor, and then cycle the power. | Cycle the power |
| 29h | 9 | CPU peripheral circuit error | The voltage around the CPU was decreased by shutting of the control power supply instantaneously. | <ul style="list-style-type: none"> Cycle the power. Check the input voltage of the power supply. Check the power supply capacity. | Cycle the power |
| 2Ah | 8 | ABZO sensor communication error | An error occurred in communication between the driver and ABZO sensor. | Turn off the power and check the connection of the ABZO sensor, and then cycle the power. | Cycle the power |
| 30h | 2 | Overload | A load exceeding the maximum torque was applied for the time exceeding the value set in the "Overload alarm (4180h)." | <ul style="list-style-type: none"> Decrease the load. Increase the acceleration/ deceleration time or slow the acceleration/ deceleration rate. Increase the operating current. | Any of the reset operations |
| 31h | 2 | Overspeed | The actual speed of the motor output shaft exceeded the specified value. | <ul style="list-style-type: none"> Review the "Gear ratio (6091h)" and set the speed of the motor output shaft to the specified value or less. If the motor is overshooting at the time of acceleration, increase the acceleration time or slow the acceleration rate. | Any of the reset operations |
| 33h | 7 | Absolute position error | The home position information of the ABZO sensor was damaged. | Execute the position preset, and cycle the power. After that, set the home position again. | Cycle the power |
| 34h | 2 | Command pulse error | <ul style="list-style-type: none"> The command pulse frequency exceeded the specified value. The P-PRESET of the driver was executed in the cyclic synchronous position mode when the motor was in an excitation state. | <ul style="list-style-type: none"> Decrease the command pulse frequency. Put the motor into a non-excitation state before executing the P-PRESET of the driver in the cyclic synchronous position mode. | Any of the reset operations |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset operation |
|------------|----------------------|--------------------------------|---|---|-----------------------------|
| 35h | 2 | Alarm detection of other axes | An alarm was detected in any of the driver axes in a state where the "Other axis alarm (4187h)" was enabled. | Check the details of the alarm, and perform the remedial action. After that, execute the alarm reset per driver axis. | Any of the reset operations |
| 41h | 9 | EEPROM error | Data stored in the controller axis was damaged. | Initialize all parameters. | Cycle the power |
| 42h | 8 | Sensor error at power on | An error of the ABZO sensor was detected when the power was turned on. | Turn off the power and check the connection of the ABZO sensor, and then cycle the power. | Cycle the power |
| 43h | 8 | Rotation error at power on | The motor was rotating when the power was turned on. | Adjust the load conditions and make sure the motor output shaft does not rotate due to an external force when the power is turned on. | Cycle the power |
| 44h | 8 | Encoder EEPROM error | Data stored in the ABZO sensor was damaged. | Execute one of the following operations. If the same alarm is still generated, the ABZO sensor is damaged. Contact the Oriental Motor sales office. <ul style="list-style-type: none"> Reset the Z-phase with the maintenance command "ZSG-PRESET." Execute "Clear tripmeter" of the MEXE02 or "Clear tripmeter" of the maintenance command. | Cycle the power |
| 45h | 8 | Motor combination error | A motor not supported by the driver is connected. | Check the model names of the motor and driver, and connect the motor and driver in the correct combination. | Cycle the power |
| 4Ah | 7 | Return-to-home incomplete | The absolute positioning operation was started when the position coordinate has not been set. | <ul style="list-style-type: none"> Review the setting of the "Permission of absolute positioning without setting absolute coordinates (4148h)." Perform position preset or return-to-home operation. | Any of the reset operations |
| 51h | 2 | Regeneration resistor overheat | <ul style="list-style-type: none"> The "RG overheat alarm (4185h)" was enabled without connecting the regeneration resistor. Regeneration resistor is not connected correctly. Regeneration resistor was overheated extraordinarily. | <ul style="list-style-type: none"> When the regeneration resistor is not used, disable the "RG overheat alarm (4185h)." Connect the regeneration resistor correctly. The allowable regenerative power of the regeneration resistor is exceeded. Review the load and operating condition. | Any of the reset operations |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset operation |
|------------|----------------------|--------------------------------|--|--|-----------------------------|
| 54h | 2 | Fan rotation deterioration | <ul style="list-style-type: none"> • The "FAN low speed alarm (4186h)" was enabled without connecting the fan. • The "FAN low speed alarm (4186h)" was enabled in a state where nothing is connected to the stall alarm input of the fan (1 pin of CN13). • The fan is not connected properly. • A standstill state of the fan was detected for 10 consecutive seconds during the operation command of the fan. | <ul style="list-style-type: none"> • When the fan is not used, disable the "FAN low speed alarm (4186h)." • Connect the stall alarm signal of the fan properly. When the fan without the stall alarm signal is used, disable the "FAN low speed alarm (4186h)." • Connect the fan properly. • Check the fan connected. | Any of the reset operations |
| 60h | 7 | ±LS both sides active | When the "FW-LS/RV-LS input action (4701h)" is set to "alarm present," both FW-LS and RV-LS inputs were detected. | Check the sensor logic and the logic setting parameter. | Any of the reset operations |
| 61h | 7 | Reverse ±LS connection | The LS input opposite to the operating direction has been detected while performing return-to-home operation in 2-sensor mode or 3-sensor mode. | Check the wiring of the sensor. | Any of the reset operations |
| 62h | 7 | Return-to-home operation error | <ul style="list-style-type: none"> • An unanticipated load was applied during the return-to-home operation. • The installation positions of the FW-LS and RV-LS sensors and the HOME sensor are near to each other. • Return-to-home operation was executed in a condition where both FW-LS and -RV-LS inputs were detected. • Position preset processing upon completion of return-to-home operation failed. • In return-to-home operation in one-way rotation mode, the motor passed by the HOME sensor during deceleration stop. | <ul style="list-style-type: none"> • Check the load. • Review the sensor installation positions and the starting direction of motor operation. • Check the sensor logic and the logic setting parameter. • See that a load exceeding the maximum torque is not applied upon completion of return-to-home operation. • Review the specifications of the HOME sensor and the "Homing acceleration (609Ah)." | Any of the reset operations |
| 63h | 7 | No HOMES | The HOMES input was not detected at a position between the FW-LS and RV-LS inputs while performing return-to-home operation in 3-sensor mode. | Install the HOME sensor at a position between the FW-LS and RV-LS sensors. | Any of the reset operations |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset operation |
|------------|----------------------|---------------------------------------|--|--|-----------------------------|
| 64h | 7 | TIM, Z, SLIT signal error | None of the TIM output, ZSG output, or SLIT input could be detected while performing return-to-home operation. | <ul style="list-style-type: none"> Review the connection status of the load and the position of the HOMES sensor so that these signals should be ON while the HOMES input is ON. Set the "(HOME) TIM/ZSG signal detection (4167h)" and the "(HOME) SLIT detection (4166h)" to "disable" if the signals are not used. | Any of the reset operations |
| 66h | 7 | Hardware overtravel | When the "FW-LS/RV-LS input action (4701h)" is set to "alarm present," FW-LS input or RV-LS input was detected. | <ul style="list-style-type: none"> Review the operation data. Operate the motor in the opposite direction to escape from the sensor. You can operate in any of operation modes. It can be escaped even in return-to-home operation. | Any of the reset operations |
| 67h | 7 | Software overtravel | When the "Software overtravel (41C3h)" is set to "alarm present," the motor position reached the set value of the software limit. | <ul style="list-style-type: none"> Review the operation data. Operate the motor in the opposite direction to escape from the sensor. You can operate in any of operation modes. It can be escaped even in return-to-home operation. | Any of the reset operations |
| 6Ah | 7 | Return-to-home operation offset error | When performing offset movement as part of return-to-home operation, FW-LS or RV-LS input has been detected. | Check the offset value. | Any of the reset operations |
| 6Dh | 7 | Mechanical overtravel | A product for which home position has been set reached the mechanical end. | Check the travel amount (position). | Any of the reset operations |
| 70h | 7 | Operation data error | <ul style="list-style-type: none"> The operation was performed at the operating speed or operating current that was exceeded the setting value of the mechanism limit parameter. The operation in the profile position mode was started when the operating speed was 0. Wrap operation was executed when "Wrap setting (41C7h)" was disabled. Push-motion operation or push-motion return-to-home operation was performed with the DGII Series. | <ul style="list-style-type: none"> Review the operation data. Check the setting of the "Wrap setting (41C7h)." Push-motion operation as well as push-motion return-to-home operation cannot be performed with the DGII Series. | Any of the reset operations |
| 71h | 7 | Electronic gear setting error | The resolution set by the "Gear ratio (6091h)" was out of the specification. | Review the "Gear ratio (6091h)" and set the resolution within the specified value. | Cycle the power |
| 72h | 7 | Wrap setting error | The power was turned on with a value of the wrap setting value that is inconsistent with the resolution set in the "Gear ratio (6091h)." | Set the wrap setting correctly and cycle the power. | Cycle the power |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset operation |
|------------|----------------------|---------------------------------------|--|---|-----------------------------|
| 81h | 7 | Network bus error | <ul style="list-style-type: none"> • A communication error of EtherCAT communication was detected during operation. • The EtherCAT communication state machine (ESM) was moved to other than operational during operation. | Check the conditions of the connector, cable, and master controller of EtherCAT communication. | Any of the reset operations |
| 82h | 7 | Driver internal communication error 1 | An error was detected via communication with the network CPU. | Execute the alarm reset. If the problem persists, contact your nearest Oriental Motor sales office. | Any of the reset operations |
| 84h | 7 | Driver internal communication error 2 | An error was detected three times consecutively in internal RS-485 communication. | Execute the alarm reset. If the problem persists, contact your nearest Oriental Motor sales office. | Any of the reset operations |
| 85h | 7 | Driver internal communication timeout | Internal RS-485 communication was not performed for 200 ms or more. | Execute the alarm reset. If the problem persists, contact your nearest Oriental Motor sales office. | Any of the reset operations |
| F0h | Lit | CPU error | CPU malfunctioned. | Cycle the power. | Cycle the power |

■ Alarm generation conditions

The alarms in the following table are generated when the generation conditions are exceeded.

| Alarm code | Alarm name | Motor model | Generation condition |
|------------|---------------------------------|--------------------------------------|----------------------|
| 21h | Main circuit overheat [°C (°F)] | – | 85 (185) |
| 22h | Overvoltage (V) | – | 63 |
| 23h | Main power supply OFF [°C (°F)] | – | 100 (212) |
| 26h | Motor overheat [°C (°F)] | – | 85 (185) |
| 31h | Overspeed (r/min) | AZM14, AZM15 AZM24, AZM26 | 8,000 |
| | | AZM46, AZM48, AZM66 | 4,500 |
| | | AZM69 | 2,500 |
| 34h | Command pulse error (r/min) | – | 38,400 |

■ Related object

| 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 |
| 4185h | * | RG overheat alarm | An alarm is generated when the accessory regeneration resistor exceeded the allowable power consumption. If any of the driver axes is set to enable, all driver axes are enabled. Setting range 0: Disable 1: Enable | 0 |
| 4186h | * | FAN low speed alarm | An alarm is generated when a standstill state of the accessory fan was detected for 10 consecutive seconds during the operation command of the fan. If any of the driver axes is set to enable, all driver axes are enabled. Setting range 0: Disable 1: Enable | 0 |
| 4187h | * | Other axis alarm | When an alarm is detected in any of the driver axes, it causes the alarm to generate in all other driver axes. If any of the driver axes is set to enable, all driver axes are enabled. Setting range 0: Disable 1: Enable | 0 |

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

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

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

- When the motor for the AC power supply was connected.
- When 48 VDC was supplied while connecting the motor which frame size was 20 mm (0.79 in.) or 28 mm (1.10 in.).

7-2 Information

The driver is equipped with a function to generate information output before an alarm is generated. Setting of appropriate values to the parameter of each information will be a help for periodic maintenance of the equipment.

For example, a failure of the equipment or production stop due to motor overheat can be prevented by using the "Motor temperature information (41A8h)." In addition, the "Tripmeter information (41AFh)" will be a reference for maintenance conducted after a certain travel distance is reached.

■ Status when information is generated

● Bit output of information

When information is generated, the bit output (INFO-** output) of the corresponding information is turned ON. (Details of bit outputs ⇒ p.161)

Among bit outputs, the INFO-USRIO output can be used by assigning an arbitrary output signal. When the assigned output signal is turned ON, the INFO-USRIO output is also turned ON.

● INFO output

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

● LED indicator

When information is generated, the POWER LED (green) and ALARM LED (red) of the driver axis blink twice at the same time.

● Operation of motor

Unlike an alarm, even if information is generated, the motor is operated continuously.

● Parameter

Each information has a corresponding "INFO action" parameter. When the parameter is set to "Not refected," only the bit output of information is turned ON. The INFO output and LED are not changed.

Related parameter

| Parameter name | Description | Initial value |
|--|---|-------------------|
| Information auto clear | When the cause of information is eliminated, the INFO output and the bit output of the corresponding information are turned OFF automatically. Setting range 0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically) | 1 |
| Information LED indicator | Setting range 0: LED does not blink when information is generated 1: LED blinks when information is generated | 1 |
| INFO-USRIO output selection | Selects an output signal to be checked in the INFO-USRIO output. Setting range Output signal ⇒ p.97 | 128: CONST-OFF |
| INFO-USRIO output inversion | Setting range 0: The output logic of the INFO-USRIO output is not inverted 1: The output logic of the INFO-USRIO output is inverted | 0 |
| Position deviation information (INFO-POSERR) | Sets the generation condition of the position deviation information (INFO-POSERR). Setting range 1 to 30,000 (1=0.01 rev) | 300 |
| Driver temperature information (INFO-DRVTMP) | Sets the generation condition of the driver temperature information (INFO-DRVTMP). Setting range 40 to 85 °C | 85 |
| Motor temperature information (INFO-MTRTMP) | Sets the generation condition of the motor temperature information (INFO-MTRTMP). Setting range 40 to 120 °C | 85 |

| Parameter name | Description | Initial value |
|--|--|---------------|
| Overvoltage information (INFO-OVOLT) | Sets the generation condition of the overvoltage information (INFO-OVOLT). Setting range 150 to 630 (1=0.1 V) | 630 |
| Undervoltage information (INFO-UVOLT) | Sets the generation condition of the undervoltage information (INFO-UVOLT). Setting range 150 to 630 (1=0.1 V) | 180 |
| Overload time information (INFO-OLTIME) | Sets the generation condition of the overload time information (INFO-OLTIME). Setting range 1 to 300 (1=0.1 s) | 50 |
| Overspeed information (INFO-SPD) | Sets the generation condition of the overspeed information (INFO-SPD). Setting range 0 to 12,000 r/min | 0 |
| Cumulative load 0 information (INFO-CULD0) | Sets the generation condition of the cumulative load 0 information (INFO-CULD0). Setting range 0 to 2,147,483,647 | 0 |
| Cumulative load 1 information (INFO-CULD1) | Sets the generation condition of the cumulative load 1 information (INFO-CULD1). Setting range 0 to 2,147,483,647 | 0 |
| Cumulative load value auto clear | Setting range 0: The cumulative load is not cleared when operation is started 1: The cumulative load is cleared when operation is started. | 1 |
| Cumulative load value count divisor | Sets the divisor of the cumulative load. Setting range 1 to 32,767 | 1 |
| Tripmeter information (INFO-TRIP) | Sets the generation condition of the tripmeter information (INFO-TRIP). Setting range 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 |
| Odometer information (INFO-ODO) | Sets the generation condition of the odometer information (INFO-ODO). Setting range 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 |
| INFO action (Assigned I/O status information (INFO-USRIO)) | Setting range 0: When information is generated, only the bit output of the corresponding information is turned ON. 1: When information is generated, the INFO output is also turned ON, and LED blinks. | 1 |
| INFO action (Position deviation information (INFO-POSERR)) | | |
| INFO action (Driver temperature information (INFO-DRVTMP)) | | |
| INFO action (Motor temperature information (INFO-MTPTMP)) | | |
| INFO action (Overvoltage information (INFO-OVOLT)) | | |
| INFO action (Undervoltage information (INFO-UVOLT)) | | |

| Parameter name | Description | Initial value |
|---|---|---------------|
| INFO action (Overload time information (INFO-OLTIME)) | <p>Setting range</p> <p>0: When information is generated, only the bit output of the corresponding information is turned ON.</p> <p>1: When information is generated, the INFO output is also turned ON, and LED blinks.</p> | 1 |
| INFO action (Speed information (INFO-SPD)) | | |
| INFO action (Start operation error information (INFO-START)) | | |
| INFO action (Start ZHOME error information (INFO-ZHOME)) | | |
| INFO action (Preset request information (INFO-PR-REQ)) | | |
| INFO action (Electronic gear setting error information (INFO-EGR-E)) | | |
| INFO action (Wrap setting error information (INFO-RND-E)) | | |
| INFO action (Forward operation prohibition information (INFO-FW-OT)) | | |
| INFO action (Reverse operation prohibition information (INFO-RV-OT)) | | |
| INFO action (Cumulative load 0 information (INFO-CULD0)) | | |
| INFO action (Cumulative load 1 information (INFO-CULD1)) | | |
| INFO action (Tripmeter information (INFO-TRIP)) | | |
| INFO action (Odometer information (INFO-ODO)) | | |
| INFO action (Start operation restricted mode information (INFO-DSLMTD)) | | |
| INFO action (I/O test mode information (INFO-IOTEST)) | | |
| INFO action (Configuration request information (INFO-CFG)) | | |
| INFO action (Reboot request information (INFO-RBT)) | | |

For index numbers of parameters, check with the "4 Driver objects of the manufacturer-specific area" on p.216.

■ Information records

Up to 16 generated information pieces are saved in the RAM in order of the latest to oldest. The information items kept as information records are the information code, generation time, and contents of information.

Information records stored in the RAM can be read or cleared when performing any of the following operations.

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



Since information records are saved in the RAM, they are cleared when the driver is turned OFF.

■ Information list

| Contents of information | Information bit output signal | Cause | Releasing condition |
|-------------------------------|-------------------------------|--|---|
| Assigned I/O status | INFO-USRIO | The I/O signal set in the "INFO-USRIO output selection (41BCh)" was turned ON. | The I/O signal set in the "INFO-USRIO output selection (41BCh)" was turned OFF. |
| Position deviation | INFO-POSERR | The deviation between the command position and actual position exceeded the value set in the "Overflow rotation information (41A5)" in the motor output shaft. | The deviation between the command position and actual position became lower than the value set in the "Overflow rotation information (41A5)" in the motor output shaft. |
| Driver temperature | INFO-DRVTMP | The internal temperature of the driver exceeded the value set in the "Driver temperature information (41A0)." | The internal temperature of the driver became lower than the value set in the "Driver temperature information (41A0)." |
| 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 | <ul style="list-style-type: none"> • The power supply voltage exceeded the value set in the "Overvoltage information (41ABh)." • A large inertial load was suddenly stopped. • Vertical operation was performed. | The power supply voltage became lower than the value set in the "Overvoltage information (41ABh)." |
| Undervoltage | INFO-UVOLT | <ul style="list-style-type: none"> • The power supply voltage became lower than the value set in the "Undervoltage information (41ACH)." • The power was cut off momentarily or the voltage became low. | The power supply voltage exceeded the value set in the "Undervoltage information (41ACH)." |
| Overload time | INFO-OLTIME | A load exceeding the maximum torque was applied for the time exceeding the value set in the "Overload time information (41A1h)." | The overload counter became lower than the value set in the "Overload time information (41A1h)." |
| Speed | INFO-SPD | The actual speed of the motor exceeded the value set in the "Overspeed information (41A2h)." | The actual speed of the motor became lower than the value set in the "Overspeed information (41A2h)." |
| Operation start error | INFO-START | <ul style="list-style-type: none"> • An operation in the direction being stopped by the FW-BLK input or the RV-BLK input was started. • An operation in the direction being stopped by the FW-LS input or the RV-LS input was started. • An operation in the direction being stopped by the software limit was started. | Operation was started normally. |
| ZHOME start error | INFO-ZHOME | When the position coordinate was not set (the ABSPEN output was OFF), the high-speed return-to-home operation was started. | Operation was started normally. |
| Preset request | INFO-PR-REQ | Preset was executed by position preset or return-to-home operation. | Preset was complete. |
| Electronic gear setting error | INFO-EGR-E | The resolution set by the "Gear ratio (6091h)" was out of the specification. | The resolution was set in the range of the specification. |
| Wrap setting error | INFO-RND-E | The resolution and "Initial coordinate generation & wrap setting range (41C9h)" were inconsistent. | The "Initial coordinate generation & wrap setting range (41C9h)" was set in the range of the specification. |

| Contents of information | Information bit output signal | Cause | Releasing condition |
|---------------------------------|-------------------------------|--|---|
| Forward operation prohibition | INFO-FW-OT | <ul style="list-style-type: none"> The positive software limit was exceeded. Either the FW-LS input or the FW-BLK input was turned ON. | The positive software limit was not exceeded, and both FW-LS and FW-BLK inputs were turned OFF. |
| Reverse operation prohibition | INFO-RV-OT | <ul style="list-style-type: none"> The negative software limit was exceeded. Either the RV-LS input or the RV-BLK input was turned ON. | The negative software limit was not exceeded, and both RV-LS and RV-BLK inputs were turned OFF. |
| Cumulative load 0 | INFO-CULD0 | The cumulative load exceeded the value set in the "Cumulative load information 0 (41B1h)." | The cumulative load became lower than the value set in the "Cumulative load information 0 (41B1h)." |
| Cumulative load 1 | INFO-CULD1 | The cumulative load exceeded the value set in the "Cumulative load information 1 (41B2h)." | The cumulative load became lower than the value set in the "Cumulative load information 1 (41B2h)." |
| Tripmeter | INFO-TRIP | The travel distance of the motor exceeded the value set in the "Tripmeter information (41AFh)." | <p>After performing one of the following operations, the travel distance (Tripmeter) of the motor became lower than the value set in the "Tripmeter information (41AFh)."</p> <ul style="list-style-type: none"> The "Tripmeter information (41AFh)" was reset. Tripmeter was cleared with the MEXE02. |
| Odometer | INFO-ODO | The cumulative travel distance of the motor exceeded the value set in the "Odometer information (41B0h)." | <p>After performing the following operation, the cumulative travel distance (Odometer) of the motor became lower than the value set in the "Odometer information (41B0h)."</p> <ul style="list-style-type: none"> The "Odometer information (41B0h)" was reset. |
| Operation start restricted mode | INFO-DSLMTD | <ul style="list-style-type: none"> "Remote operation" was executed with the MEXE02. Configuration was executed. | <ul style="list-style-type: none"> Remote operation was released. Configuration was complete. |
| I/O test mode | INFO-IOTEST | <ul style="list-style-type: none"> "I/O test" was executed with the MEXE02. Configuration was executed. | <ul style="list-style-type: none"> The I/O test mode was released. Configuration was complete. |
| Configuration request | INFO-CFG | Execution of configuration was required. | Configuration is executed. |
| Reboot request | INFO-RBT | Reboot was requested. | Reboot was performed. |



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

■ Monitor of information

Information in details can be checked by the "Information (407B)" of the driver objects.

The read information code is indicated in 8-digit hexadecimal number. It can also be read in 32 Bits.

If multiple information is generated, the logical add (OR) of the information code is indicated.

| Information code | 32 Bits indication | Information name | Output signal |
|------------------|--|---------------------------------|---------------|
| 00000001h | 0000 0000 0000 0000 0000 0000 0000 0001 | Assigned I/O status | INFO-USRIO |
| 00000002h | 0000 0000 0000 0000 0000 0000 0000 0010 | Position deviation | INFO-POSERR |
| 00000004h | 0000 0000 0000 0000 0000 0000 0000 0100 | Driver temperature | INFO-DRVTMP |
| 00000008h | 0000 0000 0000 0000 0000 0000 0000 1000 | Motor temperature | INFO-MTRTMP |
| 00000010h | 0000 0000 0000 0000 0000 0000 0001 0000 | Overvoltage | INFO-OVOLT |
| 00000020h | 0000 0000 0000 0000 0000 0000 0010 0000 | Undervoltage | INFO-UVOLT |
| 00000040h | 0000 0000 0000 0000 0000 0000 0100 0000 | Overload time | INFO-OLTIME |
| 00000100h | 0000 0000 0000 0000 0000 0001 0000 0000 | Speed | INFO-SPD |
| 00000200h | 0000 0000 0000 0000 0000 0010 0000 0000 | Operation start error | INFO-START |
| 00000400h | 0000 0000 0000 0000 0000 0100 0000 0000 | ZHOME start 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-CULDO |
| 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 | Operation start restricted mode | INFO-DSLMTD |
| 20000000h | 0010 0000 0000 0000 0000 0000 0000 0000 | I/O test mode | INFO-IOTEST |
| 40000000h | 0100 0000 0000 0000 0000 0000 0000 0000 | Configuration request | INFO-CFG |
| 80000000h | 1000 0000 0000 0000 0000 0000 0000 0000 | Reboot request | INFO-RBT |

■ Related object

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|-------|--------|-------|-----------------------|--|-----------|
| 41A0h | * | Driver temperature information (INFO-DRVTMP) [°C] | INT16 | RW | RxPDO | <input type="radio"/> | 40 to 85 (Initial value: 85) | A |
| 41A1h | * | Overload time information (INFO-OLTIME) [1=0.1 s] | INT16 | RW | RxPDO | <input type="radio"/> | 1 to 300 (Initial value: 50) | A |
| 41A2h | * | Overspeed information (INFO-SPD) [r/min] | INT16 | RW | RxPDO | <input type="radio"/> | 0 to 12,000 (Initial value: 0) | A |
| 41A5h | * | Position deviation information (INFO-POSERR) [1=0.01 rev] | INT16 | RW | RxPDO | <input type="radio"/> | 1 to 30,000 (Initial value: 300) | A |
| 41A8h | * | Motor temperature information (INFO-MTRTMP) [°C] | INT16 | RW | RxPDO | <input type="radio"/> | 40 to 120 (Initial value: 85) | A |
| 41ABh | * | Overvoltage information (INFO-OVOLT) [V] | INT16 | RW | RxPDO | <input type="radio"/> | 150 to 630 (Initial value: 630) | A |
| 41ACh | * | Undervoltage information (INFO-UVOLT) [V] | INT16 | RW | RxPDO | <input type="radio"/> | 150 to 630 (Initial value: 180) | A |
| 41AFh | * | Trip meter information (INFO-TRIP) [1=0.1 kRev] | INT32 | RW | RxPDO | <input type="radio"/> | 0 to 2,147,483,647 (Initial value: 0) | A |
| 41B0h | * | Odometer information (INFO-ODO) [1=0.1 kRev] | INT32 | RW | RxPDO | <input type="radio"/> | 0 to 2,147,483,647 (Initial value: 0) | A |
| 41B1h | * | Cumulative load information 0 (INFO-CULD0) | INT32 | RW | RxPDO | <input type="radio"/> | 0 to 2,147,483,647 (Initial value: 0) | A |
| 41B2h | * | Cumulative load information 1 (INFO-CULD1) | INT32 | RW | RxPDO | <input type="radio"/> | 0 to 2,147,483,647 (Initial value: 0) | A |
| 41B3h | * | Cumulative load value auto clear | U8 | RW | No | <input type="radio"/> | 0, 1 (Initial value: 1) | A |
| 41B4h | * | Cumulative load value count divisor | U16 | RW | No | <input type="radio"/> | 1 to 32,767 (Initial value: 1) | A |
| 41BCh | * | INFO-USRIO output selection | U8 | RW | No | <input type="radio"/> | 0 to 255 (Initial value: 128) | A |
| 41BDh | * | INFO-USRIO output inversion | U8 | RW | No | <input type="radio"/> | 0: Normal 1: Invert | A |
| 41BEh | * | Information LED condition | U8 | RW | No | <input type="radio"/> | 0: ALARM LED does not blink when information is generated 1: ALARM LED blinks when information is generated (Initial value) | A |
| 41BFh | * | Information auto clear | U8 | RW | No | <input type="radio"/> | 0: Not turned OFF automatically 1: Turned OFF automatically (Initial value) | A |

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|--|------|--------|-----|------|--|-----------|
| 47A0h | * | INFO action (Assigned I/O status information (INFO-USRIO)) | U8 | RW | No | ○ | 0: When information is generated, only the bit output of the corresponding information is turned ON. 1: When information is generated, the INFO output is also turned ON, and ALARM 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-MTPTMP)) | U8 | RW | No | ○ | | A |
| 47A4h | * | INFO action (Overvoltage information (INFO-OVOLT)) | U8 | RW | No | ○ | | A |
| 47A5h | * | INFO action (Undervoltage information (INFO-UVOLT)) | U8 | RW | No | ○ | | A |
| 47A6h | * | INFO action (Overload time information (INFO-OLTIME)) | U8 | RW | No | ○ | | A |
| 47A8h | * | INFO action (Speed information (INFO-SPD)) | U8 | RW | No | ○ | | A |
| 47ABh | * | INFO action (PRESET request information (INFO-PR-REQ)) | U8 | RW | No | ○ | | A |
| 47ADh | * | INFO action (Electronic gear setting error information (INFO-EGR-E)) | U8 | RW | No | ○ | | A |
| 47AEh | * | INFO action (Wrap setting error information (INFO-RND-E)) | U8 | RW | No | ○ | | A |
| 47B0h | * | INFO action (Forward operation prohibiton information (INFO-FW-OT)) | U8 | RW | No | ○ | | A |
| 47B1h | * | INFO action (Reverse operation prohibiton information (INFO-RV-OT)) | U8 | RW | No | ○ | | A |
| 47B2h | * | INFO action (Cumulative load 0 information (INFO-CULD0)) | U8 | RW | No | ○ | | A |
| 47B3h | * | INFO action (Cumulative load 1 information (INFO-CULD1)) | U8 | RW | No | ○ | | A |
| 47B4h | * | INFO action (Tripmeter information (INFO-TRIP)) | U8 | RW | No | ○ | | A |

| Index | Sub | Name | Type | Access | PDO | Save | Range | Effective |
|-------|-----|---|------|--------|-----|-----------------------|--|-----------|
| 47B5h | * | INFO action (Odometer information (INFO-ODO)) | U8 | RW | No | <input type="radio"/> | 0: When information is generated, only the bit output of the corresponding information is turned ON. 1: When information is generated, the INFO output is also turned ON, and ALARM LED blinks. (Initial value) | A |
| 47BCh | * | INFO action (Start operation restricted mode information (INFO-DSLMTD)) | U8 | RW | No | <input type="radio"/> | | A |
| 47BDh | * | INFO action (I/O test mode information (INFO-IOTEST)) | U8 | RW | No | <input type="radio"/> | | A |
| 47BEh | * | INFO action (Configuration request information (INFO-CFG)) | U8 | RW | No | <input type="radio"/> | | A |
| 47BFh | * | INFO action (Reboot request information (INFO-RBT)) | U8 | RW | No | <input type="radio"/> | | A |

3 Operation Edition

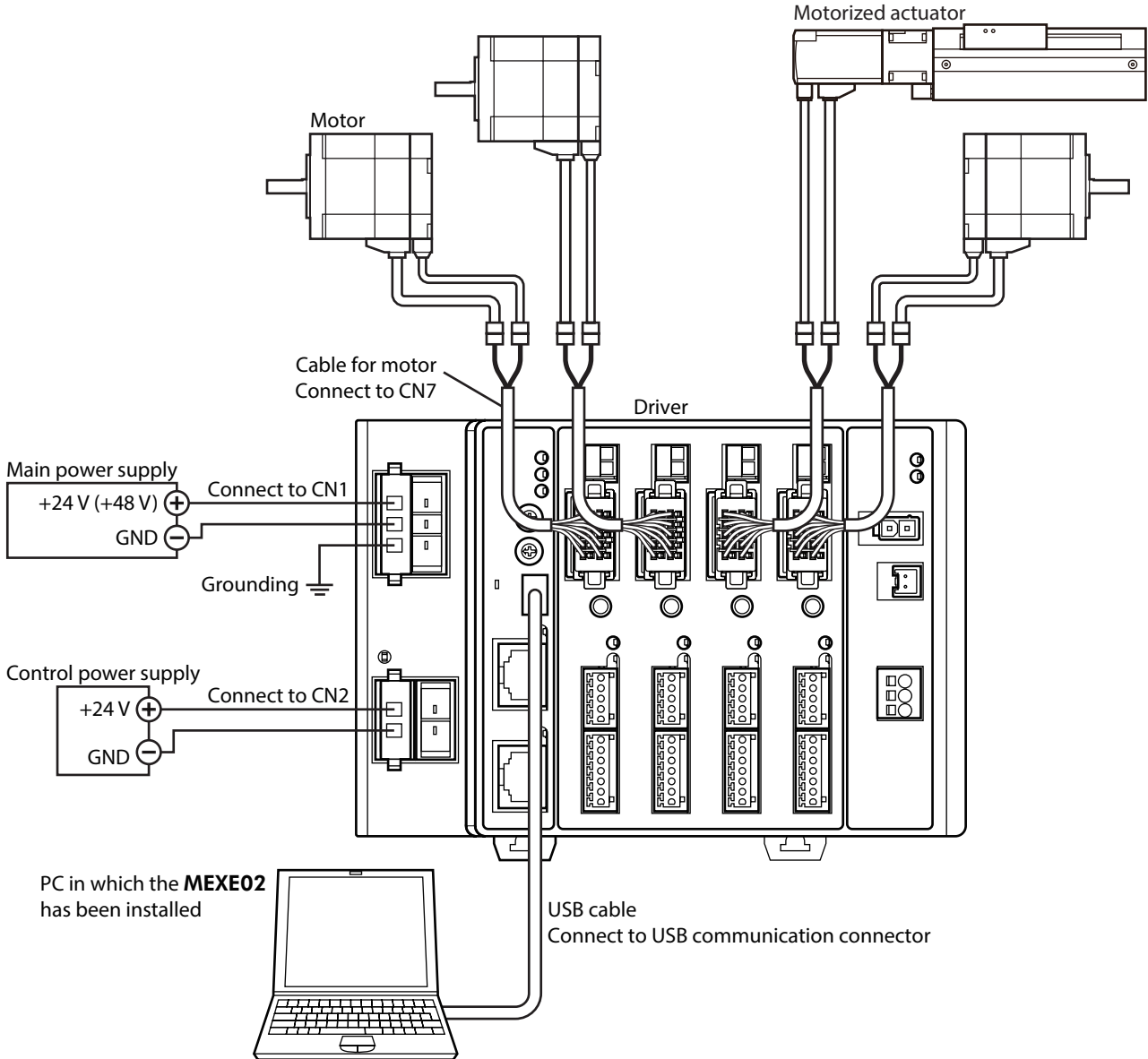
This part explains operation examples and monitors using the **MEXE02**.

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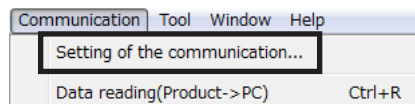
| | | | | | |
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| 2-3 | Method of recovery..... | 173 | 6-1 | Unit information monitor | 189 |
| 3 | Home position setting | 177 | 6-2 | Status monitor | 192 |
| 4 | Test operation | 178 | 6-3 | EtherCAT PDO monitor | 195 |
| | | | 6-4 | EtherCAT status monitor | 198 |
| | | | 6-5 | EtherCAT monitor | 200 |
| | | | 6-6 | Waveform monitor | 201 |

1 Starting the MEXE02

1. Connect motors, main power supply, control power supply and a PC in which the **MEXE02** has been installed to the driver.
The figure shows the 4-axis type.

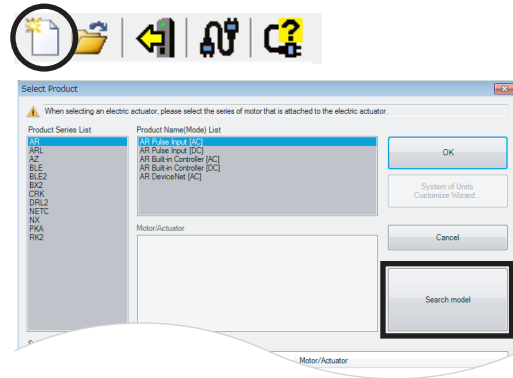


2. Turn on the main power supply and control power supply.
3. Start a PC, and continuously start the **MEXE02**.
4. Set the communication port in the following steps.
 - 1) Click [Setting of the communication] from the [Communication] menu.
 - 2) Select "ORIENTAL MOTOR/Common Virtual COM Port", and click [OK].

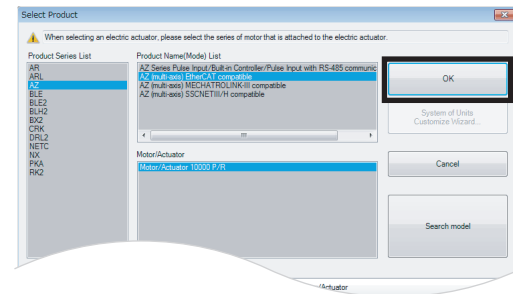


5. Select the product in the following steps.

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

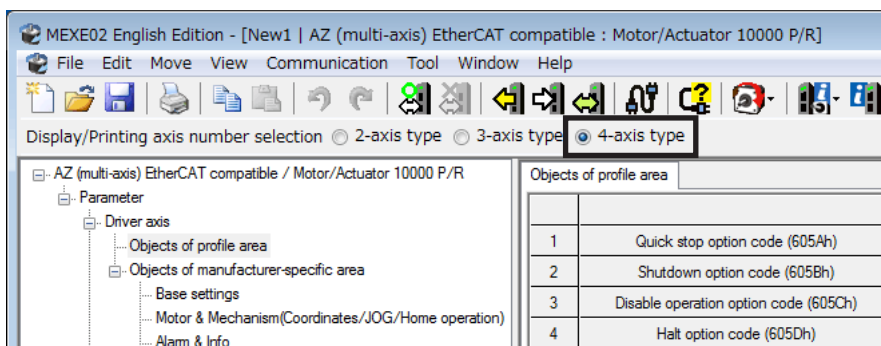


- 3) Check the connected product is selected and click [OK].



6. Select the axis type.
Select the 4-axis type here.

| Model | Axis type |
|------------------|-------------|
| AZD2A-KED | 2-axis type |
| AZD3A-KED | 3-axis type |
| AZD4A-KED | 4-axis type |



2 Notes for when a motorized actuator is used

Be sure to create the recovery data file initially when a motorized actuator is used.

The recovery data file represents a file saved the factory setting of the product. Copy the fixed value (parameter) of the ABZO sensor to the driver before creating the recovery data file.

Create the recovery data file initially in case of replacing the product for maintenance or product damage.

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

2-1 Copying the fixed value (parameter) of the ABZO sensor to driver

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

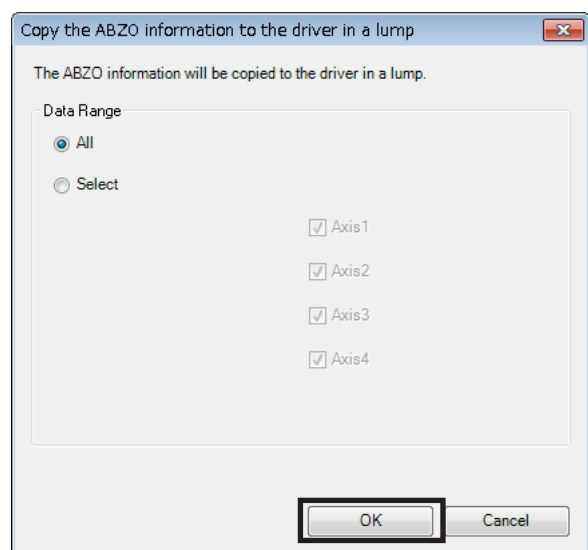
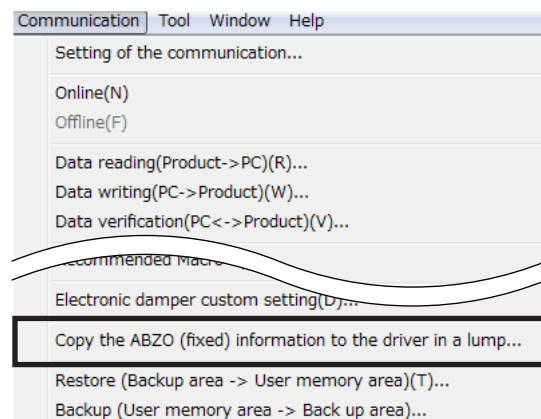
The values based on the product specifications such as recommended operation condition and position coordinate information are stored in the ABZO sensor. The values stored in the ABZO sensor cannot be changed because of the fixed value.

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

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

■ Procedure

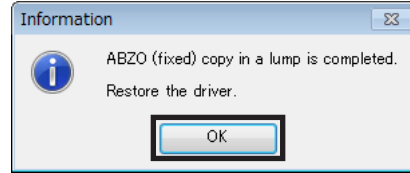
1. Click the [Communication] menu of the **MEXE02**, and select [Copy the ABZO (fixed) information to the driver in a lump].
2. Select the axis that the motorized actuator is connected, and click [OK].



- Click [Yes].
The ABZO information (fixed value) of the motorized actuator is copied to the driver.



- After it is completed, click [OK].



- Cycle the driver power.
- Check whether the copied value is applied on the unit information monitor window (Axis1 to Axis 4).

New1 | AZ (multi-axis) EtherCAT compatible : Motor/Actuator 10000 P/R - Unit information monitor (Axis1)

Start the unit information monitor (Axis1)

| | Motor | Mechanism | Device |
|---------------|------------|-----------|-------------|
| User memo | | | |
| Product name | AZM46AK | - | AZD4A-KED-1 |
| Serial number | SS11834003 | - | UZ41Z12308 |

| | | | | | |
|----------------------------|--------------------|------------------------|-------------|------------------------|-----------------|
| CPU | 6040 | Control power count | 175 [times] | Resolution | 10000 [P/R] |
| Ver. | 2.10 | Main power count | 135 [times] | Fraction of resolution | 0 |
| PID | 3420 h | Main power supply time | 948 [min] | ROUND processing | Enable |
| SID | 0000 h | Comm.I/F(1st) | USB | ROUND range | 18000000 [step] |
| Series (Mech.) | 0000 h | Comm.I/F(2nd) | ECAT | ROUND maximum | 8999999 [step] |
| Model (Mech.) | 0000 h | Comm.I/F(3rd) | --- | ROUND minimum | -9000000 [step] |
| Used multi-rotation amount | 1800 | POW-TYPE | DC- | ROUND offset | 9000000 [step] |
| Driver simulation mode | Use the real motor | ABZO connection | Yes | STATION No. | 01 h |
| Parameter Rev. | 0001 h | | | | |

[Help ?]

| | Active | Driver parameter | ABZO (fixed) |
|--|-------------------------|-------------------------|-------------------------|
| Manual setting of the mechanism settings | Driver parameter | Manual setting | |
| Electronic gear A | 1 | 1 | 1 |
| Electronic gear B | 1 | 1 | 1 |
| Motor rotation direction | Positive side=Clockwise | Positive side=Clockwise | Positive side=Clockwise |
| Mechanism type | | | No setting |
| Mechanism lead [mm] | | | 1 |
| Mechanism lead | | | x1 [mm] |
| Mechanism lead decimal digit setting | | | 1 [mm] |
| Mechanism stroke | | | None |
| Magnetic brake | None | | None |
| Manual setting of gear ratio | ABZO | Prioritize ABZO setting | 1.00 |
| Gear ratio | 1.00 | | |
| Initial coordinate generation & manual wrap setting | ABZO | Prioritize ABZO setting | Setting exists |
| Initial coordinate generation & wrap setting range | 1800.0 [rev] | 1800.0 [rev] | 1800.0 [rev] |
| Initial coordinate generation & wrap range offset ratio | 50.00 [%] | 50.00 [%] | 50.00 [%] |
| Initial coordinate generation & wrap range offset value | 0 [step] | 0 [step] | 0 [step] |
| Wrap setting | Enable | Enable | Enable |
| The number of the RND-ZERO output in wrap range | 1800 | 1 | 1800 |
| Mechanism limit parameter | Disable | Follow ABZO setting | No setting |
| Mechanism limit (distance from F home position) positive direction | Disable | | Disable |
| Mechanism limit (distance from F home position) negative direction | Disable | | Disable |
| Mechanism protection parameter | Disable | Follow ABZO setting | No setting |
| Maximum starting speed | 0 [r/min] | | 8000 [r/min] |
| Maximum Operating speed | 0 [r/min] | | 8000 [r/min] |
| Maximum pushing speed | 0 [r/min] | | 8000 [r/min] |
| Maximum pushing return-to-home speed | 0 [r/min] | | 8000 [r/min] |
| Maximum push current | Pushing not possible | | 100.0 [%] |
| (JOG/HOME/ZHOME)Manual setting | Driver parameter | Prioritize ABZO setting | No setting |
| (JOG/HOME/ZHOME) Command filter time constant | 1 [ms] | 1 [ms] | 1 [ms] |
| (JOG/HOME/ZHOME) Operating current | 100.0 [%] | 100.0 [%] | 100.0 [%] |
| (JOG) Travel amount | | | 1 [step] |
| (JOG) Operating speed | 10000 [Hz] | 10000 [Hz] | 60 [r/min] |
| (JOG) Acceleration/deceleration | 300.000 [kHz/s] | 300.000 [kHz/s] | 1.000 [s] |
| (JOG) Starting speed | 5000 [Hz] | 5000 [Hz] | 30 [r/min] |
| (JOG) Operating speed (high) | 50000 [Hz] | 50000 [Hz] | 300 [r/min] |

● Description of each item

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

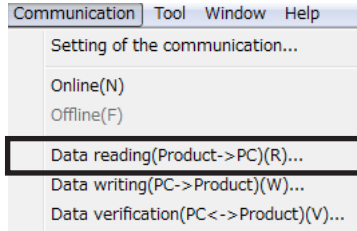
2-2 Creating the recovery data file

Note Be sure to create the recovery data file before installing the motorized actuator to equipment.

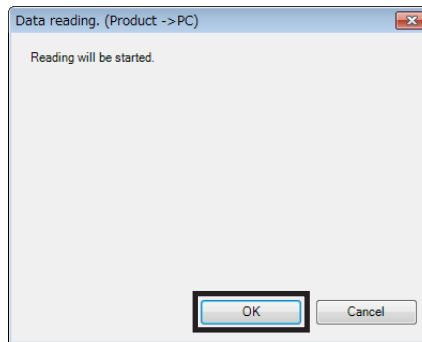
■ Procedure

After copying the fixed value (factory setting) of the ABZO sensor to the driver, read the fixed value from the driver to create the recovery data.

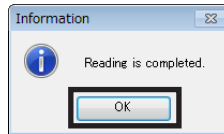
1. Click [Data reading (Product → PC)] from the [Communication] menu or click [Data reading (Product → PC)] icon in the toolbar.



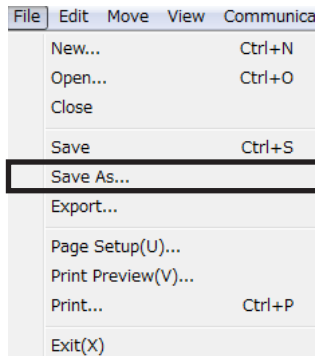
2. Click [Yes].
Data reading is started.



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



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




The fixed value (factory setting) of the ABZO sensor is saved as the recovery data file.

Note For the recovery, create two files that are the recovery data file stored the factory setting and the final backup file applied the operation data and others. If the recovery data file and backup file have been created in advance, the equipment can be restored smoothly. For details of backup file, refer to **AZ** Series [Function Edition](#).

2-3 Method of recovery

The recovery can be performed under the precondition of having created the recovery data file according to the "2-2 Creating the recovery data file" on p.172.

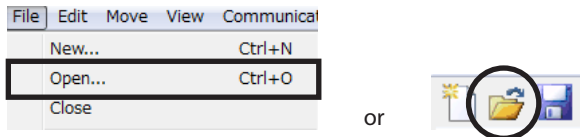
| | |
|--|--|
|  WARNING | <p>When the motor or driver was replaced, be sure to perform the recovery and the home position resetting. Unless the recovery and the home position resetting are performed, the followings may happen.</p> <ul style="list-style-type: none"> • The moving part may cause unexpected operations, resulting in injury or damage to equipment. • The moving part of the motorized linear slide or motorized cylinder may collide with the mechanical stopper. • A load may collide with other equipment. <p>Refer to p.177 for resetting the home position.</p> |
|--|--|

 Refer to the OPERATING MANUAL Actuator Edition for how to replace the motor.

■ When the motor and driver were malfunctioned

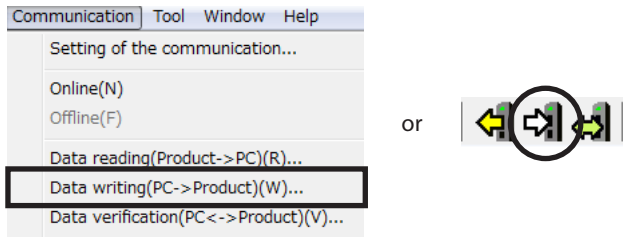
1. Replace the motor and driver, and turn on the power.
2. Open the recovery data file in the **MEXE02** in the following steps.

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

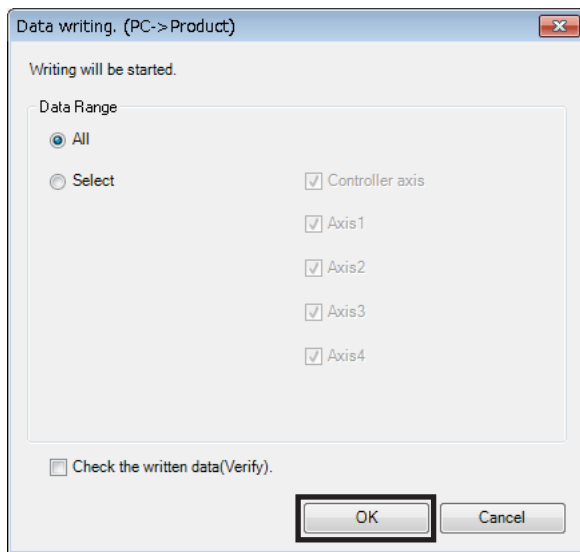


3. Check the data is correct, and write to the driver in the following steps.

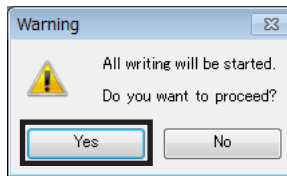
- 1) Click [Data writing (PC → Product)] from the [Communication] menu or click [Data writing (PC → Product)] icon in the toolbar.



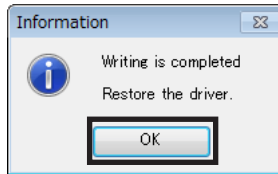
- 2) Select the axis that the motorized actuator is connected, and click [OK].



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



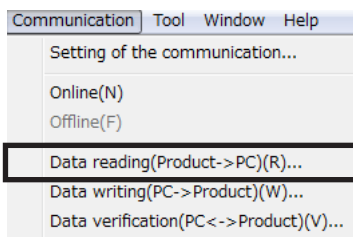
- 4) After it is completed, click [OK].



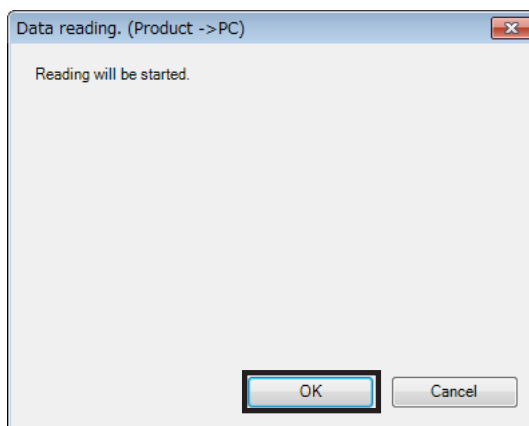
- 5) Cycle the driver power.

4. Read the information of the factory setting written to the driver in the following steps.
When the motor is replaced, set the home position again after reading the driver information.
The communication function of the **MEXE02** cannot be used without reading the driver information.

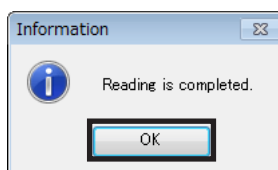
- 1) Click [Data reading (Product → PC)] from the [Communication] menu or click [Data reading (Product → PC)] icon in the toolbar.



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



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



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

5. Refer to p.177 and set the home position again.
6. Refer to p.172 and create the recovery data file for the product after replacement.

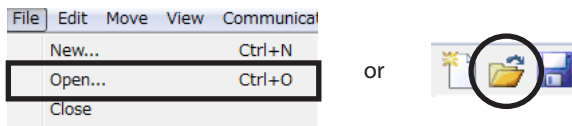
Note Save the read driver information as the new recovery data file.

memo The details of the written parameters can be checked with the "unit information monitor (Axis1 to Axis4)."

■ **When the driver was malfunctioned**

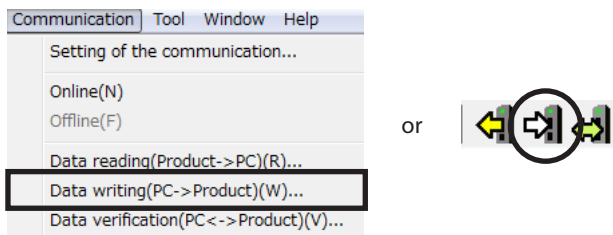
1. Replace the driver, and turn on the power.
2. Open the recovery data file in the **MEXE02** in the following steps.

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

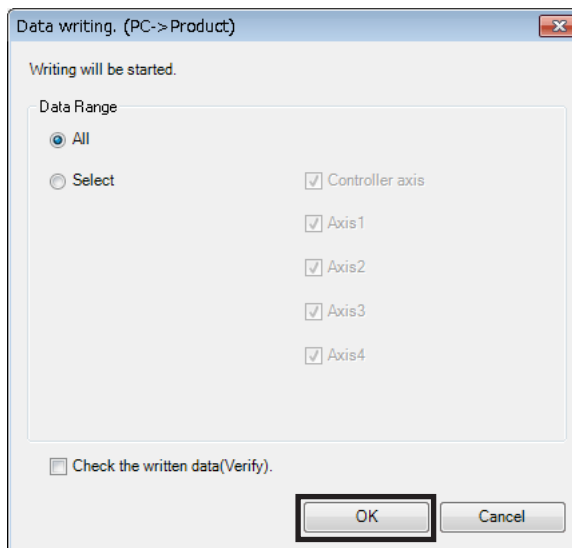


3. Check the data is correct, and write to the driver in the following steps.

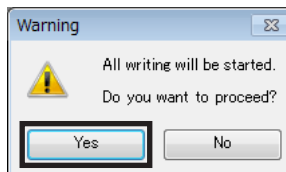
- 1) Click [Data writing (PC → Product)] from the [Communication] menu or click [Data writing (PC → Product)] icon in the toolbar.



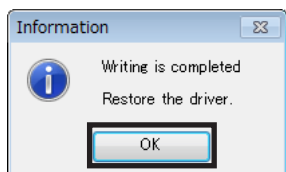
- 2) Select the axis that the motorized actuator is connected, and click [OK].



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



- 4) Click [OK].



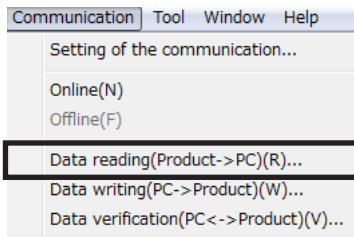
- 5) Cycle the driver power.

memo The details of the written parameters can be checked with the "unit information monitor (Axis1 to Axis4)."

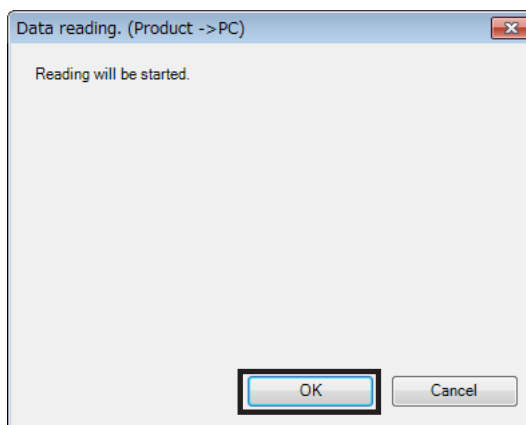
■ When the motor was malfunctioned

1. Replace the motor, and turn on the power.
2. Read the driver information to the PC in the following steps.
When the motor is replaced, set the home position again after reading the driver information.
The communication function of the **MEXE02** cannot be used without reading the driver information.

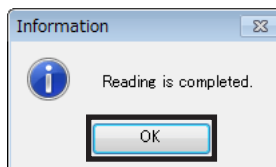
1) Click [Data reading (Product → PC)] from the [Communication] menu or click [Data reading (Product → PC)] icon in the toolbar.



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



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



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

3. Refer to p.177 and set the home position again.
4. Refer to p.172 and create the recovery data file for the product after replacement.

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

3 Home position setting

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

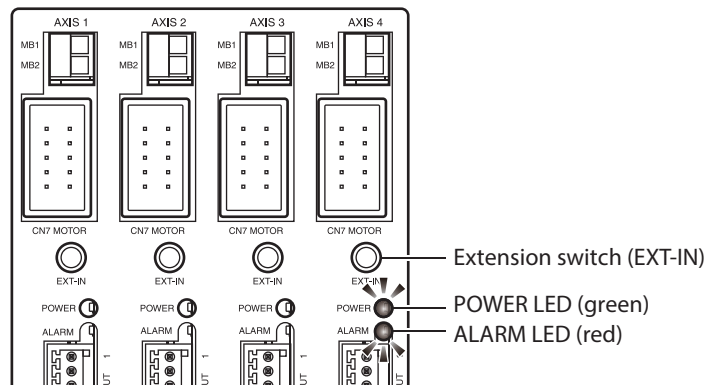
This chapter explains how to set the home position with the extension switch (EXT-IN) of the driver axis. The figure shows the 4-axis type.



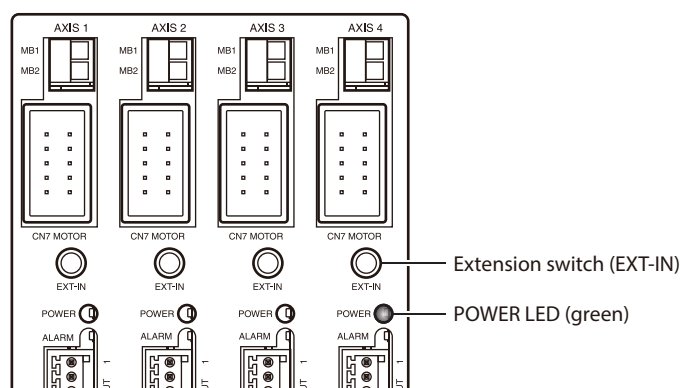
- The home position is written to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.
- The home position for motorized actuators has been set at the time of shipment. Set the home position only when you want to change it.

■ Procedure

1. Turn the main power supply off when the power is supplied.
2. Move the motor output shaft to a desired home position manually.
3. Turn on the main power supply and keep pressing the extension switch for one second. The POWER LED (green) and ALARM LED (red) blinks.



4. Release a hand off within three seconds after the POWER LED and ALARM LED started blinking, and press the extension switch again within three seconds after releasing the hand off. After both POWER LED and ALARM LED are lit, only POWER LED continues to be lit.



5. The home position is set.



About an operation of the procedure 4, be sure to release a hand off after the POWER LED and ALARM LED started blinking, and perform within three seconds. If three seconds were passed, the POWER LED will return to the state being lit in green. In this case, perform from the procedure 3 again.

4 Test operation

This chapter explains how to perform test operation using the **MEXE02**.

With test operation, the motor can be operated without connecting the master controller. Perform when checking vibrations, noises, and movements.

For the basic operation and data storage for the **MEXE02**, refer to the OPERATING MANUAL of the **MEXE02**.

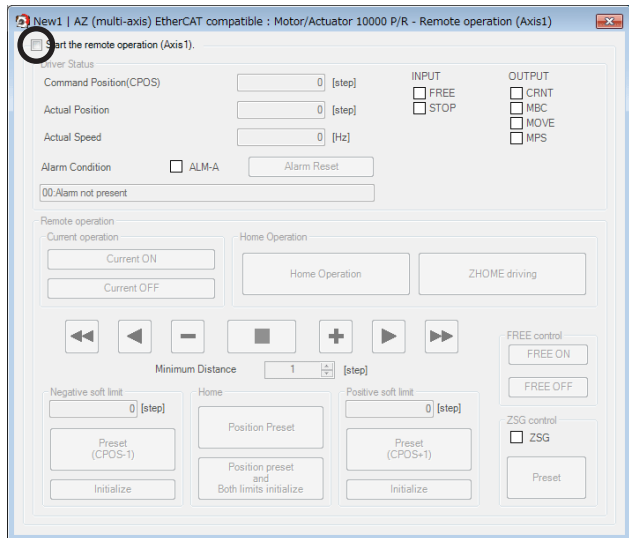
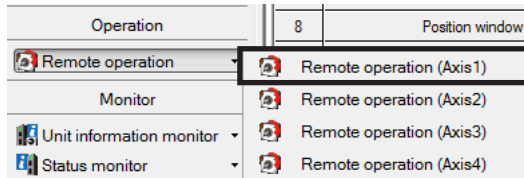


- Test operation (remote operation) cannot be started while the motor is in an excitation state via EtherCAT communication.
- Controlling the motor excitation state or executing an operation cannot be executed via EtherCAT communication while performing test operation (remote operation).

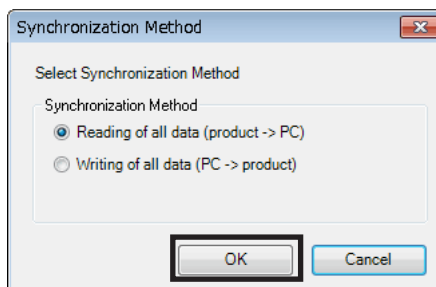
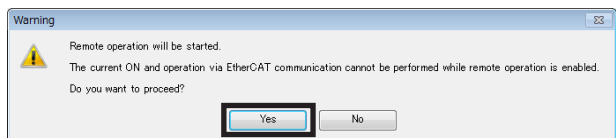
■ Procedure

Here, test operation for the motor connected to the AXIS 1 of the driver axis is performed.

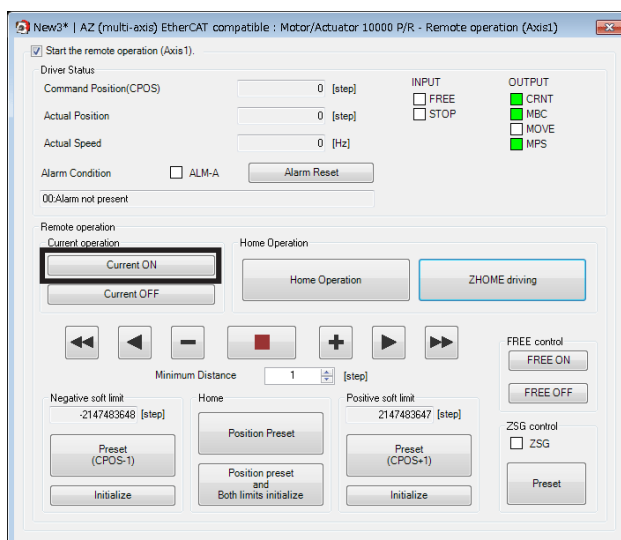
1. Connect motors, power supplies, and a PC in which the **MEXE02** has been installed to the driver.
2. Turn on the main power supply and control power supply.
3. Start a PC, and continuously start the **MEXE02**.
4. Click [Remote operation] to select [Remote operation (Axis1)].
The window of the remote operation (Axis1) is shown.
5. Click "Start the remote operation (Axis1)."



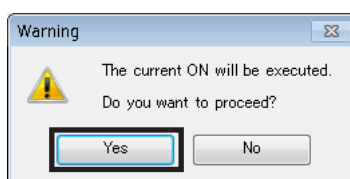
6. Click [Yes].
7. Since the window which uses to synchronize the **MEXE02** data and the driver data appears, select the synchronization method and click [OK].
 - When test operation (remote operation) is performed using the driver data
→ Selects "Reading of all data (product → PC)"
 - When test operation (remote operation) is performed using the **MEXE02** data
→ Selects "Writing of all data (PC → product)"



8. Click [Current ON] to excite the motor.



9. Click [Yes].



10. Operate the motor using the JOG operation buttons.

JOG operation buttons



Descriptions of JOG operation buttons

| Button | Description |
|--------|---|
| | Performs continuous operation in the negative direction at the operating speed set in the "(JOG) Operating speed (high)" parameter. |
| | Performs continuous operation in the negative direction at the operating speed set in the "(JOG) Operating speed" parameter. |
| | Performs positioning operation in the negative direction for the travel amount set in the "Minimum Distance" of the JOG operation switches. |
| | This is used to stop the motor immediately. |
| | Performs positioning operation in the positive direction for the travel amount set in the "Minimum Distance" of the JOG operation switches. |
| | Performs continuous operation in the positive direction at the operating speed set in the "(JOG) Operating speed" parameter. |
| | Performs continuous operation in the positive direction at the operating speed set in the "(JOG) Operating speed (high)" parameter. |

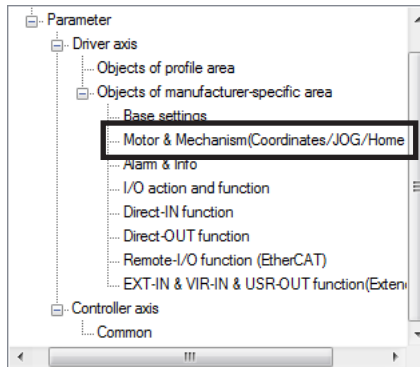
If the motor does not operate even when clicking the JOG operation switches, check the following points.

- Are the power supply, motor, and **MEXE02** connected properly?
- Is an alarm present?

11. To end the test operation (remote operation), unselect "Start the remote operation (Axis1)."

● **When changing the operating condition of JOG operation**

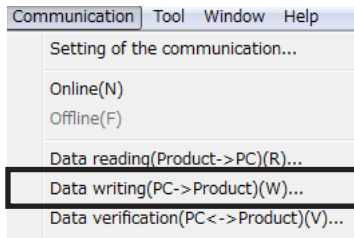
1. From TreeView in the left side of the screen, click [Motor & Mechanism (Coordinates/JOG/Home Operation)] under [Objects of manufacturer-specific area] under [Driver axis]. The "Motor & Mechanism" parameter window appears.



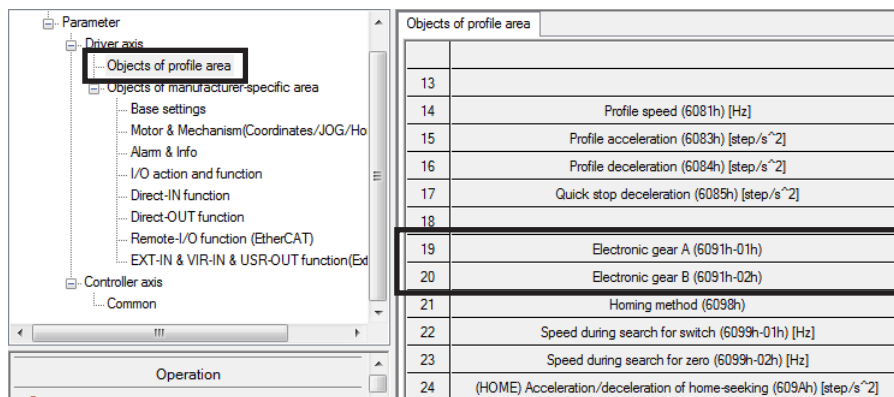
2. The operating condition can be changed using the right four parameters.

| Motor & Mechanism(Coordinates/JOG/Home operation) | |
|---|---|
| 22 | (JOG) Operating speed [Hz] |
| 23 | (JOG) Acceleration/deceleration [kHz/s] |
| 24 | (JOG) Starting speed [Hz] |
| 25 | (JOG) Operating speed (high) [Hz] |

3. After changing the operating condition, click [Data writing (PC → Product)] from the [Communication] menu or click [Data writing (PC → Product)] icon in the toolbar.



Set the resolution with the "Electronic gear" in objects of profile area. It cannot be set with the parameter of the "Motor & Mechanism (Coordinates/JOG/Home Operation)."



5 Return-to-home

The **MEXE02** allows two types of return-to-home operations: return-to-home operation and high-speed return-to-home operation.

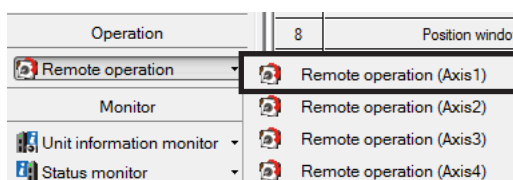
- Return-to-home operation
Return-to-home operation is an operation to return to the home position in the homing mode (HM). Refer to p.70 for details about return-to-home mode (HM).
- High-speed return-to-home operation
High-speed return-to-home operation is an operation to return to the mechanical home position on the absolute position coordinate set in advance. Since the home position is recognized by the ABZO sensor, return-to-home operation can be executed at the same speed as that of the normal positioning operation without using an external sensor.

Note Two types of return-to-home operations, which can be executed using the **MEXE02**, are both the driver specific return operations. In these operations, it may return to a different position from the home position that the master controller manages. Note that an unexpected movement may cause when the operation is executed.

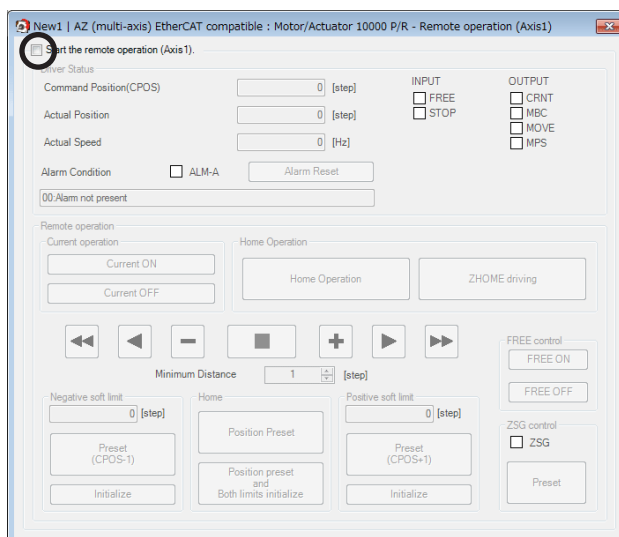
5-1 Return-to-home operation

Here, return-to-home operation for the motor connected to the AXIS 1 of the driver axis is performed.

1. Click [Remote operation] to select [Remote operation (Axis1)].
The window of the remote operation (Axis1) is shown.



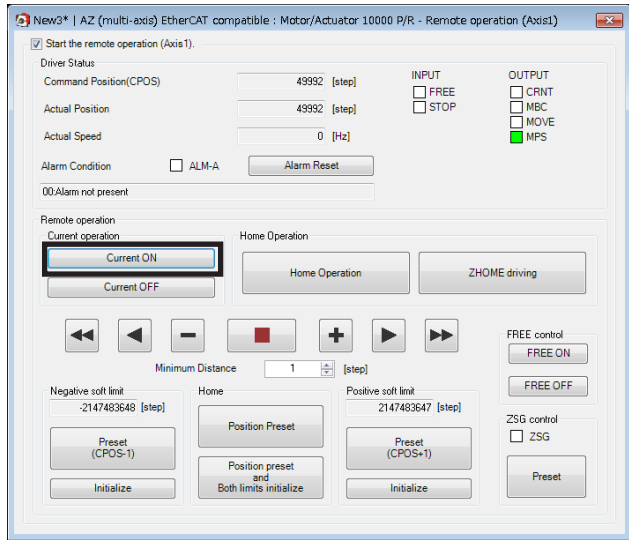
2. Click "Start the remote operation (Axis1)."



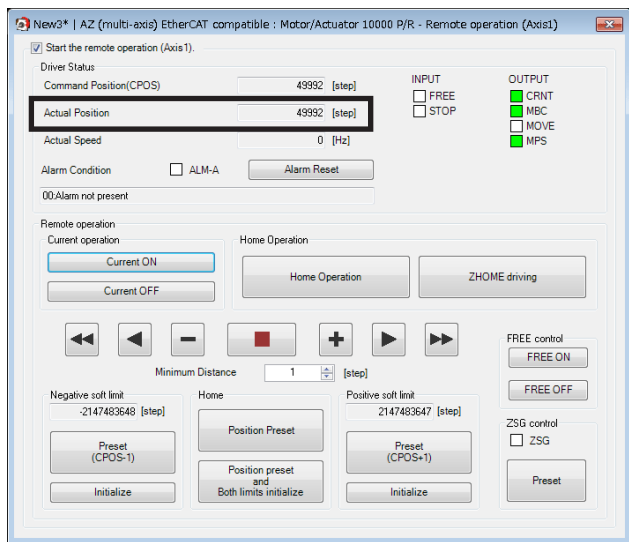
3. Click [Yes].



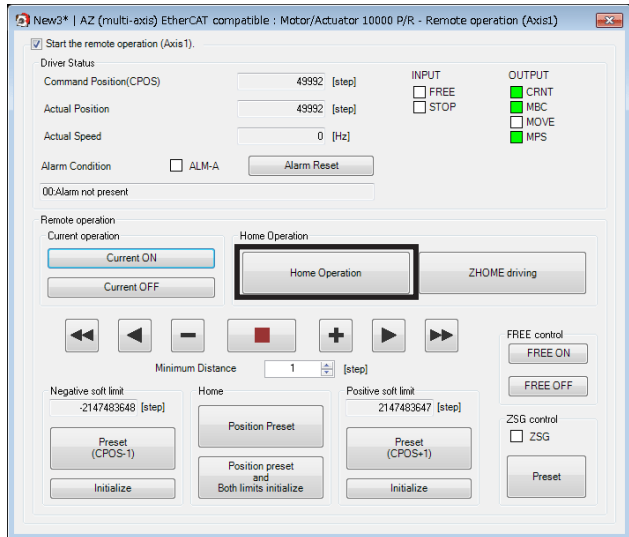
4. Click [Current ON] to excite the motor.



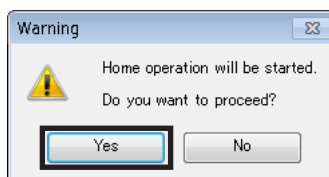
5. Check the value in the "Actual position."



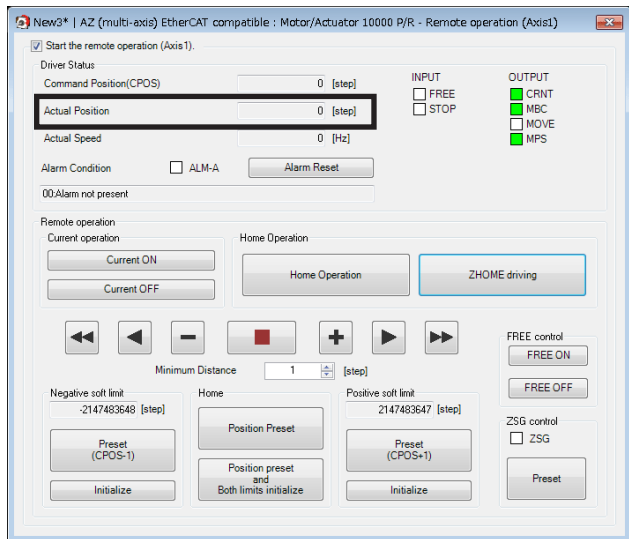
6. Click "HOME operation."



7. Click [Yes].
The motor will start return-to-home operation.



- After the motor returns to the home position, check that the "Actual position" is 0.

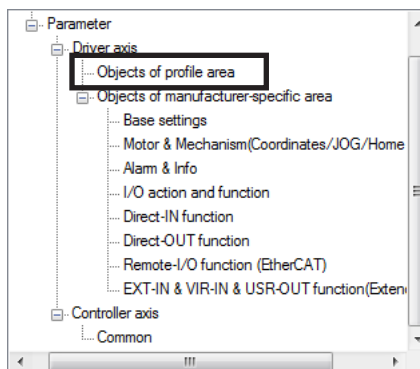


- To end the remote operation, unselect "Start the remote operation (Axis1)."

■ **When changing the operating condition of return-to-home operation**

- **When the "Homing method (6098h)" is set to other than "-1" (return-to-home our specifications)**

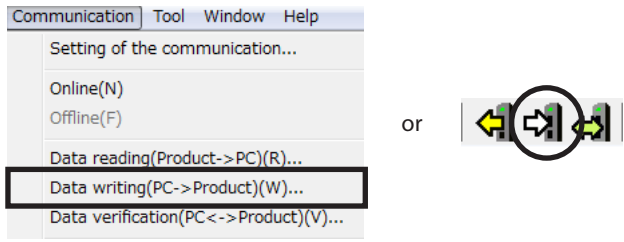
- From TreeView in the left side of the screen, click [Objects of profile area] under [Driver axis]. The objects of profile area appears.



- The operating condition can be changed using the right five parameters.

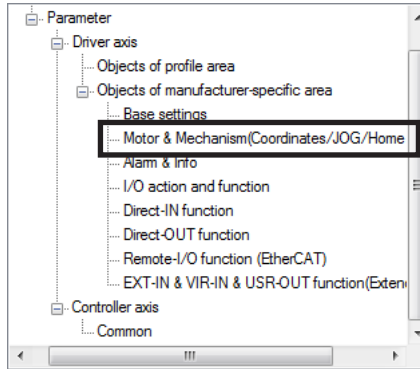
| Objects of profile area | |
|-------------------------|--|
| 9 | Home offset (607Ch) [step] |
| 10 | |
| 11 | Min position limit (607Dh-01h) [step] |
| 12 | Max position limit (607Dh-02h) [step] |
| 13 | |
| 14 | Profile velocity (6081h) [Hz] |
| 15 | Profile acceleration (6083h) [step/s ²] |
| 16 | Profile deceleration (6084h) [step/s ²] |
| 17 | Quick stop deceleration (6085h) [step/s ²] |
| 18 | |
| 19 | Electronic gear A (6091h-01h) |
| 20 | Electronic gear B (6091h-02h) |
| 21 | Homing method (6098h) |
| 22 | Speed during search for switch (6099h-01h) [Hz] |
| 23 | Speed during search for zero (6099h-02h) [Hz] |
| 24 | Homing acceleration [step/s ²] |

3. After changing the operating condition, click [Data writing (PC → Product)] from the [Communication] menu or click [Data writing (PC → Product)] icon in the toolbar.



● When the "Homing method (6098h)" is set to "-1" (return-to-home our specifications)

1. From TreeView in the left side of the screen, click [Motor & Mechanism (Coordinates/JOG/Home Operation)] under [Objects of manufacturer-specific area] under [Driver axis]. The "Motor & Mechanism" parameter window appears.



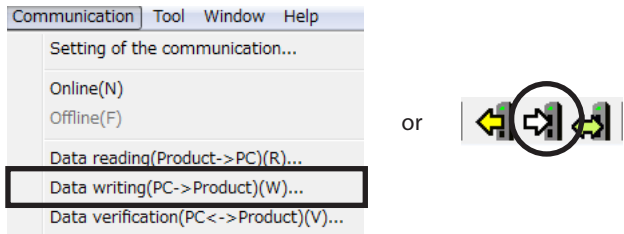
2. Change the "(JOG/HOME/ZHOME) Manual setting" parameter to "manual setting."

| Motor & Mechanism(Coordinates/JOG/Home operation) | | Axis 1 |
|---|--|----------------|
| 19 | (JOG/HOME/ZHOME)Manual setting | Manual setting |
| 20 | (JOG/HOME/ZHOME) Command filter time constant [ms] | 1 |

3. The operating condition can be changed using the right 15 parameters.

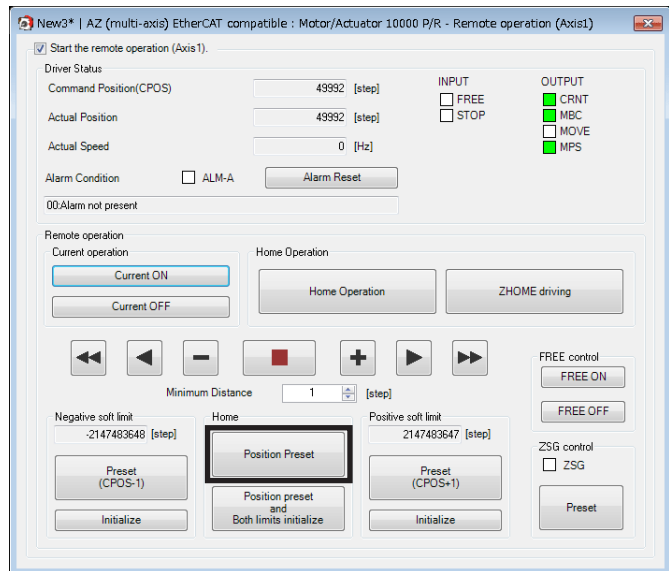
| Motor & Mechanism(Coordinates/JOG/Home operation) | |
|---|---|
| 30 | (HOME) Home-seeking mode |
| 31 | (HOME) Starting direction |
| 32 | (HOME) Acceleration/deceleration of home-seeking [kHz/s] |
| 33 | (HOME) Starting speed [Hz] |
| 34 | (HOME) Operating speed [Hz] |
| 35 | (HOME) Home seeking speed [Hz] |
| 36 | (HOME) SLIT detection |
| 37 | (HOME) TIM/ZSG signal detection |
| 38 | (HOME) Sets the amount of offset from mechanical home. [step] |
| 39 | (HOME) Backward steps in 2 sensor home-seeking [step] |
| 40 | (HOME) Operating amount in uni-directional home-seeking [step] |
| 41 | (HOME) Operating current for push motion home-seeking [%] |
| 42 | (HOME) Backward steps after first entry in push-home-seeking [step] |
| 43 | (HOME) Pushing-time in push-home-seeking [ms] |
| 44 | (HOME)Backward steps in push-home-seeking [step] |

4. After changing the operating condition, click [Data writing (PC → Product)] from the [Communication] menu or click [Data writing (PC → Product)] icon in the toolbar.



■ When the "Homing method (6098h)" is set to "home position preset (35 or 37)"

Use [Position preset] when selecting "home position preset (35 or 37)" in the "Homing method (6098h)."



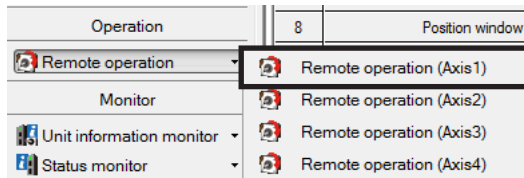
Note Be sure to click [Position preset] when performing the position preset. If [HOME operation] or [ZHOME driving] is used, since return-to-home operation is performed instead of the position preset, the motor will suddenly start moving.

5-2 High-speed return-to-home operation

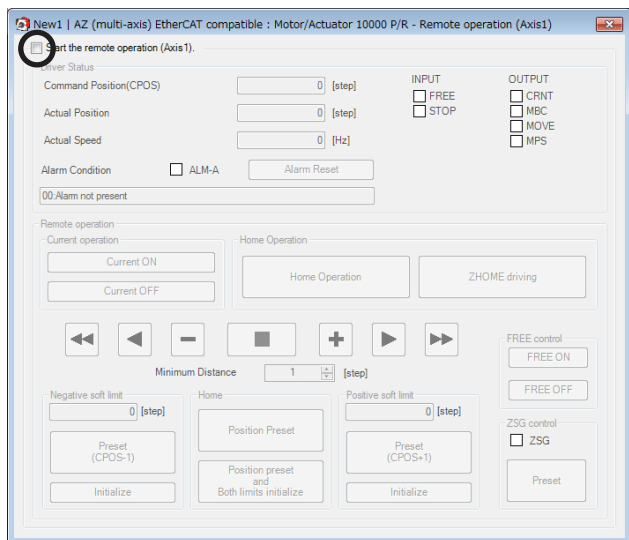
Here, high-speed return-to-home operation for the motor connected to the AXIS 1 of the driver axis is performed.

Note The home position for motorized actuators has been set at the time of shipment. (Excluding the rod type of the **DR** Series and non-guide type of the **DRS2** Series.) However, in the case of a motor alone, the home position has not been set at the time of shipment. In addition, the home position becomes an unset state when the resolution is changed. If high-speed return-to-home operation is started in a condition like this, the "ZHOME start error" information is generated, and operation is not performed. Be sure to set the home position before performing high-speed return-to-home operation. Refer to p.177 for resetting the home position.

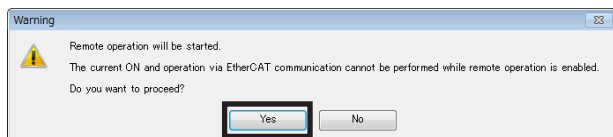
1. Click [Remote operation] to select [Remote operation (Axis1)].
The window of the remote operation (Axis1) is shown.



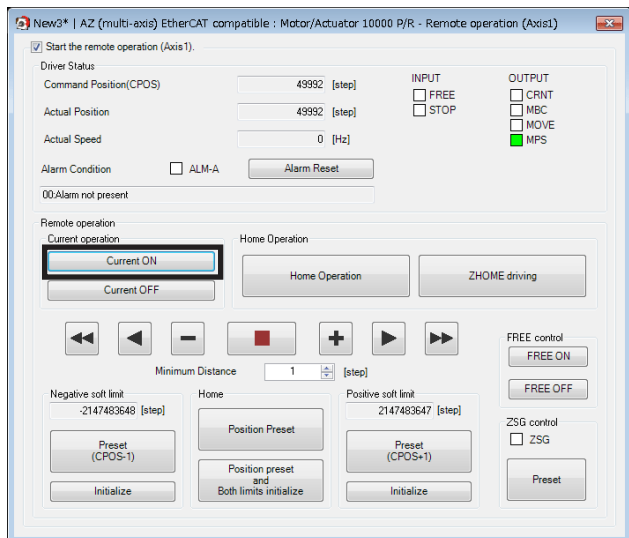
2. Click "Start the remote operation (Axis1)."



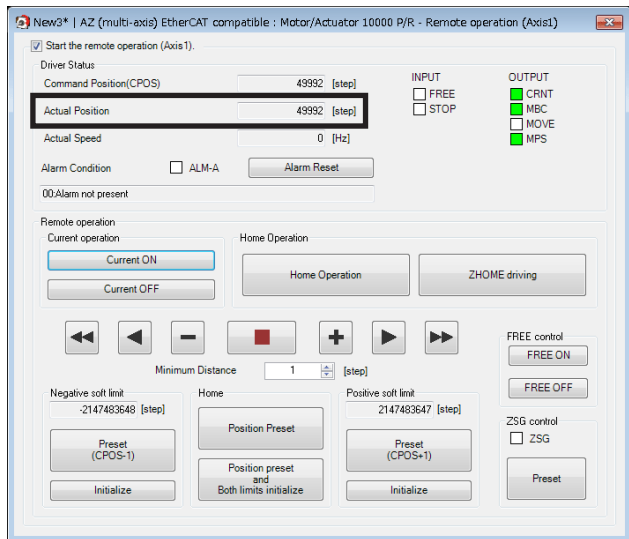
3. Click [Yes].



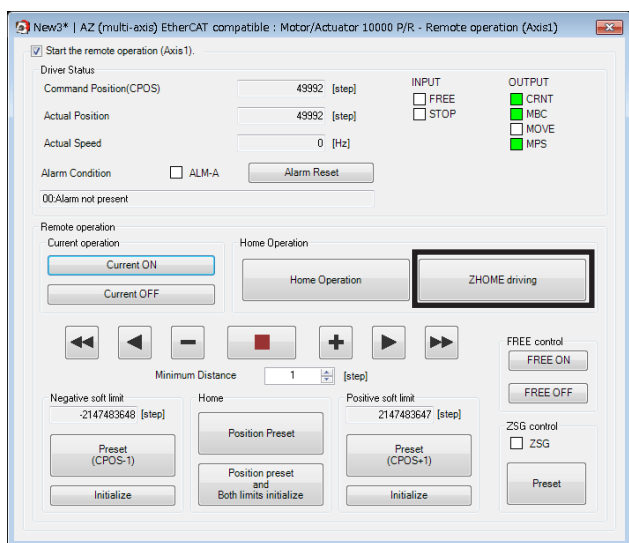
4. Click [Current ON] to excite the motor.



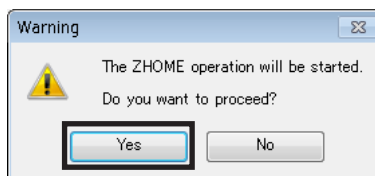
5. Check the value in the "Actual position."



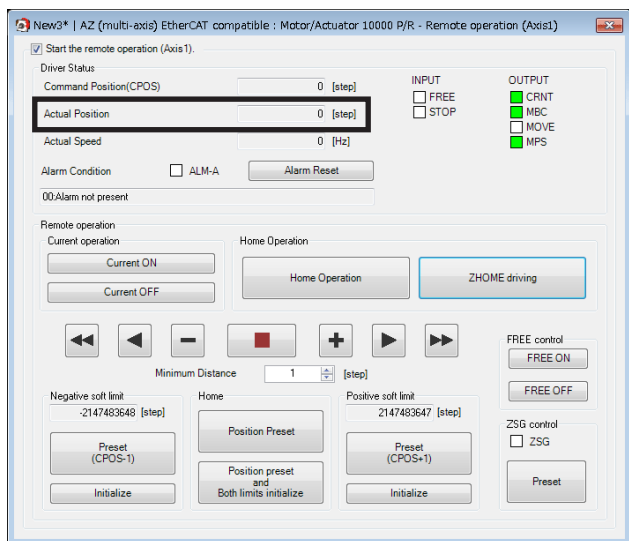
6. Click "ZHOME driving."



7. Click [Yes].
The motor will start high-speed return-to-home operation.



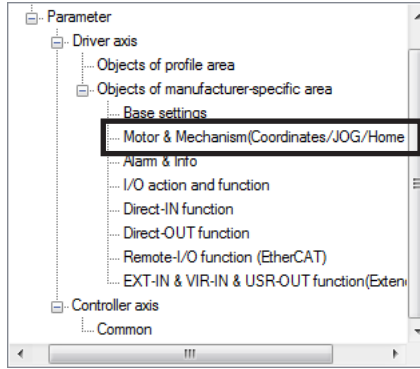
8. After the motor returns to the home position, check that the "Actual position" is 0.



9. To end the remote operation, unselect "Start the remote operation (Axis 1)."

■ When changing the operating condition of high-speed return-to-home operation

1. From TreeView in the left side of the screen, click [Motor & Mechanism (Coordinates/JOG/Home Operation)] under [Objects of manufacturer-specific area] under [Driver axis]. The "Motor & Mechanism" parameter window appears.



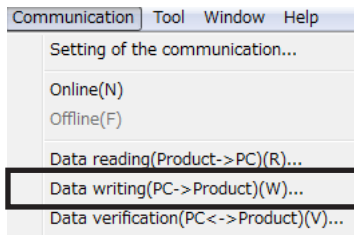
2. Change the "(JOG/HOME/ZHOME) Manual setting" parameter to "manual setting."

| Motor & Mechanism(Coordinates/JOG/Home operation) | | Axis 1 |
|---|--|----------------|
| 19 | (JOG/HOME/ZHOME)Manual setting | Manual setting |
| 20 | (JOG/HOME/ZHOME) Command filter time constant [ms] | 1 |

3. The operating condition can be changed using the right five parameters.

| Motor & Mechanism(Coordinates/JOG/Home operation) | |
|---|--|
| 20 | (JOG/HOME/ZHOME) Command filter time constant [ms] |
| 21 | (JOG/HOME/ZHOME) Operating current [%] |
| 22 | (JOG) Operating speed [Hz] |
| 23 | (JOG) Acceleration/deceleration [kHz/s] |
| 24 | (JOG) Starting speed [Hz] |
| 25 | (JOG) Operating speed (high) [Hz] |
| 26 | (ZHOME) Operation speed [Hz] |
| 27 | (ZHOME) Acceleration/deceleration [kHz/s] |
| 28 | (ZHOME) Starting speed [Hz] |

4. After changing the operating condition, click [Data writing (PC → Product)] from the [Communication] menu or click [Data writing (PC → Product)] icon in the toolbar.



6 Monitor

This chapter shows how to monitor the items specific to the multi-axis driver.

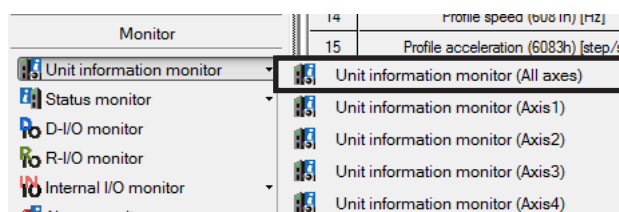
6-1 Unit information monitor

The following two unit information monitors are available:

- Unit information monitor (all axes)
The setting status of switches for the controller axis in addition to the product information such as the model name and the serial number for the driver can be checked.
- Unit information monitor (axis 1 to axis 4)
The setting status of switches and parameters in addition to the product information such as the model name and the serial number can be checked for each driver axis.

■ Unit information monitor (all axes)

1. Click [Unit information monitor] to select [Unit information monitor (All axes)].



The unit information monitor (all axes) window appears.

2. Click "Start the unit information monitor (All axes)."
Unit information monitor (all axes) starts.

The screenshot shows the 'Unit information monitor (All axes)' window. At the top, there is a checkbox labeled 'Start the unit information monitor (All axes)' which is checked. Below this, the window is divided into two main sections: 'Controller axis' and 'Driver axis'.

Controller axis information area:

| Controller axis | | Active [applied] | |
|---------------------------|-------------|------------------|----------------------|
| Driver user name | | | |
| Product name | AZD4A-KED | | |
| Serial number | TZ41J13001 | | |
| CPU | 6025 | | |
| Ver. | 2.01 | | |
| PID | 5010 h | | |
| SID | 0000 h | | |
| Control power count | 149 [times] | | |
| Control power supply time | 51 [min] | ECAT ID Sw(x10) | Setting value 0 h |
| ECAT ID | 01 h | ECAT ID Sw(x1) | 1 h |

Driver axis information area:

| Driver axis | Axis1 | Axis2 | Axis3 | Axis4 |
|----------------------------|--------------------|--------------------|--------------------|--------------------|
| Motor user memo | | | | |
| Motor product name | AZM46AK | AZM46AK | AZM66AK | AZM66AK |
| Motor serial number | S511834003 | QU11J42603 | ST11C18302 | ST11C18301 |
| Actuator product name | - | - | - | - |
| Actuator serial number | - | - | - | - |
| Driver user memo | | | | |
| Driver product name | AZD4A-KED-1 | AZD4A-KED-2 | AZD4A-KED-3 | AZD4A-KED-4 |
| Driver serial number | TZ41J13001 | TZ41J13001 | TZ41J13001 | TZ41J13001 |
| CPU | 6040 | 6040 | 6040 | 6040 |
| Ver. | 2.01 | 2.01 | 2.01 | 2.01 |
| PID | 3420 h | 3420 h | 3420 h | 3420 h |
| SID | 0000 h | 0000 h | 0000 h | 0000 h |
| Series (Mech.) | 0000 h | 0000 h | 0000 h | 0000 h |
| Model (Mech.) | 0000 h | 0000 h | 0000 h | 0000 h |
| Used multi-rotation amount | 1800 | 1800 | 1800 | 1800 |
| Driver simulation mode | Use the real motor | Use the real motor | Use the real motor | Use the real motor |
| Parameter Rev. | 0001 h | 0001 h | 0001 h | 0001 h |
| Control power count | 37 [times] | 37 [times] | 37 [times] | 37 [times] |
| Main power count | 10 [times] | 10 [times] | 10 [times] | 10 [times] |
| Main power supply time | 143 [min] | 143 [min] | 143 [min] | 143 [min] |
| POW-TYPE | DC24 | DC24 | DC24 | DC24 |
| ABZ0 connection | Yes | Yes | Yes | Yes |

How to read the unit information monitor (all axes) screen

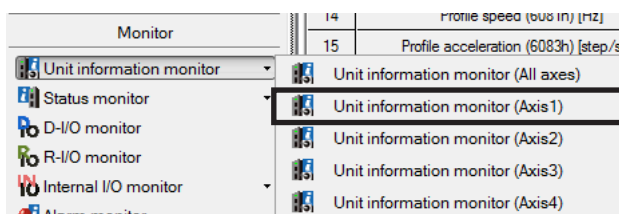
| Area | Main monitor item | Description |
|----------------------------------|---|--|
| Controller axis information area | Driver user name | An arbitrary name can be given with a parameter. |
| | Product name | The name of the product connected to the MEXE02 is displayed. |
| | Serial number | This is a serial number assigned to each product. It is written at the time of factory shipment and cannot be changed. |
| | Ver. | The version of the driver is shown. |
| Driver axis information area | <ul style="list-style-type: none"> • Motor user memo • Driver user memo | An arbitrary name can be given with a parameter. |
| | <ul style="list-style-type: none"> • Motor product name • Actuator product name | The model name being connected to each driver axis is shown. |
| | <ul style="list-style-type: none"> • Motor serial number • Actuator serial number | This is a serial number assigned to each product. It is written at the time of factory shipment and cannot be changed. |
| | Control power count | The number of times when the control power supply was turned on. |
| | Main power count | The number of times when the main power supply was turned on. |
| | Main power supply time | The total time while the main power supply was turned on. |

3. To end the monitor unselect "Start the unit information monitor (All axes)."

■ Unit information monitor (axis 1 to axis 4)

This explains how to use by taking the axis 1 of the driver axis as an example.

1. Click [Unit information monitor] to select [Unit information monitor (Axis1)].



The unit information monitor (axis 1) window appears.

2. Click "Start the unit information monitor (Axis1)."
Unit information monitor (axis 1) starts. Gray colored cells represent that the value is not set.

The image shows a screenshot of the 'Unit information monitor (Axis1)' window. The window title is 'New1 | AZ (multi-axis) EtherCAT compatible : Motor/Actuator 10000 P/R - Unit information monitor (Axis1)'. A checkmark in a box next to the title indicates that the monitor is started. The window is divided into three main sections:

- Product information area:** Contains fields for 'User memo', 'Product name' (AZM46AK), and 'Serial number' (SS11834003).
- Driver axis information area:** Contains a table of driver parameters such as CPU (6040), Ver. (2.10), PID (3420 h), and Resolution (10000 [P/R]).
- Motor and mechanism information area:** Contains a table of motor and mechanism settings such as 'Manual setting of the mechanism settings', 'Electronic gear A', 'Motor rotation direction', and 'Mechanism lead [mm]'. It includes columns for 'Active', 'Driver parameter', and 'ABZO (fixed)'.

How to read the unit information monitor (axis 1) screen

| Area | Main monitor item | Description |
|--------------------------------------|---------------------|--|
| Product information area | User memo | An arbitrary name can be given with a parameter. |
| | Product name | The name of the product connected to the MEXE02 is displayed. |
| | Serial number | This is a serial number assigned to each product. It is written at the time of factory shipment and cannot be changed. |
| Driver axis information area | Ver. | The version of the driver axis is shown. |
| | Control power count | The number of times when the control power supply was turned on. |
| | Main power count | The number of times when the main power supply was turned on. |
| Motor and mechanism information area | Active | Parameter value presently used. |
| | Driver parameter | Parameter value set in the driver axis using the MEXE02 or EtherCAT communication. |
| | ABZO (fixed) | Parameter value stored in the ABZO sensor. This is the fixed value. It cannot be changed. |

3. To end the monitor unselect "Start the unit information monitor (Axis1)."

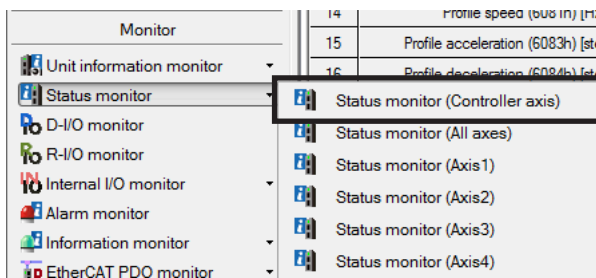
6-2 Status monitor

The following three status monitors are available:

- Status monitor (controller axis)
The status of the fan and regeneration resistor in addition to the communication status of EtherCAT communication can be checked.
- Status monitor (all axes)
The present status of the driver axis can be checked.
- Status monitor (axis 1 to axis 4)
The present status can be checked for each axis. More detailed status than the status monitor (all axes) can be checked.

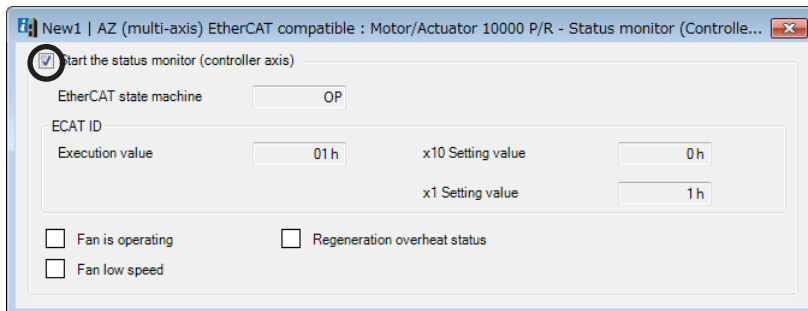
■ Status monitor (controller axis)

1. Click [Status monitor] to select [Status monitor (Controller axis)].



The status monitor (controller axis) window appears.

2. Click "Start the status monitor (controller axis)."
Status monitor (controller axis) starts.



How to read the status monitor (controller axis) screen

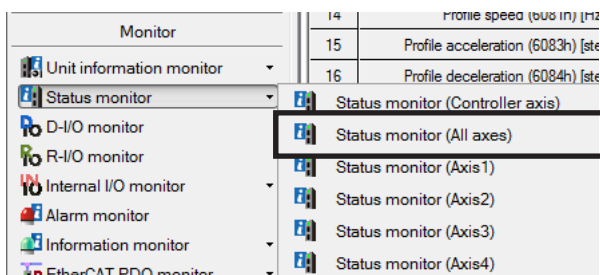
| Main monitor item | Description |
|---------------------------------------|--|
| EtherCAT state machine | Indicates the status of the state machine of EtherCAT communication. The state machine of EtherCAT communication is controlled by the master controller. Displayed items <ul style="list-style-type: none"> • INIT: During initialization • PREOP: Pre-operational state • SAFEOP: Safe-operational state • OP: Operational state |
| Execution value | Indicates the node address presently applied. The node address is set when the power is turned on. |
| x10 Setting value x1 Setting value | Indicates the status of the node address setting switches. |
| Fan is operating | This is turned ON during the action command of the fan. |
| Fan low speed | This is turned ON if the following state is continued for 10 seconds during the action command of the fan. <ul style="list-style-type: none"> • The standstill of the fan was detected. • The fan was not connected. |

| Main monitor item | Description |
|------------------------------|--|
| Regeneration overheat status | <p>This is turned ON if the following state is brought while the main power supply is supplied.</p> <ul style="list-style-type: none"> • An overheat of the regeneration resistor was detected. • The thermal signal of the regeneration resistor was not connected. |

3. To end the monitor unselect "Start the status monitor (controller axis)."

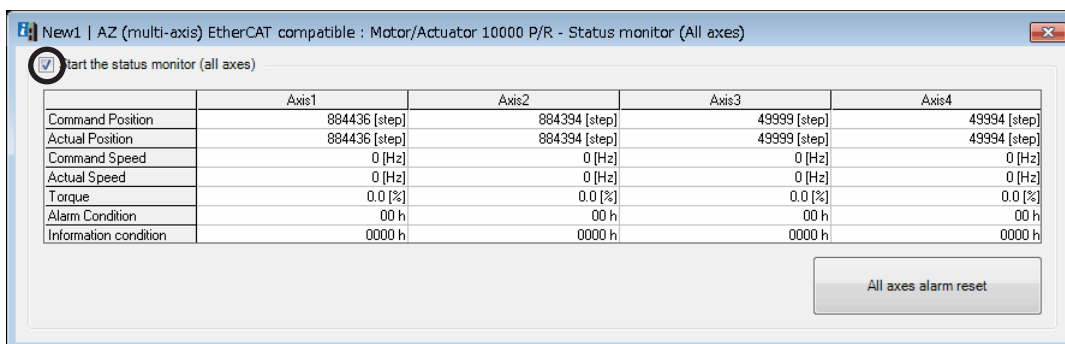
■ Status monitor (all axes)

1. Click [Status monitor] to select [Status monitor (All axes)].



The status monitor (all axes) window appears.

2. Click "Start the status monitor (all axes)."
Status monitor (all axes) starts.

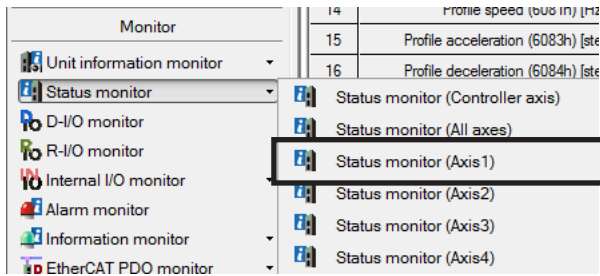


3. To end the monitor unselect "Start the status monitor (all axes)."

■ Status monitor (Axis 1 to Axis 4)

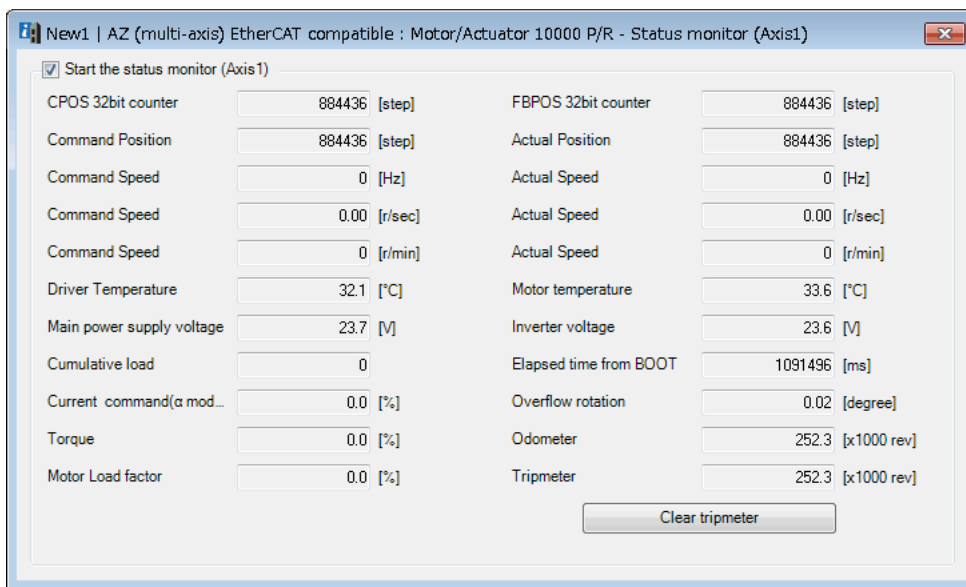
This explains how to use by taking the status monitor (axis 1) as an example.

1. Click [Status monitor] to select [Status monitor (Axis1)].



The status monitor (axis 1) window appears.

2. Click "Start the status monitor (Axis1)."
Status monitor (axis 1) starts.



3. To end the monitor unselect "Start the status monitor (Axis1)."

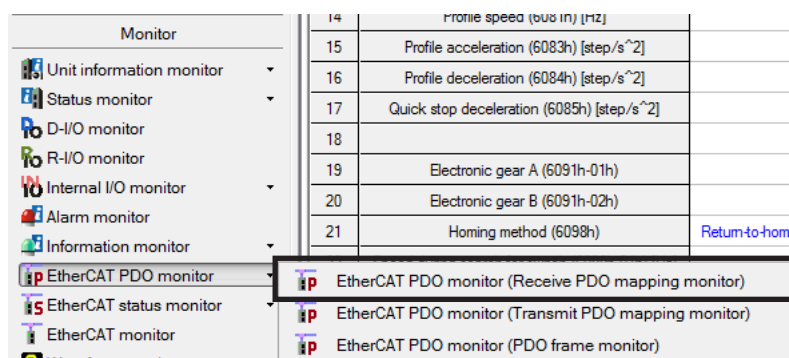
6-3 EtherCAT PDO monitor

The following three EtherCAT PDO monitors are available:

- EtherCAT PDO monitor (receive PDO mapping monitor)
The receive PDO mapping object can be checked.
- EtherCAT PDO monitor (transmit PDO mapping monitor)
The transmit PDO mapping object can be checked.
- EtherCAT PDO monitor (PDO frame monitor)
The communication data for the receive PDO and the transmit PDO can be checked.

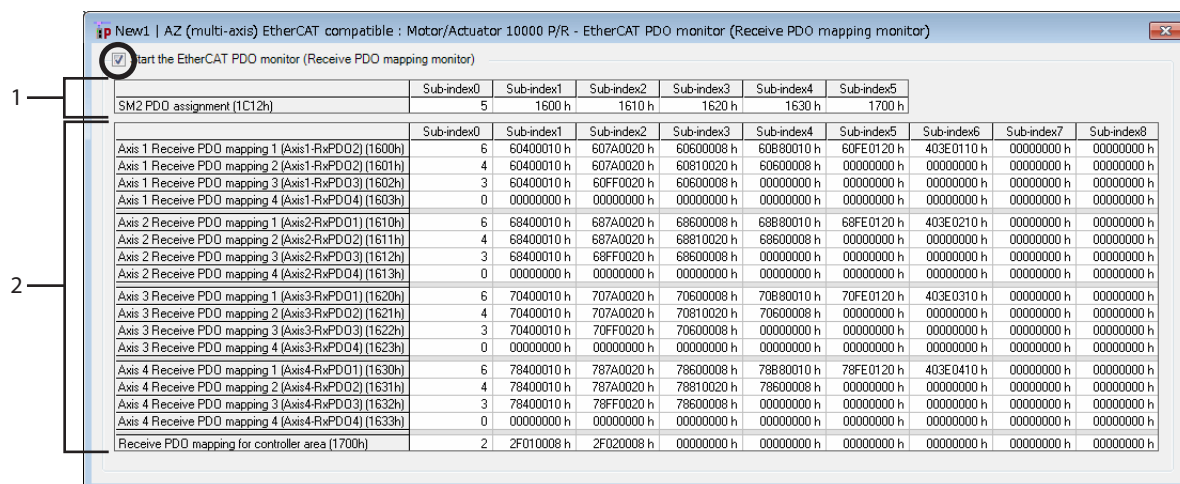
■ EtherCAT PDO monitor (receive PDO mapping monitor)

1. Click [EtherCAT PDO monitor] to select [EtherCAT PDO monitor (Receive PDO mapping monitor)].



The EtherCAT PDO monitor (receive PDO mapping monitor) window appears.

2. Click "Start the EtherCAT PDO monitor (Receive PDO mapping monitor)."
EtherCAT PDO monitor (receive PDO mapping monitor) starts.



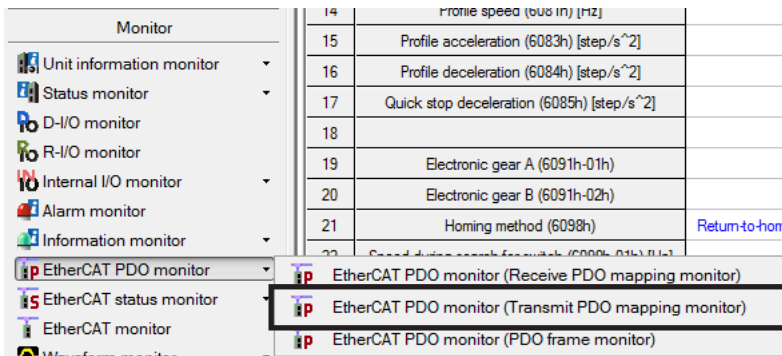
How to read the EtherCAT PDO monitor (receive PDO mapping monitor)

| Area | Description |
|------|---|
| 1 | Indicates the effective receive PDO mapping on each axis. |
| 2 | Indicates the receive PDO mapping object on each axis. |

3. To end the monitor unselect "Start the EtherCAT PDO monitor (Receive PDO mapping monitor)."

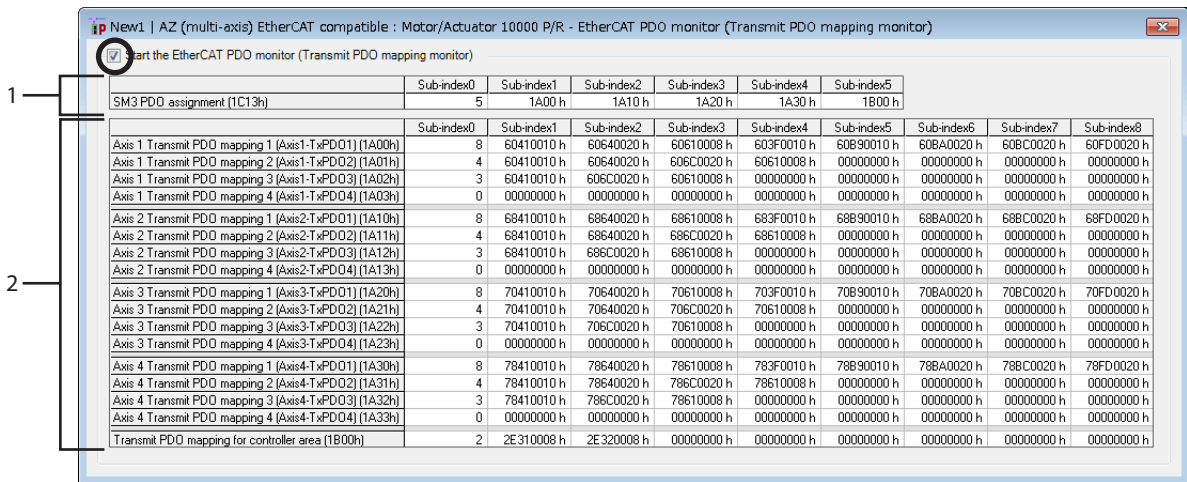
■ EtherCAT PDO monitor (transmit PDO mapping monitor)

1. Click [EtherCAT PDO monitor] to select [EtherCAT PDO monitor (Transmit PDO mapping monitor)].



The EtherCAT PDO monitor (transmit PDO mapping monitor) window appears.

2. Click "Start the EtherCAT PDO monitor (Transmit PDO mapping monitor)." EtherCAT PDO monitor (transmit PDO mapping monitor) starts.



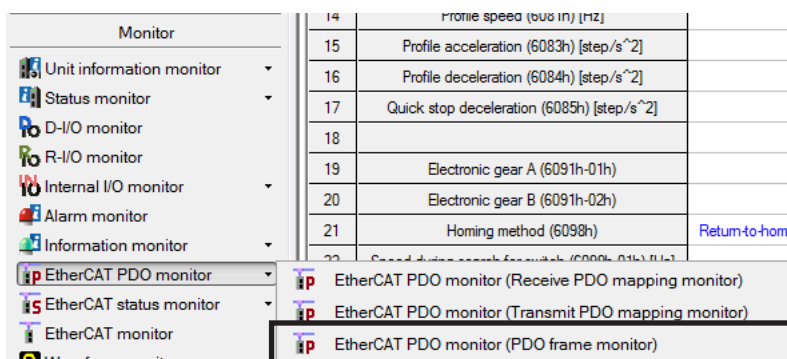
How to read the EtherCAT PDO monitor (transmit PDO mapping monitor)

| Area | Description |
|------|--|
| 1 | Indicates the effective transmit PDO mapping on each axis. |
| 2 | Indicates the transmit PDO mapping object on each axis. |

3. To end the monitor unselect "Start the EtherCAT PDO monitor (Transmit PDO mapping monitor)".

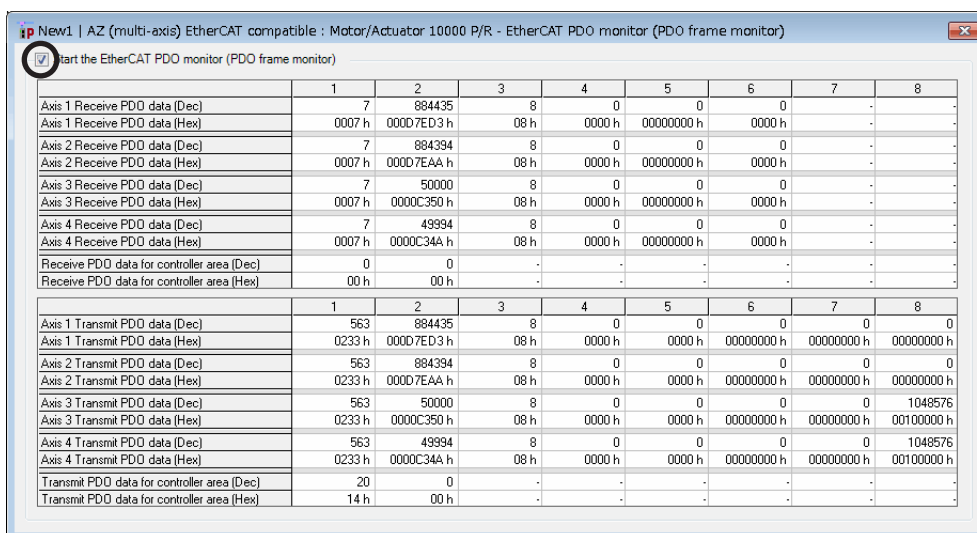
■ EtherCAT PDO monitor (PDO frame monitor)

1. Click [EtherCAT PDO monitor] to select [EtherCAT PDO monitor (PDO frame monitor)].



The EtherCAT PDO monitor (PDO frame monitor) window appears.

2. Click "Start the EtherCAT PDO monitor (PDO frame monitor)."
EtherCAT PDO monitor (PDO frame monitor) starts.



3. To end the monitor unselect "Start the EtherCAT PDO monitor (PDO frame monitor)".

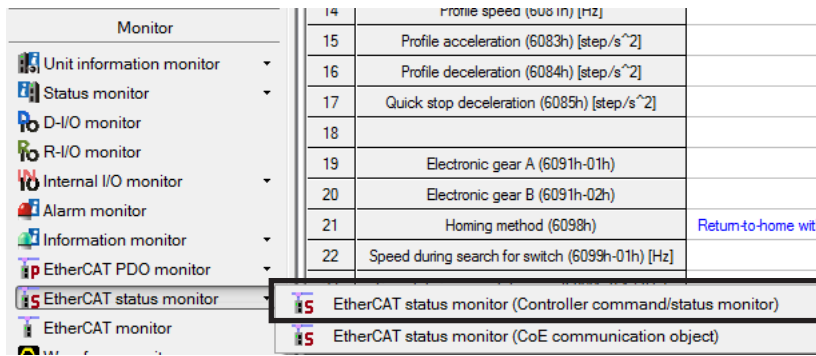
6-4 EtherCAT status monitor

The following two EtherCAT status monitors are available:

- EtherCAT status monitor (controller command/status monitor)
The command and the status for the controller axis can be checked.
- EtherCAT status monitor (CoE communication object)
The object of CoE communication area can be checked.

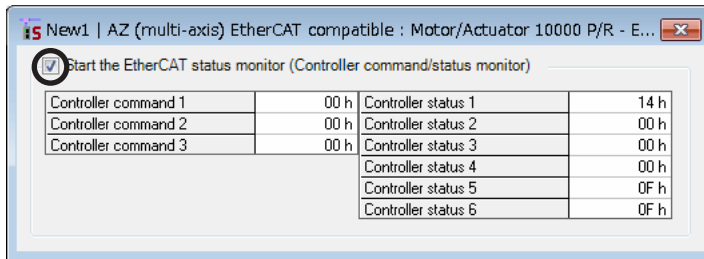
■ EtherCAT status monitor (controller command/status monitor)

1. Click [EtherCAT status monitor] to select [EtherCAT status monitor (Controller command/status monitor)].



The EtherCAT status monitor (controller command/status monitor) window appears.

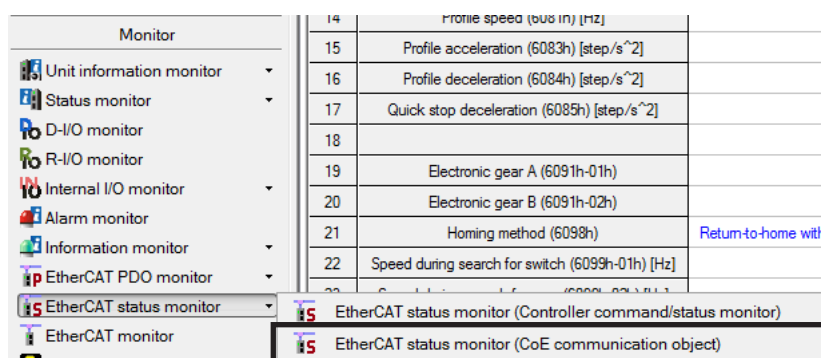
2. Click "Start the EtherCAT status monitor (Controller command/status monitor)."
EtherCAT status monitor (controller command/status monitor) starts.



3. To end the monitor unselect "Start the EtherCAT status monitor (Controller command/status monitor)".

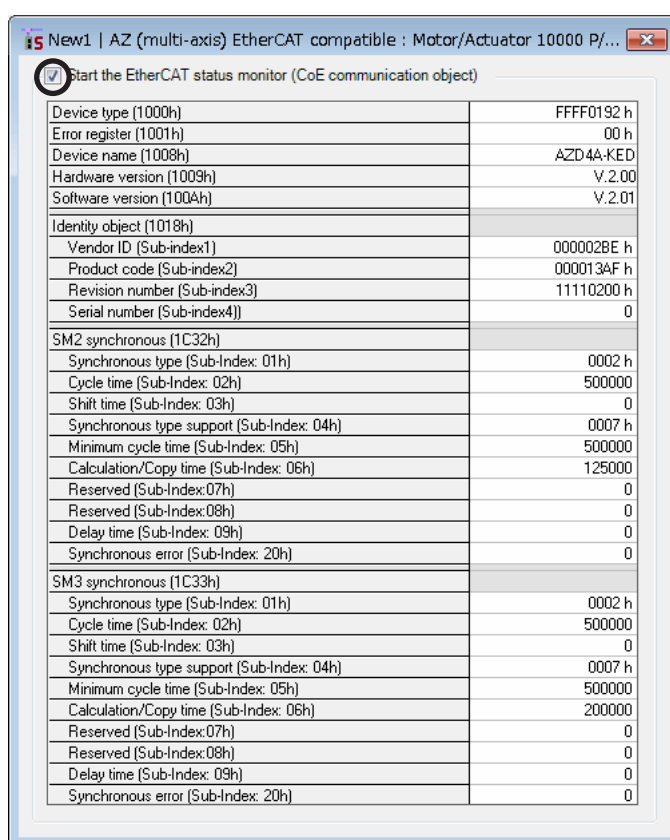
■ EtherCAT status monitor (CoE communication object)

1. Click [EtherCAT status monitor] to select [EtherCAT status monitor (CoE communication object)].



The EtherCAT status monitor (CoE communication object) window appears.

2. Click "Start the EtherCAT status monitor (CoE communication object)."
EtherCAT status monitor (CoE communication object) starts.

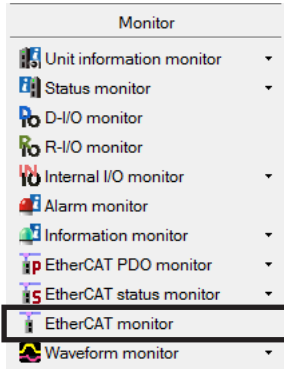


3. To end the monitor unselect "Start the EtherCAT status monitor (CoE communication object)."

6-5 EtherCAT monitor

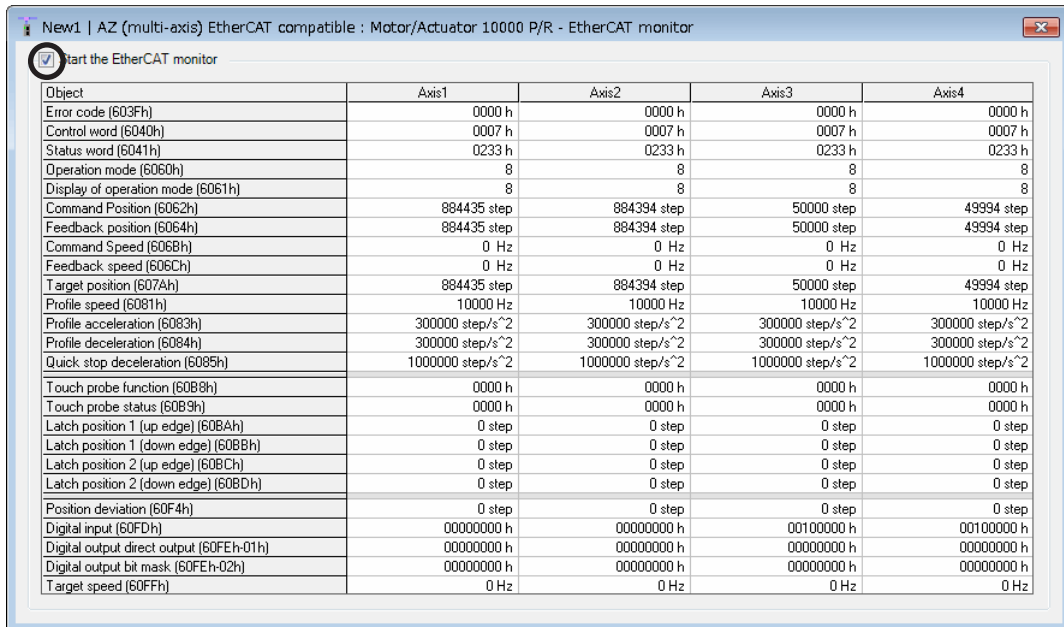
The objects of profile area can be monitored.

1. Click the [EtherCAT monitor].



The EtherCAT monitor window appears.

2. Click "Start the EtherCAT monitor."
EtherCAT monitor starts.



3. To end the monitor unselect "Start the EtherCAT monitor."

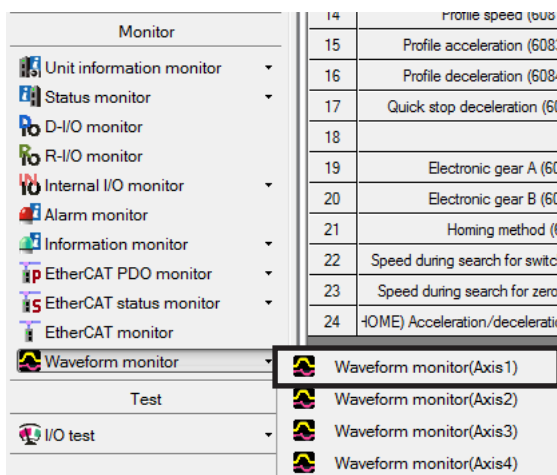
6-6 Waveform monitor

The waveform monitor is a function to output the output signal as a waveform in addition to the command speed and actual speed of the motor.

Since each output signal such as READY, MOVE and TLC can be monitored simultaneously according to the operating status of the motor, creating and debugging of ladder programs can be performed efficiently.

This explains how to use by taking the axis 1 of the driver axis as an example.

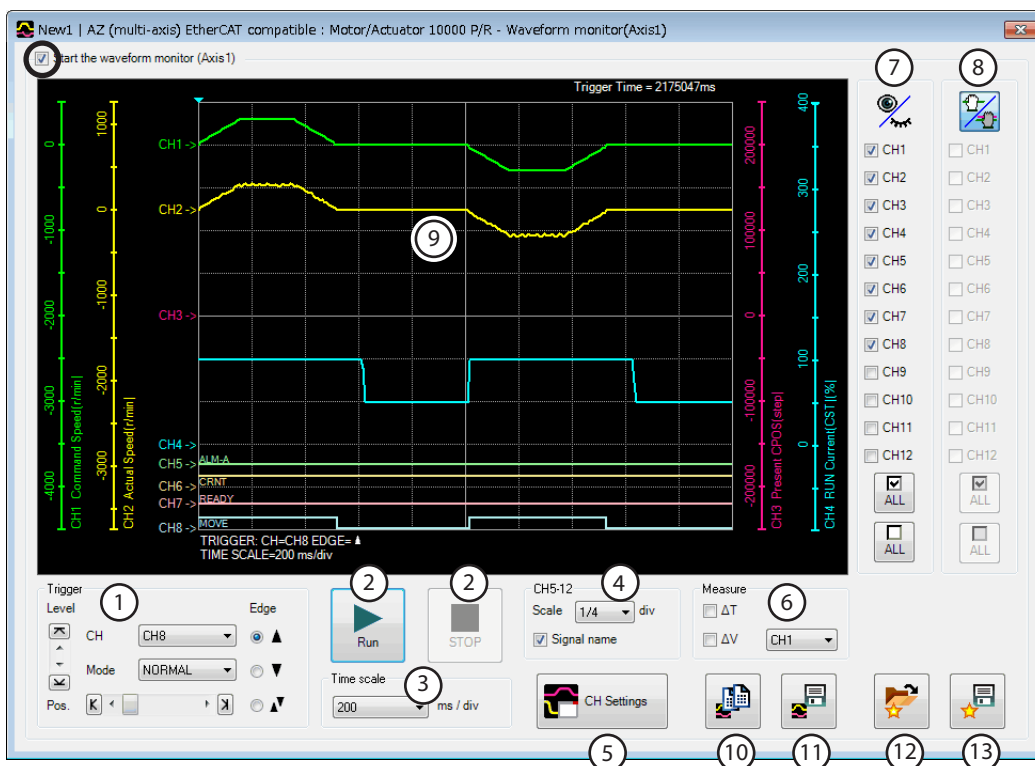
1. Click [Waveform monitor] to select [Waveform monitor (Axis1)].



The waveform monitor (axis1) window appears.

2. Click "Start the waveform monitor (Axis1)."

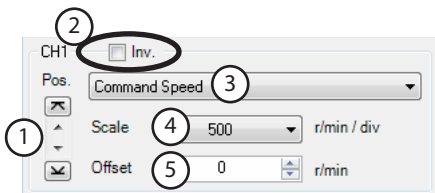
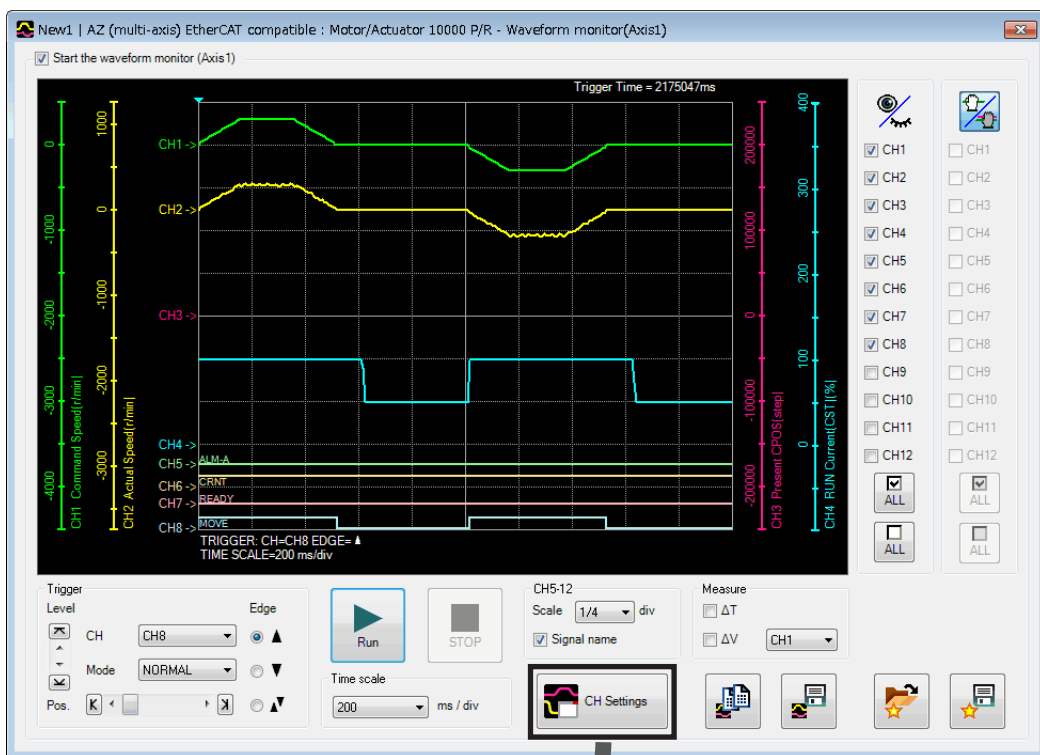
The buttons in the window are enabled, allowing you to measure the waveform.



- | | |
|---|---|
| 1 | Sets the Level, CH, Mode, Edge (detection condition), and Pos (trigger position) that are used when the waveform is measured. For "CH," only CH shown on 9 can be used. |
| 2 | RUN: This button is used to start measurement. STOP: This button is used to stop measurement. |
| 3 | Sets the measurement time range. |

| | |
|----|--|
| 4 | Sets the display method for CH5 to CH12. Scale: Selects the display size from 1/1 (100%), 1/2 (50%), or 1/4 (25%). Signal name: Switches between show or hide for the signal name. |
| 5 | Shows the CH setting window. |
| 6 | Switches between show or hide for the measure for measurement. Also, selects the CH to be measured. |
| 7 | Switches between show or hide for each CH. |
| 8 | When the display position of the waveform drawn on the screen is moved, CHs selected here can be moved collectively. |
| 9 | This is the area the measurement result is drawn. |
| 10 | Copies the waveform presently shown to the clipboard. |
| 11 | Saves the waveform presently shown to an external file. |
| 12 | Reads the setting for measurement from "Favorites." |
| 13 | Saves the setting for measurement as "Favorites." |

- Click [CH Settings].
The CH setting window is shown. Set the measurement condition for each CH.



| | |
|---|---|
| 1 | Moves the display position of the waveform up and down. |
| 2 | Shows the measured item inverted. |
| 3 | Selects the item to be measured. The CH1 to CH4 are items for the command speed, actual speed, receive PDO, transmit PDO and others, and the CH5 to CH12 are items for I/O signals. |
| 4 | Selects the display size (for CH1 to CH4 only). The display size can be enlarged in combination with ⑤. |
| 5 | Adds the set offset value to the measured value (for CH1 to CH4 only). The display size can be enlarged in combination with ④. |

4. Click [Run].
Waveform measurement starts.
5. If the [STOP] button is clicked during the measurement, the waveform measurement is ended.
If "SINGLE" is selected in the mode of trigger, the measurement is automatically ended when the drawing of the waveform is complete.
6. To end the waveform measurement, unselect "Start the waveform monitor (Axis1)."

4 Object List

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

◆ Table of contents

| | | |
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| 1 | Objects of the CoE communication area | 207 |
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| 3 | Controller objects of the manufacturer-specific area..... | 215 |
| 4 | Driver objects of the manufacturer-specific area..... | 216 |



■ Update timing of parameters

When a parameter is changed, the timing to enable the new value varies depending on the parameter. In this chapter, each update timing is represented in an alphabetical character.

- A: Effective immediately
- B: Effective after stopping the operation
- C: Effective after executing the configuration, or effective after executing write batch non-volatile memory and cycling the control power supply
- D: Effective after executing write batch non-volatile memory and cycling the control power supply

1 Objects of the CoE communication area

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

| Index | Sub | Name | Type | Access | PDO | Save | initial value | Range | Effective | |
|------------|-----------------------------|-------------------------------|--------|--------|-----|------|--|-----------------|-----------|--|
| 1000h | 00h | Device type | U32 | RO | No | – | FFFF0192h | – | – | |
| 1001h | 00h | Error register | U8 | RO | No | – | 0 | – | – | |
| 1008h | 00h | Manufacturer device name | STRING | RO | No | – | AZD2A-KED, AZD3A-KED, AZD4A-KED | | – | |
| 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 | – | 0000 13AFh | – | – | |
| | 03h | Revision number | U32 | RO | No | – | AZD2A-KED: 0011 xxxxh AZD3A-KED: 0111 xxxxh AZD4A-KED: 1111 xxxxh | | – | |
| 1600h | Axis1 receive PDO mapping 1 | | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A | |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6040 0010h | 0 to FFFF FFFFh | A | |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 607A 0020h | 0 to FFFF FFFFh | A | |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6060 0008h | 0 to FFFF FFFFh | A | |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | | |
| 1601h | Axis1 receive PDO mapping 2 | | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A | |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6040 0010h | 0 to FFFF FFFFh | A | |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 607A 0020h | 0 to FFFF FFFFh | A | |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6081 0020h | 0 to FFFF FFFFh | A | |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 6060 0008h | 0 to FFFF FFFFh | A | |
| 05h to 08h | Mapping entry 5-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | | |
| 1602h | Axis1 receive PDO mapping 3 | | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A | |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6040 0010h | 0 to FFFF FFFFh | A | |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 60FF 0020h | 0 to FFFF FFFFh | A | |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6060 0008h | 0 to FFFF FFFFh | A | |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | | |
| 1603h | Axis1 receive PDO mapping 4 | | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A | |
| 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | | |
| 1610h | Axis2 receive PDO mapping 1 | | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A | |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6840 0010h | 0 to FFFF FFFFh | A | |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 687A 0020h | 0 to FFFF FFFFh | A | |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6860 0008h | 0 to FFFF FFFFh | A | |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | | |
| 1611h | Axis2 receive PDO mapping 2 | | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A | |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6840 0010h | 0 to FFFF FFFFh | A | |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 687A 0020h | 0 to FFFF FFFFh | A | |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6881 0020h | 0 to FFFF FFFFh | A | |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 6860 0008h | 0 to FFFF FFFFh | A | |
| 05h to 08h | Mapping entry 5-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | | |

| Index | Sub | Name | Type | Access | PDO | Save | initial value | Range | Effective |
|-------|-----------------------------|-------------------|------|--------|-----|------|---------------|-----------------|-----------|
| 1612h | Axis2 receive PDO mapping 3 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6840 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 68FF 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6860 0008h | 0 to FFFF FFFFh | A |
| | 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1613h | Axis2 receive PDO mapping 4 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A |
| | 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1620h | Axis3 receive PDO mapping 1 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7040 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 707A 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7060 0008h | 0 to FFFF FFFFh | A |
| | 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1621h | Axis3 receive PDO mapping 2 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7040 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 707A 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7081 0020h | 0 to FFFF FFFFh | A |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 7060 0008h | 0 to FFFF FFFFh | A |
| | 05h to 08h | Mapping entry 5-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1622h | Axis3 receive PDO mapping 3 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7040 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 70FF 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7060 0008h | 0 to FFFF FFFFh | A |
| | 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1623h | Axis3 receive PDO mapping 4 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A |
| | 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1630h | Axis4 receive PDO mapping 1 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7840 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 787A 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7860 0008h | 0 to FFFF FFFFh | A |
| | 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1631h | Axis4 receive PDO mapping 2 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7840 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 787A 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7881 0020h | 0 to FFFF FFFFh | A |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 7860 0008h | 0 to FFFF FFFFh | A |
| | 05h to 08h | Mapping entry 5-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1632h | Axis4 receive PDO mapping 3 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7840 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 78FF 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7860 0008h | 0 to FFFF FFFFh | A |
| | 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1633h | Axis4 receive PDO mapping 4 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A |
| | 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |

| Index | Sub | Name | Type | Access | PDO | Save | initial value | Range | Effective |
|------------|--------------------------------|-------------------|------|--------|-----|------|-----------------|-----------------|-----------|
| 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 | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 2F02 0008h | 0 to FFFF FFFFh | A |
| | 03h to 08h | Mapping entry 3-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1A00h | Axis1 transmit PDO mapping 1 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6041 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 6064 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6061 0008h | 0 to FFFF FFFFh | A |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A01h | Axis1 transmit PDO mapping 2 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6041 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 6064 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 606C 0020h | 0 to FFFF FFFFh | A |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 6061 0008h | 0 to FFFF FFFFh | A |
| 05h to 08h | Mapping entry 5-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A02h | Axis1 transmit PDO mapping 3 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6041 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 606C 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6061 0008h | 0 to FFFF FFFFh | A |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A03h | Axis1 transmit PDO mapping 4 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A |
| 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A10h | Axis2 transmit PDO mapping 1 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6841 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 6864 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6861 0008h | 0 to FFFF FFFFh | A |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A11h | Axis2 transmit PDO mapping 2 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6841 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 6864 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 686C 0020h | 0 to FFFF FFFFh | A |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 6861 0008h | 0 to FFFF FFFFh | A |
| 05h to 08h | Mapping entry 5-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A12h | Axis2 transmit PDO mapping 3 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 6841 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 686C 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 6861 0008h | 0 to FFFF FFFFh | A |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A13h | Axis2 transmit PDO mapping 4 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A |
| 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |
| 1A20h | Axis3 transmit PDO mapping 1 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7041 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 7064 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7061 0008h | 0 to FFFF FFFFh | A |
| 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A | |

| Index | Sub | Name | Type | Access | PDO | Save | initial value | Range | Effective |
|-------|---------------------------------|-----------------------------------|------|--------|-----|------|---|-----------------|-----------|
| 1A21h | Axis3 transmit PDO mapping 2 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7041 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 7064 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 706C 0020h | 0 to FFFF FFFFh | A |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 7061 0008h | 0 to FFFF FFFFh | A |
| | 05h to 08h | Mapping entry 5-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1A22h | Axis3 transmit PDO mapping 3 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7041 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 706C 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7061 0008h | 0 to FFFF FFFFh | A |
| | 04h to 08h | Mapping entry 4-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1A23h | Axis3 transmit PDO mapping 4 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A |
| | 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 to FFFF FFFFh | A |
| 1A30h | Axis4 transmit PDO mapping 1 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7841 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 7864 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7861 0008h | 0 to FFFF FFFFh | A |
| 1A31h | Axis4 transmit PDO mapping 2 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 4 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7841 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 7864 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 786C 0020h | 0 to FFFF FFFFh | A |
| | 04h | Mapping entry 4 | U32 | RW | No | – | 7861 0008h | 0 to FFFF FFFFh | A |
| 1A32h | Axis4 transmit PDO mapping 3 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 3 | 0 to 8 | A |
| | 01h | Mapping entry 1 | U32 | RW | No | – | 7841 0010h | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 786C 0020h | 0 to FFFF FFFFh | A |
| | 03h | Mapping entry 3 | U32 | RW | No | – | 7861 0008h | 0 to FFFF FFFFh | A |
| 1A33h | Axis4 transmit PDO mapping 4 | | | | | | | | |
| | 00h | Number of entries | U8 | RW | No | – | 0 | 0 to 8 | A |
| | 01h to 08h | Mapping entry 1-8 | U32 | RW | No | – | 0 | 0 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 | 0 to FFFF FFFFh | A |
| | 02h | Mapping entry 2 | U32 | RW | No | – | 2E32 0008h | 0 to FFFF FFFFh | A |
| | 03h to 08h | Mapping entry 3-8 | U32 | RW | No | – | 0 | 0 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 (Master to driver) | | – |
| | 02h | Communication type sync manager 1 | U8 | RO | No | – | 2: Mailbox input (Driver to master) | | – |
| | 03h | Communication type sync manager 2 | U8 | RO | No | – | 3: Process data output (Master to driver) | | – |
| | 04h | Communication type sync manager 3 | U8 | RO | No | – | 4: Process data input (Driver to master) | | – |

| Index | Sub | Name | Type | Access | PDO | Save | initial value | Range | Effective |
|-------|--------------------------------|---------------------------------|------|--------|-----|------|-------------------------|--|-----------|
| 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 | 0 to FFFFh | A |
| | 02h | Index of assigned PDO 2 | U16 | RW | No | – | 1610h | 0 to FFFFh | A |
| | 03h | Index of assigned PDO 3 | U16 | RW | No | – | 1620h | 0 to FFFFh | A |
| | 04h | Index of assigned PDO 4 | U16 | RW | No | – | 1630h | 0 to FFFFh | A |
| | 05h | Index of assigned PDO 5 | U16 | RW | No | – | 1700h | 0 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 | 0 to FFFFh | A |
| | 02h | Index of assigned PDO 2 | U16 | RW | No | – | 1A10h | 0 to FFFFh | A |
| | 03h | Index of assigned PDO 3 | U16 | RW | No | – | 1A20h | 0 to FFFFh | A |
| | 04h | Index of assigned PDO 4 | U16 | RW | No | – | 1A30h | 0 to FFFFh | A |
| | 05h | Index of assigned PDO 5 | U16 | RW | No | – | 1B00h | 0 to FFFFh | A |
| 1C32h | Sync manager 2 Synchronization | | | | | | | | |
| | 00h | Number of entries | U8 | RO | No | – | 20h | – | – |
| | 01h | Synchronization type | U16 | RW | No | – | 02h | 00h: Free run mode (asynchronous) 01h: SM2 event synchronization mode 02h: DC mode (SYNC0 event synchronization) | A |
| | 02h | Cycle time [ns] | U32 | RO | No | – | – | – | – |
| | 03h | Shift time [ns] | U32 | RO | No | – | 0 | – | – |
| | 04h | Synchronization types supported | U16 | RO | No | – | 0007h | – | – |
| | 05h | Minimum cycle time [ns] | U32 | RO | No | – | 0007 A120h (500,000 ns) | | – |
| | 06h | Calc and copy time [ns] | U32 | RO | No | – | 0001 E848h (125,000 ns) | | – |
| | 07h | Reserved | U32 | – | – | – | – | – | – |
| | 08h | Reserved | U16 | – | – | – | – | – | – |
| | 09h | Delay time [ns] | U32 | RO | No | – | 0 | – | – |
| | 0Ah to 1Fh | Reserved | U16 | – | – | – | – | – | – |
| | 20h | Sync error | BOOL | RO | No | – | 0 | – | – |

Objects of the CoE communication area

| Index | Sub | Name | Type | Access | PDO | Save | initial value | Range | Effective |
|-------|--------------------------------|---------------------------------|------|--------|-----|------|-------------------------|--|-----------|
| 1C33h | Sync manager 3 Synchronization | | | | | | | | |
| | 00h | Number of entries | U8 | RO | No | – | 20h | – | – |
| | 01h | Synchronization type | U16 | RW | No | – | 02h | 00h: Free run mode (asynchronous) 02h: DC mode (SYNC0 event synchronization) 22h: SM2 event synchronization mode | A |
| | 02h | Cycle time [ns] | U32 | RO | No | – | – | – | – |
| | 03h | Shift time [ns] | U32 | RO | No | – | 0 | – | – |
| | 04h | Synchronization types supported | U16 | RO | No | – | 0007h | – | – |
| | 05h | Minimum cycle time [ns] | U32 | RO | No | – | 0007 A120h (500,000 ns) | | – |
| | 06h | Calc and copy time [ns] | U32 | RO | No | – | 0003 0D40h (200,000 ns) | | – |
| | 07h | Reserved | U32 | – | – | – | – | – | – |
| | 08h | Reserved | U16 | – | – | – | – | – | – |
| | 09h | Delay time [ns] | U32 | RO | No | – | 0 | – | – |
| | 0Ah to 1Fh | Reserved | U16 | – | – | – | – | – | – |
| | 20h | Sync error | BOOL | RO | No | – | 0 | – | – |

2 Objects of the profile area

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



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

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective | |
|-------|-------------------------|--|-------|--------|-------|------|----------------|--|-----------|--|
| 603Fh | 00h | Error code | U16 | RO | TxPDO | – | – | – | – | |
| 6040h | 00h | Controlword | U16 | RW | RxPDO | – | 0 | 0 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 | |

Objects of the profile area

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|--------------------------|-----|--|-------|--------|-------|------|---------------|----------------------------|-----------|
| 6098h | 00h | Homing method | INT8 | RW | No | ○ | 24 | 17, 18, 24, 28, 35, 37, -1 | B |
| Homing speed | | | | | | | | | |
| 6099h | 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 | ○ | 5000 | 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 | – | – | – | – |
| Supported homing methods | | | | | | | | | |
| 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 | – | – |
| 60F4h | 00h | Following error actual value [step] | INT32 | RO | TxPDO | – | 0 | – | – |
| 60FDh | 00h | Digital inputs | U32 | RO | TxPDO | – | – | – | – |
| Digital outputs | | | | | | | | | |
| 60FEh | 00h | Number of entries | U8 | RO | No | – | 2 | – | – |
| | 01h | Physical outputs | U32 | RW | RxPDO | – | 0000 0000h | 0000 0000h to FFFF FFFFh | A |
| | 02h | Bit mask | U32 | RW | No | – | 0000 0000h | 0000 0000h to FFFF FFFFh | A |
| 60FFh | 00h | Target velocity [Hz] | INT32 | RW | RxPDO | – | 0 | –4,000,000 to 4,000,000 | A |
| 6502h | 00h | Supported drive modes | U32 | RO | No | – | 0000 01A5h | – | – |
| 67FFh | 00h | Device profile number | U32 | RO | No | – | 0004 0192h | – | – |

3 Controller objects of the manufacturer- specific area

These are our specific objects. The controller objects indicate the status of the entire driver, and perform control.

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|----------------------|------|--------|-------|------|---------------|------------|-----------|
| 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 our specific objects. The driver objects represent the objects for the driver axis 1 to driver axis 4. This document describes the Sub-index as "*" Access after setting the axis number (1 to 4) in the sub-index of each object. Refer to the "Parameter" and "Address/code lists" in the **AZ Series "Function Edition"** for details of each object.

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|---------------------------------|-------|--------|-------|------|---------------|----------------------------------|-----------|
| 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 32bit counter | INT32 | RO | TxPDO | – | – | | |
| 4091h | *1 | Command position 32bit counter | INT32 | RO | TxPDO | – | – | | |
| 4092h | *1 | CST operating current [1=0.1%] | INT16 | RO | TxPDO | – | – | | |
| 40A0h | *1 | Main power supply count | INT32 | RO | TxPDO | – | – | | |
| 40A1h | *1 | Main power supply time [min] | INT32 | RO | TxPDO | – | – | | |
| 40A2h | *1 | Control power supply count | INT32 | RO | TxPDO | – | – | | |
| 40A3h | *1 | Inverter voltage [1=0.1 V] | INT16 | RO | TxPDO | – | – | | |
| 40A4h | *1 | Main power voltage [1=0.1 V] | INT16 | RO | TxPDO | – | – | | |
| 40A9h | *1 | Elapsed time from BOOT [ms] | INT32 | RO | TxPDO | – | – | | |
| 40B7h | *1 | Operation voltage mode [V] | U8 | RO | TxPDO | – | – | | |
| 40B8h | *1 | I/O status 1 | U32 | RO | TxPDO | – | – | | |
| 40B9h | *1 | I/O status 2 | U32 | RO | TxPDO | – | – | | |
| 40BAh | *1 | I/O status 3 | U32 | RO | TxPDO | – | – | | |
| 40BBh | *1 | I/O status 4 | U32 | RO | TxPDO | – | – | | |
| 40BCh | *1 | I/O status 5 | U32 | RO | TxPDO | – | – | | |
| 40BDh | *1 | I/O status 6 | U32 | RO | TxPDO | – | – | | |
| 40BEh | *1 | I/O status 7 | U32 | RO | TxPDO | – | – | | |
| 40BFh | *1 | I/O status 8 | U32 | RO | TxPDO | – | – | | |

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|---|-------|--------|-------|------|---------------|---|-----------|
| 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 histories | U8 | RW | No | – | 0 | | |
| 40C5h | *1 | P-PRESET execution | U8 | RW | No | – | 0 | | |
| 40C6h | *1 | Configuration | U8 | RW | No | – | 0 | | |
| 40C8h | *1 | Read batch NV memory | U8 | RW | No | – | 0 | | |
| 40C9h | *1 | Write batch NV memory | U8 | RW | No | – | 0 | | |
| 40CAh | *1 | All data initialization | U8 | RW | No | – | 0 | | |
| 40CBh | *1 | Read from backup | U8 | RW | No | – | 0 | | |
| 40CCh | *1 | Write to backup | U8 | RW | No | – | 0 | | |
| 40CDh | *1 | Clear latch information | U8 | RW | No | – | 0 | | |
| 40CFh | *1 | Clear tripmeter | U8 | RW | No | – | 0 | | |
| 40D1h | *1 | ZSG-PRESET | U8 | RW | No | – | 0 | | |
| 40D2h | *1 | Clear ZSG-PRESET | U8 | RW | No | – | 0 | | |
| 40D3h | *1 | Clear information | U8 | RW | No | – | 0 | | |
| 40D4h | *1 | Clear information histories | 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 *2 |
| 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: α control mode (CST) 2: Servo emulation mode (SVE) | A |
| 412Eh | *1 | Servo emulation (SVE) ratio [1=0.1%] | INT16 | RW | No | ○ | 1,000 | 0 to 1,000 | A |
| 412Fh | *1 | SVE position loop gain | INT16 | RW | No | ○ | 10 | 1 to 50 | A |
| 4130h | *1 | SVE speed loop gain | INT16 | RW | No | ○ | 180 | 10 to 200 | A |
| 4131h | *1 | SVE speed loop integral time constant [1=0.1ms] | INT16 | RW | No | ○ | 1,000 | 100 to 2,000 | A |
| 4132h | *1 | Automatic current cutback function | U8 | RW | No | ○ | 1 | 0: Disable 1: Enable | A |
| 4133h | *1 | Automatic current cutback switching time [ms] | INT16 | RW | No | ○ | 100 | 0 to 1,000 | A |
| 4134h | *1 | Operating current ramp up rate [ms/100%] | U8 | RW | No | ○ | 0 | 0 to 100 | A |
| 4135h | *1 | Operating current ramp down rate [ms/100%] | U8 | RW | No | ○ | 0 | | |
| 4136h | *1 | Electronic damper function | INT8 | RW | No | ○ | 1 | 0: Disable 1: Enable | A |
| 4137h | *1 | Resonance suppression control frequency [Hz] | INT16 | RW | No | ○ | 1,000 | 100 to 2,000 | A |
| 4138h | *1 | Resonance suppression control gain | INT16 | RW | No | ○ | 0 | –500 to 500 | A |
| 4139h | *1 | Deviation acceleration suppressing gain | INT16 | RW | No | ○ | 45 | 0 to 500 | A |
| 413Ch | *1 | Current setting during push-motion | U8 | RW | No | ○ | 0 | 0: Push current 1: Operating current | A |
| 413Dh | *1 | Non-excitation mode selection | U8 | RW | No | ○ | 0 | 0: Dynamic brake status 1: Free-run status | A |
| 4142h | *1 | Starting speed [Hz] | INT32 | RW | No | ○ | 5,000 | 0 to 4,000,000 | B |
| 4148h | *1 | Permission of absolute positioning without setting absolute coordinates | U8 | RW | No | ○ | 0 | 0: Disable 1: Enable | B |
| 414Fh | *1 | Wrap positioning mode | U8 | RW | RxPDO | ○ | 0 | 0: Wrap absolute positioning 1: Wrap proximity 2: Wrap forward direction 3: Wrap reverse direction | B |

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| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|--|-------|--------|-------|------|---------------|--|-----------|
| 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 | A |
| 4159h | *1 | (ZHOME) Acceleration/ deceleration [kHz/s] | INT32 | RW | No | ○ | 300,000 | 1 to 1,000,000,000 | A |
| 415Ah | *1 | (ZHOME) Starting speed [Hz] | INT32 | RW | No | ○ | 50,000 | 0 to 4,000,000 | A |
| 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 | ○ | 1000 | 0 to 1000 | B |
| 4160h | *1 | (HOME)Home-seeking mode | U8 | RW | No | ○ | 1 | 0: 2-sensor mode 1: 3-sensor mode 2: One-way rotation mode 3: Push mode | B |
| 4161h | *1 | (HOME)Starting direction | U8 | RW | No | ○ | 1 | 0: Negative direction 1: Positive direction | B |
| 4163h | *1 | (HOME)Starting speed [Hz] | INT32 | RW | No | ○ | 5,000 | 1 to 4,000,000 | B |
| 4166h | *1 | (HOME)SLIT detection | U8 | RW | No | ○ | 0 | 0: Disable 1: Enable | B |
| 4167h | *1 | (HOME)TIM/ZSG signal detection | U8 | RW | No | ○ | 0 | 0: Disable 1: TIM output 2: ZSG output | B |
| 4168h | *1 | (HOME) Position offset [step] | INT32 | RW | No | ○ | 0 | -2,147,483,647 to 2,147,483,647 | B |
| 4169h | *1 | (HOME) Backward steps in 2 sensor home-seeking [step] | INT32 | RW | No | ○ | 5,000 | 0 to 8,388,607 | B |
| 416Ah | *1 | (HOME)Operating amount in uni-directional home-seeking [step] | INT32 | RW | No | ○ | 5,000 | | |
| 416Bh | *1 | (HOME) Operating current for push-home-seeking [1=0.1%] | INT16 | RW | No | ○ | 1,000 | 0 to 1,000 | B |
| 416Ch | *1 | (HOME)Backward steps after first entry in push-home-seeking [step] | INT32 | RW | No | ○ | 0 | 0 to 8,388,607 | B |
| 416Dh | *1 | (HOME)Pushing-time in push-home-seeking [ms] | U16 | RW | No | ○ | 200 | 1 to 65,535 | B |
| 416Eh | *1 | (HOME)Backward steps in push-home-seeking [step] | INT32 | RW | No | ○ | 5,000 | 0 to 8,388,607 | B |
| 4180h | *1 | Overload alarm [1=0.1 s] | INT16 | RW | No | ○ | 50 | 1 to 300 | A |
| 4185h | *1 | RG overheat alarm | U8 | RW | No | ○ | 0 | 0: Disable 1: Enable | A |
| 4186h | *1 | FAN low speed alarm | U8 | RW | No | ○ | 0 | | |
| 4187h | *1 | Other axis alarm | U8 | RW | No | ○ | 0 | | |
| 41A0h | *1 | Driver temperature information (INFO-DRVTMP) [°C] | INT16 | RW | RxPDO | ○ | 85 | 40 to 85 | A |
| 41A1h | *1 | Overload time information (INFO-OLTIME) [1=0.1 s] | INT16 | RW | RxPDO | ○ | 50 | 1 to 300 | A |
| 41A2h | *1 | Overspeed information (INFO-SPD) [r/min] | INT16 | RW | RxPDO | ○ | 0 | 0: Disable 1 to 12,000 | A |
| 41A5h | *1 | Position deviation information (INFO-POSERR) [1=0.01 rev] | INT16 | RW | RxPDO | ○ | 300 | 1 to 30,000 | A |
| 41A8h | *1 | Motor temperature information (INFO-MTRTMP) [°C] | INT16 | RW | RxPDO | ○ | 85 | 40 to 120 | A |
| 41ABh | *1 | Overvoltage information (INFO-OVOLT) [V] | INT16 | RW | RxPDO | ○ | 630 | 150 to 630 | A |
| 41ACh | *1 | Undervoltage information (INFO-UVOLT) [V] | INT16 | RW | RxPDO | ○ | 180 | | |
| 41AFh | *1 | Tripmeter information (INFO-TRIP) [1=0.1 kRev] | INT32 | RW | RxPDO | ○ | 0 | 0: Disable 1 to 2,147,483,647 | A |
| 41B0h | *1 | Odometer information (INFO-ODO) [1=0.1 kRev] | INT32 | RW | RxPDO | ○ | 0 | | |

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|---|-------|--------|-------|------|---------------|---|-----------|
| 41B1h | *1 | Cumulative load information 0 (INFO-CULD0) | INT32 | RW | RxPDO | ○ | 0 | 0 to 2,147,483,647 | A |
| 41B2h | *1 | Cumulative load information 1 (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 signals list ⇨ p.97 | A |
| 41BDh | *1 | INFO-USRIO output inversion | U8 | RW | No | ○ | 0 | 0: Not invert 1: Invert | A |
| 41BEh | *1 | Information LED condition | U8 | RW | No | ○ | 1 | 0: The LED does not blink 1: The 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 direction 1: Positive side=Clockwise direction | 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 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 recognition 0: 24 VDC 1: 48 VDC | D |
| 41FFh | *1 | Drive simulation mode | U8 | RW | No | ○ | 0 | 0: The motor is actually connected 1: A virtual motor is used (No ABZO sensor information) 2: A virtual motor is used (A wrap function with up to 1800 revolutions is enabled) 3: A virtual motor is used (A wrap function with up to 900 revolutions is enabled) *3 | D |
| 44B0h | *1 | Touch probe 1 latch position | U8 | RW | No | ○ | 0 | 0: Latches the feedback position | A |
| 44B1h | *1 | Touch probe 2 latch position | U8 | RW | No | ○ | 0 | 1: Latches the command position | A |
| 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 | | A |
| 4510h | *1 | Information history 1 | INT32 | RO | No | - | - | - | - |
| 4511h | *1 | Information history 2 | INT32 | RO | No | - | - | | |
| 4512h | *1 | Information history 3 | INT32 | RO | No | - | - | | |
| 4513h | *1 | Information history 4 | INT32 | RO | No | - | - | | |
| 4514h | *1 | Information history 5 | INT32 | RO | No | - | - | | |
| 4515h | *1 | Information history 6 | INT32 | RO | No | - | - | | |
| 4516h | *1 | Information history 7 | INT32 | RO | No | - | - | | |
| 4517h | *1 | Information history 8 | INT32 | RO | No | - | - | | |
| 4518h | *1 | Information history 9 | INT32 | RO | No | - | - | | |
| 4519h | *1 | Information history 10 | INT32 | RO | No | - | - | | |
| 451Ah | *1 | Information history 11 | INT32 | RO | No | - | - | | |

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| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|---|-------|--------|-----|------|---------------|---|-----------|
| 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 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 signal source | U8 | RW | No | ○ | 0 | 0: Based on actual 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 |
| 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 | | |

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|--|-------|--------|-----|------|---------------|---|-----------|
| 4743h | *1 | AREA1 negative direction position/ detection range [step] | INT32 | RW | No | ○ | 0 | -2,147,483,648 to 2,147,483,647 | A |
| 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 | | |
| 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 | 0: Based on actual position 1: Based on command position | A |
| 4758h | *1 | AREA0 positioning standard | U8 | RW | No | ○ | 0 | | |
| 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 | 0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks | A |
| 475Fh | *1 | AREA7 positioning standard | U8 | RW | No | ○ | 0 | | |
| 47A0h | *1 | INFO action (Assigned I/O status information (INFO-USRIO)) | U8 | RW | No | ○ | 1 | | |
| 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-MTPTMP)) | 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 | | |

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| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
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| 47A6h | *1 | INFO action (Overload time information (INFO-OLTIME)) | U8 | RW | No | ○ | 1 | 0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks | A |
| 47A8h | *1 | INFO action (Speed information (INFO-SPD)) | U8 | RW | No | ○ | 1 | | |
| 47A9h | *1 | INFO action (Start operation error information (INFO-START)) | U8 | RW | No | ○ | 1 | | |
| 47AAh | *1 | INFO action (Start ZHOME error information (INFO-ZHOME)) | U8 | RW | No | ○ | 1 | | |
| 47ABh | *1 | INFO action (PRESET request information (INFO-PR-REQ)) | U8 | RW | No | ○ | 1 | | |
| 47ADh | *1 | INFO action (Electronic gear setting error information (INFO-EGR-E)) | U8 | RW | No | ○ | 1 | | |
| 47AEh | *1 | INFO action (Wrap setting error information (INFO-RND-E)) | U8 | RW | No | ○ | 1 | | |
| 47B0h | *1 | INFO action (Forward operation prohibiton information (INFO-FW-OT)) | U8 | RW | No | ○ | 1 | | |
| 47B1h | *1 | INFO action (Reverse operation prohibiton information (INFO-RV-OT)) | U8 | RW | No | ○ | 1 | | |
| 47B2h | *1 | INFO action (Cumulative load 0 information (INFO-CULD0)) | U8 | RW | No | ○ | 1 | | |
| 47B3h | *1 | INFO action (Cumulative load 1 information (INFO-CULD1)) | U8 | RW | No | ○ | 1 | | |
| 47B4h | *1 | INFO action (Tripmeter information (INFO-TRIP)) | U8 | RW | No | ○ | 1 | | |
| 47B5h | *1 | INFO action (Odometer information (INFO-ODO)) | U8 | RW | No | ○ | 1 | | |
| 47BCh | *1 | INFO action (Start operation restricted mode information (INFO-DSLMTD)) | U8 | RW | No | ○ | 1 | | |
| 47BDh | *1 | INFO action (I/O test mode information (INFO-IOTEST)) | U8 | RW | No | ○ | 1 | | |
| 47BEh | *1 | INFO action (Configuration request information (INFO-CFG)) | U8 | RW | No | ○ | 1 | | |
| 47BFh | *1 | INFO action (Reboot request information (INFO-RBT)) | U8 | RW | No | ○ | 1 | | |
| 47F0h | *1 | Mechanism settings | U8 | RW | No | ○ | 1 | 0: ABZO setting is prioritized 1: Manual setting | D |
| 47F1h | *1 | Gear ratio setting | INT16 | RW | No | ○ | 0 | 0: ABZO setting is prioritized 1 to 32,767 | D |
| 47F2h | *1 | Initial coordinate generation & wrap coordinate setting | U8 | RW | No | ○ | 0 | 0: ABZO setting is prioritized 1: Manual setting | D |
| 47F3h | *1 | Mechanism limit parameter setting | U8 | RW | No | ○ | 0 | 0: ABZO setting is followed 1: Disable | D |
| 47F4h | *1 | Mechanism protection parameter setting | U8 | RW | No | ○ | 0 | 0: ABZO setting is followed 1: Disable | D |
| 47F5h | *1 | JOG/HOME/ZHOME operation setting | U8 | RW | No | ○ | 0 | 0: ABZO setting is prioritized 1: Manual setting | D |
| 4840h | *1 | DIN0 input function | U8 | RW | No | ○ | 28 | Input signal list ⇨ p.95 | 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 | 0: Non invert 1: Invert | C |
| 4850h | *1 | DIN0 inverting mode | U8 | RW | No | ○ | 0 | | |
| 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 | | |

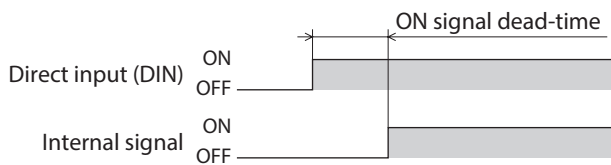
| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
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| | *1 | DOUT0 (Normal) output function | U8 | RW | No | ○ | 130 | Output signal list ⇨ p.97 | C |
| 4860h | *1 | DOUT1 (Normal) output function | U8 | RW | No | ○ | 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.95 | 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.97 | 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.95 | 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 | | |
| 4906h | *1 | R-IN6 input function | U8 | RW | No | ○ | 0 | | |
| 4907h | *1 | R-IN7 input function | U8 | RW | No | ○ | 0 | | |
| 4910h | *1 | R-OUT0 output function | U8 | RW | No | ○ | 28 | Output signal list ⇨ p.97 | 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 | | |

| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|--|------|--------|-----|------|---------------|----------------------------|-----------|
| 4919h | *1 | R-OUT9 output function | U8 | RW | No | ○ | 160 | Output signal list ⇨ p.97 | C |
| 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.95 | 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.97 | C |
| 4945h | *1 | Virtual input (VIR-IN1) source selection | U8 | RW | No | ○ | 128 | | |
| 4946h | *1 | Virtual input (VIR-IN2) source selection | U8 | RW | No | ○ | 128 | | |
| 4947h | *1 | Virtual input (VIR-IN3) source selection | U8 | RW | No | ○ | 128 | | |
| 4948h | *1 | Virtual input (VIR-IN0) inverting mode | U8 | RW | No | ○ | 0 | 0: Non invert 1: Invert | C |
| 4949h | *1 | Virtual input (VIR-IN1) inverting mode | U8 | RW | No | ○ | 0 | | |
| 494Ah | *1 | Virtual input (VIR-IN2) inverting mode | U8 | RW | No | ○ | 0 | | |
| 494Bh | *1 | Virtual input (VIR-IN3) inverting mode | U8 | RW | No | ○ | 0 | | |
| 494Ch | *1 | Virtual input (VIR-IN0) ON signal dead time [ms] | U8 | RW | No | ○ | 0 | 0 to 250 | C |
| 494Dh | *1 | Virtual input (VIR-IN1) ON signal dead time [ms] | U8 | RW | No | ○ | 0 | | |
| 494Eh | *1 | Virtual input (VIR-IN2) ON signal dead time [ms] | U8 | RW | No | ○ | 0 | | |
| 494Fh | *1 | Virtual input (VIR-IN3) ON signal dead time [ms] | U8 | RW | No | ○ | 0 | | |
| 4950h | *1 | Virtual input (VIR-IN0) 1 shot signal mode | U8 | RW | No | ○ | 0 | 0: Disable 1: Enable | C |
| 4951h | *1 | Virtual input (VIR-IN1) 1 shot signal mode | U8 | RW | No | ○ | 0 | | |
| 4952h | *1 | Virtual input (VIR-IN2) 1 shot signal mode | U8 | RW | No | ○ | 0 | | |
| 4953h | *1 | Virtual input (VIR-IN3) 1 shot signal mode | U8 | RW | No | ○ | 0 | | |

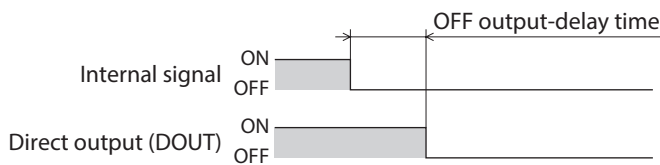
| Index | Sub | Name | Type | Access | PDO | Save | Initial value | Range | Effective |
|-------|-----|---|-------|--------|-----|------|---------------|---|-----------|
| 4960h | *1 | User output (USR-OUT0) source A function | U8 | RW | No | ○ | 128 | Output signal list ⇨ p.97 | C |
| 4961h | *1 | User 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.97 | C |
| 4965h | *1 | User output (USR-OUT1) source B function | U8 | RW | No | ○ | 128 | | |
| 4966h | *1 | User output (USR-OUT0) source B inverting mode | U8 | RW | No | ○ | 0 | 0: Non invert 1: Invert | C |
| 4967h | *1 | User output (USR-OUT1) source B inverting mode | U8 | RW | No | ○ | 0 | | |
| 4968h | *1 | User output (USR-OUT0) logical operation | U8 | RW | No | ○ | 1 | 0: AND 1: OR | C |
| 4969h | *1 | User output (USR-OUT1) logical operation | U8 | RW | No | ○ | 1 | | |
| 4970h | *1 | Extended input (EXT-IN) function | U8 | RW | No | ○ | 9 | Input signal list ⇨ p.95 | C |
| 4971h | *1 | Extended input (EXT-IN) inverting mode | U8 | RW | No | ○ | 0 | 0: Non invert 1: Invert | C |
| 4972h | *1 | Extended input (EXT-IN) interlock releasing time [1=0.1s] | INT8 | RW | No | ○ | 10 | 0: Disable 1 to 50 | A |
| 4973h | *1 | Extended input (EXT-IN) interlock releasing duration [1=0.1s] | INT8 | RW | No | ○ | 30 | 0 to 50 | A |
| 4974h | *1 | Extended input (EXT-IN) ON monitor time [1=0.1s] | INT8 | RW | No | ○ | 10 | 0 to 50 | A |
| 49FAh | *1 | Current setting during motor standstill at T-MODE | INT32 | RW | No | ○ | 0 | 0: Standstill current 1: Operating current | A |

- *1 Set the axis number (1 to 4) in the Sub-index because of the driver object in the manufacturer-specific area.
- *2 With the profile position mode, it will become effective at start of operation.
- *3 It is effective for drivers Ver.2.00 or later. Setting to the drivers older than Ver.2.00 will be the same action as "1: A virtual motor is used (No ABZO sensor information)."
The version of the driver can be checked using the unit information monitor of the **MEXE02**. (Unit information monitor ⇨ p.189)

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



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



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