# SPECIFICATIONS

Product Name: Servo Driver

Product Series Name: MINAS A7B (EtherCAT)

Product Model Number: Rotary motor (Standard / Multi-function / Application specialized)

**Panasonic**

# REVISIONS

| Date | Rev. | Page | Description | Signed |
|---|---|---|---|---|
| Jan. 7, 2025 | 0.0 | — | NEWLY ISSUED | — |
| Apr. 11, 2025 | 1.0 | 14.4.8 | Updated Object Dictionary List<br>● Changed the Initial value of 3780h<br>● Add 37B7h | — |
| | | 14.4.11 | Updated Object Dictionary List<br>● Add 3A01h | |
| | | | | |
| | | | | |

# Table of Contents

# 1   Precautions

## 1.1   Safety Precautions

This section explains precautions that must be taken to prevent harm to people and damage to property.

| ⚠ SAFETY PRECAUTIONS | |
|---|---|
| The following symbols represent the extent of the harm or damage that may occur through improper use. | |
| ⚠ **DANGER** | This indicates "a significant risk of death or serious injury". |
| ⚠ **CAUTION** | This indicates "a risk of minor injury or damage to property". |
| The following symbols indicate how to comply with safety precautions. | |
| 🚫 | Indicates actions that must not be performed. |
| ❗ | Indicates actions that must be performed without fail. |

| ⚠ DANGER | | |
|---|---|---|
| 🚫 | 1 | Ensure that the product is used in environments with a pollution degree of 2 (places free from dust, metal powders, oil mists, and other foreign objects, as well as liquids such as water, oil, or grinding fluids). Do not store or use near combustible materials or in an environment containing corrosive gases ($H_2S$, $SO_2$, $NO_2$, $Cl_2$, etc.) or flammable gases, or store in atmospheres where helium gas or other gases with small molecular weight are generated. |
| | 2 | Do not place flammable materials near the motor, servo driver, or regenerative resistor. |
| | 3 | Do not run the motor using an external power source. If the motor is run externally, it will start acting as an electricity generator. This may cause it to short-circuit during operation of the dynamic brake, which is integrated into the servo driver, resulting in smoke and dust being emitted. Doing so may also cause the dynamic brake to become disconnected, preventing it from functioning. |
| | 4 | Do not damage the cable, apply excessive stress, place heavy objects on it, or pinch it. |
| | 5 | Do not use with the cable submerged in oil or water. |
| | 6 | Do not install the product next to heating elements such as heaters or large winding resistors (Protection such as heat shields should be used to protect the product from heating elements.). |
| | 7 | Do not connect a commercial power supply directly to the motor. |
| | 8 | Do not use in places susceptible to strong vibrations or impacts. If installing a servo driver near a source of vibration, attach a vibration dampening device to the servo driver mounting surface. |
| | 9 | Do not touch the rotating parts of the motor during operation. |
| | 10 | Do not touch the keyway of the motor output shaft with bare hands. |
| | 11 | Do not put hands inside the servo driver. |
| | 12 | Do not touch the heat sink and peripheral devices of the motor or servo driver, as they can get very hot. |
| | 13 | Do not perform wiring or operate the product with wet hands. |

# ⚠ DANGER

14. Wiring work should be carried out by an electrician.

15. Motors other than that specified do not include protective devices. Protect them using overcurrent protection devices, ground-fault circuit interrupters, overheating prevention devices, emergency stop devices, etc.

16. Before operating the servo driver following an earthquake, ensure that the servo driver and motor are properly installed and that the machine is safe.

17. After the power supply is switched off, the internal circuit will be charged at high voltage for a period of time. When relocating, wiring, or inspecting the driver, ensure that the power supply input is completely disconnected on the outside of the servo driver and wait at least 15 minutes before carrying out any work.

18. Install and set up the product so that it does not cause fire or personal injury in the event of an earthquake.

19. An external emergency stop circuit must be installed to enable the power supply to be immediately disconnected in the event of an emergency. Failure of the combined motor and servo driver may result in smoke and dust being emitted. For example, if an electric current is passed through the regenerative control power transistor built into the servo driver following a short-circuit fault, the regenerative resistor installed outside the servo driver may overheat, leading to smoke and dust being emitted. If a regenerative resistor is connected to the outside of the servo driver, it must be installed so that the thermal protector or other overheating detection devices can detect abnormal overheating and to enable the power supply to be disconnected.

20. Install the motor, servo driver, and peripheral devices to nonflammable materials such as metal.

21. Ensure that the product is wired correctly and securely. Insecure or incorrect wiring may cause the motor to malfunction or lead to thermal damage. Also, do not allow any conductive materials such as wire debris to enter the servo driver during installation and wiring.

22. Ensure that the cables are securely connected and that energized parts are insulated.

23. Binding and inserting wires into a metal duct will cause the temperature to increase, which will result in reduced wire current capacity and possibly lead to thermal damage. Please consider the current reduction coefficient before deciding on how to wire the product.

24. Make sure to install a molded case circuit breaker (MCCB) to the power supply. Also, make sure to ground the ground terminal or ground wire. D-type grounding or higher (ground resistance less than 100 Ω) is recommended in order to prevent electric shocks and malfunctions.

25. Securely tighten the screws for connecting the terminal block, as well as the grounding screw, using the torque indicated in the specification sheet.

26. When constructing a system using safety functions, make sure you understand and comply with the relevant safety standards as well as the information in our user manuals or technical reference documents.

27. Your equipment may be affected by switching noise current while the servo driver is operating, depending on the device and the installation environment.

    When installing one of our servo drivers or motors to your equipment, confirm and verify that the earth terminal, the earth cable and the motor itself have been grounded properly.

R1.0

# ⚠ **CAUTION**

28  When transporting the product, do not hold it by the cable or motor shaft.

29  When adjusting the parameters of the servo driver, do not set the gain too high or make extreme modifications to settings simultaneously, as doing so may result in unstable operation.

30  Following a power outage, do not get close to the machine once power is restored, as it may restart suddenly. Settings must be made to ensure personal safety even in event the machine restarts suddenly.

31  Do not approach the motor or the machine when it is running during power-up to ensure safety in the event of an unexpected malfunction.

32  Do not subject the motor shaft to strong shock.

33  Do not use the electromagnetic contactor installed on the main power supply side to start or stop the motor.

34  If the motor has a built-in brake, it is for holding purposes and should not be used as a stopping (braking) device in order to ensure machine safety.

35  Do not turn the servo driver main power supply on and off more frequently than necessary.

36  Do not drop or tip over the product during transportation or installation.

37  Do not climb on the motor or place heavy objects on it.

38  Do not cover the servo driver louver or allow any foreign objects to enter.

39  Do not expose the product to direct sunlight. When storing the product, keep it away direct sunlight and store at temperatures and humidity within the specified ranges.

40  Do not attempt to overhaul or modify the motor. Overhauls must be carried out by Panasonic or an authorized dealer.

41  Do not start or stop the device by turning the servo-on command (SRV-ON) on or off. This may damage the dynamic braking circuit incorporated into the servo drive.

R1.0

# ⚠ CAUTION

| | |
|---|---|
| ❗ | 42 Use the motor and servo driver within the output range stipulated by Panasonic. If combining the motor with a different servo driver, make sure to confirm its performance and safety. |
| | 43 Failure of the motor or the servo driver it is combined with may result in thermal damage to the motor and may cause smoke and dust to be emitted. Please consider these possibilities when using the device in cleanrooms, etc. |
| | 44 Make sure the device is installed in a manner suitable for the power output and the weight of the unit. |
| | 45 Keep the ambient temperature and humidity of the servo driver and motor within the permitted ambient temperature and humidity ranges. |
| | 46 Observe the specified mounting method and orientation. |
| | 47 Keep the required distance between the servo driver and the control panel interior or other equipment. |
| | 48 If an eyebolt is attached to the motor, it should only be used to transport the motor and not to transport any other equipment. The eyebolt should also not be used if a decelerator, face plate, etc., is attached. |
| | 49 Connect the relay that disconnects in the event of an emergency stop in series with the brake control relay. |
| | 50 To perform a test run, secure the motor and check its operation with it disconnected from the mechanical system, then mount it onto the machine. |
| | 51 Make sure that the input power supply voltage is in line with the servo driver specifications before turning it on and operating. Entering a voltage higher than the rated voltage could cause smoke and dust to be emitted inside the servo driver, which in some cases may cause the motor to malfunction or lead to thermal damage. |
| | 52 In the event of an alarm, eliminate the cause of the alarm and restart the device. Restarting the device without eliminating the cause of the alarm may cause the motor to malfunction or lead to thermal damage. |
| | 53 If the motor has a built-in brake, it may not hold due to reasons such as its lifetime or mechanical structure. A stopping device must be installed on the machine side to ensure safety. |
| | 54 The motor and servo drive emit heat while the motor is in operation. Ambient temperature may rise abnormally if used in an enclosed area. Take care to ensure that the ambient temperatures of the motor and servo driver are within the operating range. |
| | 55 Maintenance and inspections should be performed by a specialist. |
| | 56 Make sure to turn off the power supply if the device will not be used for a long period of time. |
| | 57 If the dynamic brake built into the servo driver is applied when the device is operating at a high speed, allow a stop time of approximately 10 minutes. Failure to do so may cause the internal circuit to disconnect or the brake to no longer be operable. |
| | 58 Secure the cables so that they do not put stress on the connectors, terminal block, or other connections. |
| | 59 Use a stabilized power supply with reinforced insulation for the DC power supply. |
| | 60 If use continues in a warning environment, it may stop, reduce life, or failure due to the protection function of the servo drive. Please do not use until the cause of the warning is ruled out. |

● The capacitance of the capacitors of the power supply rectifier circuit will drop over time. To avoid a secondary problem due to a failure, replacement is recommended approximately every five years. Replacement must be carried out by Panasonic or an authorized dealer.

● Be sure to read the operating manual (safety guide) included with the product before use.

## ■ Servo Driver Ambient Temperature

The life span of the servo driver is largely dependent on the ambient temperature.

Make sure that the ambient temperature within 50 mm of the servo driver does not exceed the operating temperature range.

If it is not possible to measure the temperature from a distance of 50 mm, instead measure at the midpoint of the gap between the obstacle preventing measurement and the servo driver.

**Front View**

Servo driver

50 mm

50 mm

50 mm
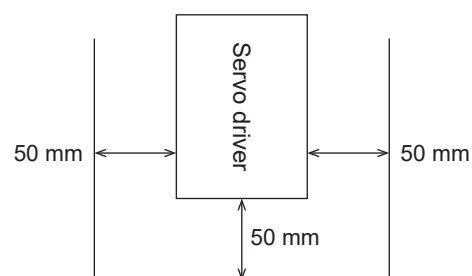
## Operating temperature range: 0–60 °C

(can be used at 55–60℃ when derated)

Refer to *"Derated Specifications"* for details on derating.

## 1.2  Network Security

As you will use this product connected to a network, your attention is called to the following security risks.

1    Leakage or theft of information through this product

2    Use of this product for fraudulent operation by persons with malicious intent

3    Interference with or stoppage of this product by persons with malicious intent

It is the customer's responsibility to ensure that sufficient network security measures are taken, including the following.

We will not be liable for any damage caused by insufficient network security.

**Precautions**

- This product is to be used in an environment where only a limited number of parties are permitted access to the product.

- This product is not to be installed in locations where the product and its accessories, such as cables, can be easily destroyed.

- This product is to be used on a network that is not connected to the Internet.

- If an external device, such as a computer or tablet, is connected to this product, there are concerns about the effects of computer viruses and unauthorized programs.

  Take appropriate security measures with external devices, such as ensuring that they are checked for computer viruses and that regular cleaning of such viruses is performed before connecting them.

- If this product is turned over to a third party for transfer, disposal, repair, etc., important information may be left recorded in the device.

  Make deletions, etc.. at your own risk, and handle such matters with sufficient care.

## 1.3  Additional Precautions

1  Precautions to be taken when exporting the product or equipment incorporating the product

   If the end user or end use of this product is related to the military or weaponry, etc., it may be subject to export restrictions as set forth in the Foreign Exchange and Foreign Trade Act. When exporting, please review and follow the necessary export procedures.

2  This product is designed for general industrial use. This product is not for use in devices critical to human wellbeing or in specialized environments, such as nuclear power control, aerospace equipment, transportation systems, medical equipment, various safety devices, or equipment that requires a high degree of cleanliness.

3  Please ensure that finished equipment complies with standards, laws, and regulations, and confirm that the structure, dimensions, life span, and characteristics of the product match those of your installed equipment and components.

4  Since it is possible, albeit unlikely, that your finished equipment will operate abnormally due to a malfunction of our product (such as due to signal disconnections, signal open phases, or operation performed outside the settings as a result of external noise or static electricity being applied), please put in place failsafes and ensure adequate safety within the operational range of your site.

5  Make sure to follow indications as overloading products can cause loads to collapse.

6  Ensure that the motor shaft is not operated without being electrically grounded, as this may lead to electrolytic corrosion of the motor bearing and increased bearing noise, depending on the machine and the installation environment.

7  A tightening torque appropriate for the product mounting screws should be chosen to avoid loosening or damage, taking into account the strength of the screws used and the material to which they are mounted.

8  Because noise resistance may be affected by wiring conditions (e.g., earthing methods, cable length, signal wire shielding), please confirm the noise resistance of your equipment.

9  When disposing of the servo driver or motor, treat them as industrial waste.

10  When disposing of batteries, insulate them with tape and dispose of them in accordance with local regulations.

11  As long as you comply with this specifications document, certain components may be modified to improve performance, etc.

12  Changes to specifications shall be reflected in the delivery specifications document or in a document specified by your company. If this affects the function or characteristics of the product, the specifications will be changed following a test with a prototype.

13  Changes in specifications may affect the price of the product.

14  If you require clarification on something that is not covered by this specifications document, please contact us in advance.

15  In the event of a problem, the two parties shall resolve the issue following consultations as set forth in this specifications document.

16  Depending on the nature of the failure of the product, an amount of smoke equivalent to one cigarette may be emitted.

   Please consider these possibilities when using the device in cleanrooms and similar facilities.

17  Do not use detergents containing benzine, thinner, alcohol, acid, or alkaline as this may cause discoloration or damage to the product's exterior.

18  Reverse engineering, decompiling and disassembling of this product is strictly prohibited.

## 2   Applicable Range

This specification relates to the MINAS A7B Series Rotating Motor Specifications of Servo Drivers manufactured by Motion Control Business Unit, Industrial Device Business Division, Panasonic Industry Co., Ltd.

This product is intended for use as industrial equipment. It must not be used for any other purpose (e.g. for home use).

### ■   Related Materials

● MINAS A7B Series Operating Instructions (Overall) : IMG07

● MINAS A7B Series Operating Instructions (Tuning) : IMG20

● For MINAS Set-up Support Software (PANATERM ver.7) Operating Manual : IMG15

● MINAS A7B Series Technical Reference Functional Specification : SX-DSV03752

● MINAS A7B Series Technical Reference Communication Specification : SX-DSV03755

The documents listed above can be downloaded from the following site.

*https://industry.panasonic.com/global/en/*

### ■   EtherCAT Overview

EtherCAT とは、Ethernet for Control Automation Technology の略称であり、Beckhoff Automation GmbH で開発されたリアルタイムイーサネットを用いた MainDevice と SubDevice 間オープンネットワーク通信で、ETG (EtherCAT Technology Group) で管理されています。

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

**EtherCAT.®**

### ■   Precautions

1   Reproduction of the contents of this document in whole or in part is strictly prohibited.

2   Due to product improvements, this document is subject to change without notice.

3   This product may be upgraded, including revisions to specifications from the ETG.

Please note that we are not responsible for labor and costs associated with the version upgrade.

4   This product makes use of open-source software (OSS).

詳細は技術資料をご参照ください。

貴社におかれましても OSS 利用義務が発生する場合がありますので、貴社にて適切なご対応をお願いします。

# 3  How to Read Product Numbers

The following explains how to read product numbers.

**Sample description**
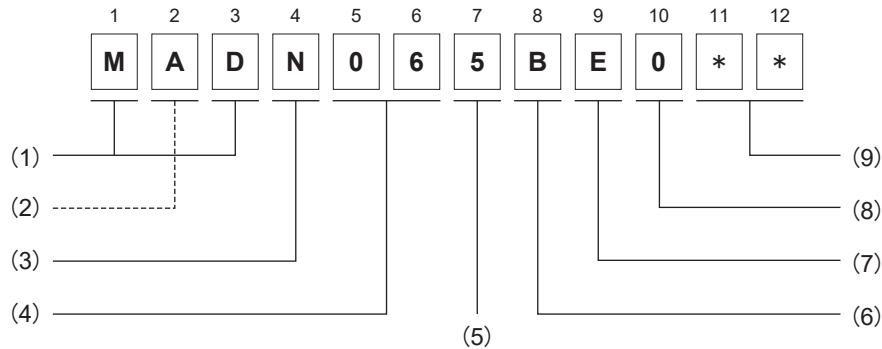


| No. | Item | Symbol | Specifications | Remarks |
|-----|------|--------|----------------|---------|
| (1) | Product | M□D | Servo Driver | □ = size symbol |
| (2) | Servo Driver Size | A | Size A | — |
|     |      | B | Size B | |
|     |      | C | Size C | |
|     |      | D | Size D | |
| (3) | Family | N | A7 Family | — |
| (4) | Instantaneous maximum current (peak value) | 06 | 6 A | — |
|     |      | 08 | 8 A | |
|     |      | 12 | 12 A | |
|     |      | 20 | 20 A | |
|     |      | 40 | 40 A | |
| (5) | Power supply and voltage specifications | 1 | Single phase 100 V | — |
|     |      | 5 | Single phase/3-phase 200 V | |
| (6) | Command interface specification | B | EtherCAT | — |
| (7) | Functionality | E | Rotation type Standard type No Safety | — |
|     |      | F | Rotation type Multi-function type Safety STO | |
|     |      | R | Rotation type Application specialized type Safety STO | |
| (8) | Special product supported | 0 | Standard type, multi-function type special product | — |
|     |      | H | Gantry control supported | |
|     |      | T | Pressure control supported | |
|     |      | U | Meandering control, GAP control supported | |
| (9) | Special specifications | ** | — | Alphanumerics |

# 4   Model Product Numbers

## 4.1   Standard Type

| Product number | Product Code (*1) | Size symbol | Power supply input | Rated output of applicable motor | Built-in fan |
|---|---|---|---|---|---|
| MADN061BE | 70380000 | A | Single-phase 100–120 V | Max 50 W | No |
| MADN081BE | 70380001 | | | Max 100 W | No |
| MADN065BE | 70380004 | | Single-phase/3-phase 200–240 V | Max 100 W | No |
| MADN085BE | 70380005 | | | Max 200 W | No |
| MBDN121BE | 70380002 | B | Single-phase 100–120 V | Max 200 W | No |
| MBDN125BE | 70380006 | | Single-phase/3-phase 200–240 V | Max 400 W | No |
| MCDN201BE | 7038004F | C | Single-phase 100–120 V | Max 400 W | No |
| MCDN205BE | 70380050 | | Single-phase/3-phase 200–240 V | Max 750 W | No |
| MDDN405BE | 70380009 | D | Single-phase/3-phase 200–240 V | Max 1000 W | Provided |

*1   This is the product code for our servo driver listed in the ESI file (Hexadecimal notation).

*   For servo driver and motor combinations, see Operating Instructions (MINAS A7B Series) "2.3 Driver and Motor Combinations". Some motors cannot be used even if they match the rated outputs shown in this table.

## 4.2   Multi-function Type

| Product number | Product Code (*1) | Size symbol | Power supply input | Rated output of applicable motor | Built-in fan |
|---|---|---|---|---|---|
| MADN061BF | 713C0000 | A | Single-phase 100–120 V | Max 50 W | No |
| MADN081BF | 713C0001 | | | Max 100 W | No |
| MADN065BF | 713C0004 | | Single-phase/3-phase 200–240 V | Max 100 W | No |
| MADN085BF | 713C0005 | | | Max 200 W | No |
| MBDN121BF | 713C0002 | B | Single-phase 100–120 V | Max 200 W | No |
| MBDN125BF | 713C0006 | | Single-phase/3-phase 200–240 V | Max 400 W | No |
| MCDN201BF | 713C004F | C | Single-phase 100–120 V | Max 400 W | No |
| MCDN205BF | 713C0050 | | Single-phase/3-phase 200–240 V | Max 750 W | No |
| MDDN405BF | 713C0009 | D | Single-phase/3-phase 200–240 V | Max 1000 W | Provided |

*1   This is the product code for our servo driver listed in the ESI file (Hexadecimal notation).

*   For servo driver and motor combinations, see Operating Instructions (MINAS A7B Series) "2.3 Driver and Motor Combinations". Some motors cannot be used even if they match the rated outputs shown in this table.

## 4.3   Application specialized Type

| Product number | Product Code [*1] | Size symbol | Power supply input | Rated output of applicable motor | Built-in fan |
|---|---|---|---|---|---|
| MADN065BR□ | 716C0004 | A | Single-phase/3-phase 200–240 V | Max 100 W | No |
| MADN085BR□ | 716C0005 | | | Max 200 W | No |
| MBDN125BR□ | 716C0006 | B | Single-phase/3-phase 200–240 V | Max 400 W | No |
| MCDN205BR□ | 716C0050 | C | Single-phase/3-phase 200–240 V | Max 750 W | No |
| MDDN405BR□ | 716C0009 | D | Single-phase/3-phase 200–240 V | Max 1000 W | Provided |

*1   This is the product code for our servo driver listed in the ESI file (Hexadecimal notation).

*   For servo driver and motor combinations, see Operating Instructions (MINAS A7B Series) "2.3 Driver and Motor Combinations" . Some motors cannot be used even if they match the rated outputs shown in this table.

## 5  Basic Specifications

The specifications of this product are as follows.

| Item | | | | Description |
|---|---|---|---|---|
| Input power supply | 100 V | Main circuit power supply | Sizes A to C | Single phase 100 to 120 V, -15% to +10%, 50/60 Hz |
| | | Control circuit power supply | Sizes A to C | Single phase 100 to 120 V, -15% to +10%, 50/60 Hz |
| | 200 V | Main circuit power supply | Sizes A to D | Single phase/3-phase 200 to 240 V, -15% to +10%, 50/60 Hz |
| | | Control circuit power supply | Sizes A to D | Single phase 200 to 240 V, -15% to +10%, 50/60 Hz |
| Ambient operating conditions | Temperature | | | Operating temperature 0 to 60°C (can be used at 55 to 60°C when derated ([*5]) ) (no freezing)<br>Storage temperature: -20°C to 65°C (Max. temperature guarantee: 80°C, cumulative 72 hours, no condensation ([*1]) ) |
| | Humidity | | | Operating/storage humidity: 20 to 85% RH or less (no condensation ([*1]) ) |
| | Altitude | | | 2000 m or lower (can be used at 1000 to 2000 m when derated ([*5]) ) |
| | Vibration | | | $5.88 \ m/s^2$ or less, 10 to 60 Hz |
| | Pollution degree | | | Pollution degree 2 (IEC60664-1) |
| | Mounting intervals | | | 10 mm or more (can be used at 1 to 10 mm when derated ([*5]) ) |
| Overvoltage category | | | | III (IEC60364-4-44 and IEC60664-1) |
| Protective class | | | | I (IEC61140) |
| IP rating | | | | IP00 |
| Insulation voltage resistance | | | | Withstanding 1,500 V AC between primary and earth for 1 minute |
| Control method | | | | IGBT PWM method, sinusoidal drive |
| Encoder feedback | | | | 27-bit (134217728 resolution) absolute encoder, 7-wire serial |
| External scale feedback ([*2]) | | | | A/B-phase, home signal differential input type<br>Panasonic supported serial communication type ([*4]) |
| Control signal | Input | | | 8 general-purpose inputs<br>Select general-purpose input function based on parameters |
| | Output | | | 3 general-purpose outputs<br>Select general-purpose output function based on parameters |
| Analog signal | Input | | | 1 input (16-bit A/D input) ([*3]) |
| | Output | | | 2 outputs (analog monitor 1, analog monitor 2) |
| Pulse signal | Output | | | Switch with following with parameters and output line driver.<br>● Encoder pulse output (A/B-phase)<br>● Position comparison output (3 outputs) |
| Communication function | EtherCAT | | | Real-time operation command transmission, parameter setting, status monitoring, etc. |
| | USB | | | Connect to a computer for parameter setting or status monitoring, etc. |
| Safety terminal ([*2]) | | | | Safe Torque Off (STO)<br>2 inputs (safety input 1, 2)<br>1 output (EDM output) |

| Item | | Description |
|---|---|---|
| Front panel | | • rotary switch <br> • 7-segment LED for display (2-digit) and 4 EtherCAT Indicator lights <br> • Analog monitor connector |
| Regeneration | | Sizes A and B: No built-in regenerative resistor (external only) <br> Sizes C and D: Built-in regenerative resistor (external also possible) |
| Dynamic brake | | Built-in |
| Control mode | Semi-closed control | • Position Control: Profile position control (pp), cyclic position control (csp), homing position control (hm) <br> • Velocity Control: Profile velocity control (pv), cyclic velocity control (csv) <br> • Torque Control: Profile torque control (tq), cyclic torque control (cst) |
| | Full-closed control | • Position Control: Profile position control (pp), cyclic position control (csp), homing position control (hm) |

*1    Please note that condensation tends to occur when the temperature drops.

*2    Cannot be used with the standard type.

*3    Only application specialized types can be used.

*4    For supported scale manufacturers and product numbers, see the "AC Servo Partner Products" catalog.

*5    See *"Derated Specifications"* .

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## Derated Specifications

● When using servo drivers at an ambient temperature of 55 to 60°C, or at an altitude between 1000 and 2000 meters, use the load factor obtained by multiplying each of the load factors given in the below diagram.

When derated, change Pr5.110 "Driver derating factor" from the initial value. For details on how to set parameters and check the load factor of the servo driver, see Operating Instructions (MINAS A7B Series) "8.20 Driver Derating Function" .

For servo driver overload protection time characteristics, see *"Overload Protection Time Characteristics (Driver)"* .

An example of Pr5.110 "Driver derating factor" configuration is shown below.

  • (Example 1) When used at an ambient temperature of 60°C and an altitude of 1000 m

    The figure shows that the load factor at an ambient temperature of 60°C is 85% and at an altitude of 1000 m the load factor is 100%. Multiplying each load factor yields 85% × 100% = 85%.

    For Pr5.110 "Driver derating factor" , set to "85".

  • (Example 2) When used at an ambient temperature of 60°C and an altitude of 2000 m or less

    The figure shows that the load factor at an ambient temperature of 60°C is 85% and at an altitude of 2000 m the load factor is 85%. Multiplying each load factor yields 85% × 85% = 72% (Round down to nearest decimal point).

    For Pr5.110 "Driver derating factor" , set to "72".

● If using servo drivers mounted at intervals of 1 to 10 mm, be sure to keep the below ambient temperatures in mind.

Load factor (%)

100
85

0
0        55   60
Ambient temperature (℃)

Load factor (%)

100
85

0
0      1000      2000
Altitude (m)

Ambient temperature (℃)

55
45

0
0  1            10
Mounting intervals (mm)
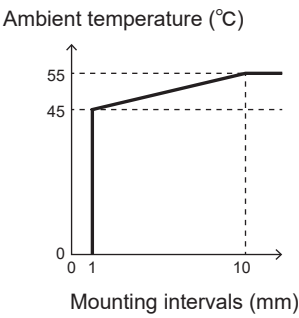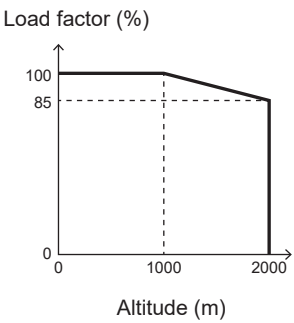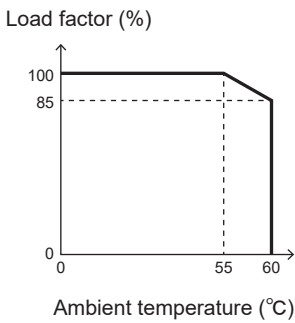
## Overload Protection Time Characteristics (Driver)

The driver overload warning function is activated when the overload protection time characteristic (driver) is reached.

Servo driver and servo motor overload warnings and protection functions (driver overload warning, motor overload warning, and motor overload protection) give priority to the lower between the overload protection time characteristic (driver) and overload protection time characteristic (motor). For details on overload protection time characteristics (motor), see Operating Instructions (MINAS A7B Series) "2.2.5 Overload Protection Time Characteristics (Motor)" .

The figure below shows the overload protection time characteristics (driver) when Pr5.110 "Driver derating factor" is set to "100". See *"Derated Specifications"* in *"5 Basic Specifications"* and set Pr5.110 "Driver derating factor" according to the ambient operating conditions. Since the overload protection time characteristic of the servo driver changes depending on the set value of Pr5.110 "Driver derating factor" , tune the operating conditions so that the overload protection time characteristic (driver) is not reached.

See Operating Instructions (MINAS A7B Series) "8.20 Driver Derating Function" for more information on the driver derating function.

### Common to MADN and MBDN



MADN061, MADN081, MBDN121,
MADN065, MADN085, MBDN125
During rotation
During servo lock

### MCDN201, MCDN205



MCDN201, MCDN205
During rotation
During servo lock

### MDDN405



MDDN405
During rotation
During servo lock

R1.0
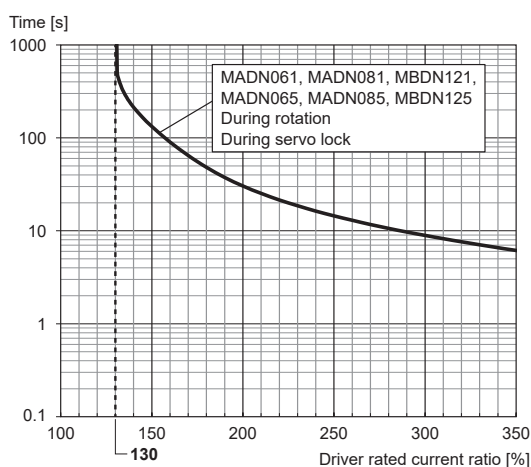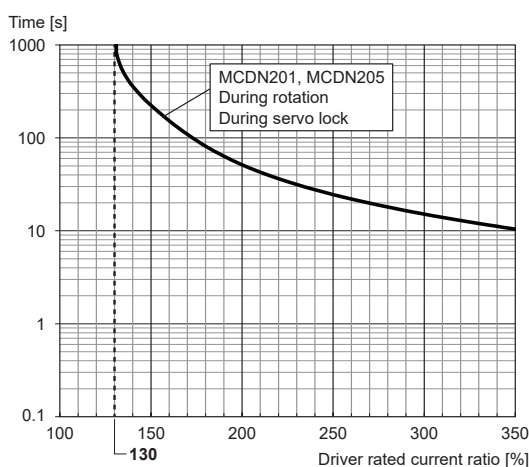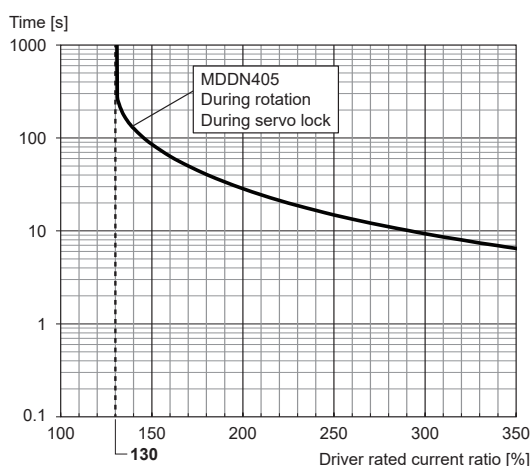
# 6   Part Names

The names of the driver parts are shown below by driver size.

For each size, the figure is for the multi-function type. The standard type does not have X3 (safety function connectors/safety bypass plug) or X5 (external scale connector).

## 6.1   Sizes A, B (100 V/200 V)



| X1 | USB connector DX07S016JA3R1500 (JAE) or equivalent | X2 | EtherCAT connector 2301996-9 (TYCO) or equivalent |
|---|---|---|---|
| X3 | Safety function connector 2294417-1 (TYCO) or equivalent | X3' | Safety bypass plug 2371136-3 (TYCO) or equivalent |
| X4 | Parallel I/O connector DF02R026NA2 (JAE) or equivalent | X5 | External scale connector MUF-RS10SK-GKX-TB (LF) (JST) or equivalent |
| X6 | Encoder connector 2232261-3 (TYCO) or equivalent | X7 | Analog monitor connector 53398-4005 (Molex) or equivalent |
| XA | Power supply input connector SC05B-JTSKM7.5SK-GSXKR (JST) or equivalent | XA' | Power supply input connector 05JFAT-SAXGSAK-KM7.5 (LA) (JST) or equivalent |
| XB | Motor output connector SC07B-JTSKM7.5SK-GSXKR (JST) or equivalent | XB' | Motor output connector 07JFAT-SAXGSAK-KM7.5 (LA) (JST) or equivalent |
| (1) | Front panel | (2) | Charge lamp |
| (3) | Earth connection screw | (4) | Main power supply input terminal |
| (5) | Control power supply input terminal | (6) | Regenerative resistor connection terminal |
| (7) | Motor output terminal | | |

\*   Remove the safety bypass plug when wiring to X3.

**Notes**

● Connectors XA′ and XB′ are included with sizes A and B.

## 6.2   Sizes C, D (100 V/200 V)



| X1 | USB connector<br>DX07S016JA3R1500 (JAE) or equivalent | X2 | EtherCAT connector<br>2301996-9 (TYCO) or equivalent |
|---|---|---|---|
| X3 | Safety function connector<br>2294417-1 (TYCO) or equivalent | X3' | Safety bypass plug<br>2371136-3 (TYCO) or equivalent |
| X4 | Parallel I/O connector<br>DF02R026NA2 (JAE) or equivalent | X5 | External scale connector<br>MUF-RS10SK-GKX-TB (LF) (JST) or equivalent |
| X6 | Encoder connector<br>2232261-3 (TYCO) or equivalent | X7 | Analog monitor connector<br>53398-4005 (Molex) or equivalent |
| XA | Power supply input connector<br>SC05B-JTSKM7.5SK-GSXKR (JST) or equivalent | XA' | Power supply input connector<br>05JFAT-SAXGSAK-KM7.5 (LA) (JST) or equivalent |
| XB | Motor output connector<br>SC07B-JTSKM7.5SK-GSXKR (JST) or equivalent | XB' | Motor output connector<br>07JFAT-SAXGSAK-KM7.5 (LA) (JST) or equivalent |
| (1) | Front panel | (2) | Charge lamp |
| (3) | Earth connection screw | (4) | Main power supply input terminal |
| (5) | Control power supply input terminal | (6) | Regenerative resistor connection terminal |
| (7) | Motor output terminal | | |

\*   Remove the safety bypass plug when wiring to X3.

**Notes**

● Connector XA′ and XB′ are included with sizes C and D.

## 6.3   Nameplate Example

The details shown on nameplates are as shown below.



Product number
Serial number

P 2 3 0 4 0 0 0 1 T

Lot number
Month of production
Year of production (last 2 digits)

I/O voltage
Number of I/O phases
Rated I/O current
I/O frequency
Rated output of applicable motor

Model No.  MCDN205BF
Serial No.  P23040001T
                    INPUT            OUTPUT
Voltage  200-240 V      0-240 V
Phase    1φ/3φ           3φ
F.L.C     6.4 A/3.4 A     4.1 A
Freq.     50/60 Hz        0-541.7 Hz
Power                       750 W
Panasonic Industry Co., Ltd.

**Panasonic**

AC SERVO DRIVER

QR code

Applicable international certification standard mark, etc.

Product mass

Country of origin

IP00        Mass : 1.5 kg
20230401   Made in Japan

IP rating

Manufacture date

2 0 2 3 0 4 0 1

Manufacture date
Manufacture month
Manufacture year

The range of the lot number in serial number is 1 to 33999, but the nameplate has 4 digits in the following format. In the four digits, the alphabet characters "I" (eye) and "O" (o) are not used.

| Value of serial number | Notation on the nameplate |
| --- | --- |
| 1 to 9999 | 0001 to 9999 |
| 10000 to 10999 | A000 to A999 |
| 11000 to 11999 | B000 to B999 |
| … | … |
| 17000 to 17999 | H000 to H999 |
| 18000 to 18999 | J000 to J999 |
| … | … |
| 22000 to 22999 | N000 to N999 |
| 23000 to 23999 | P000 to P999 |
| … | … |
| 33000 to 33999 | Z000 to Z999 |

## 6.4   Front Panel

**Operation and Display of the Front Panel**
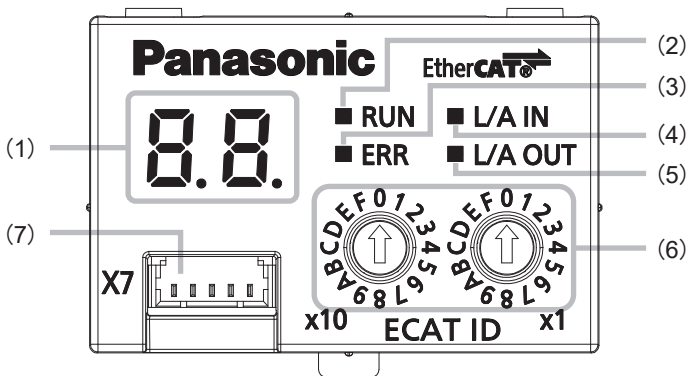


| No. in image | Name | |
|---|---|---|
| (1) | 7-segment LED for display (2-digit) | |
| (2) | RUN LED (Green) | EtherCAT indicator |
| (3) | ERROR LED (Red) | |
| (4) | Link/Activity IN LED (Green) | |
| (5) | Link/Activity OUT LED (Green) | |
| (6) | Node address (Station Alias) setting rotary switch (2-digit) Setting range: 0 to FF | |
| (7) | Analog monitor connector (X7) | |

# 7    Dimensions

The dimensions are the same for the standard type, multi-function type, and application specialized type for each frame (The figure is for the multi-function type).

## 7.1    Size A (100 V/200 V)

■    **Base mount (standard: rear-mount)**
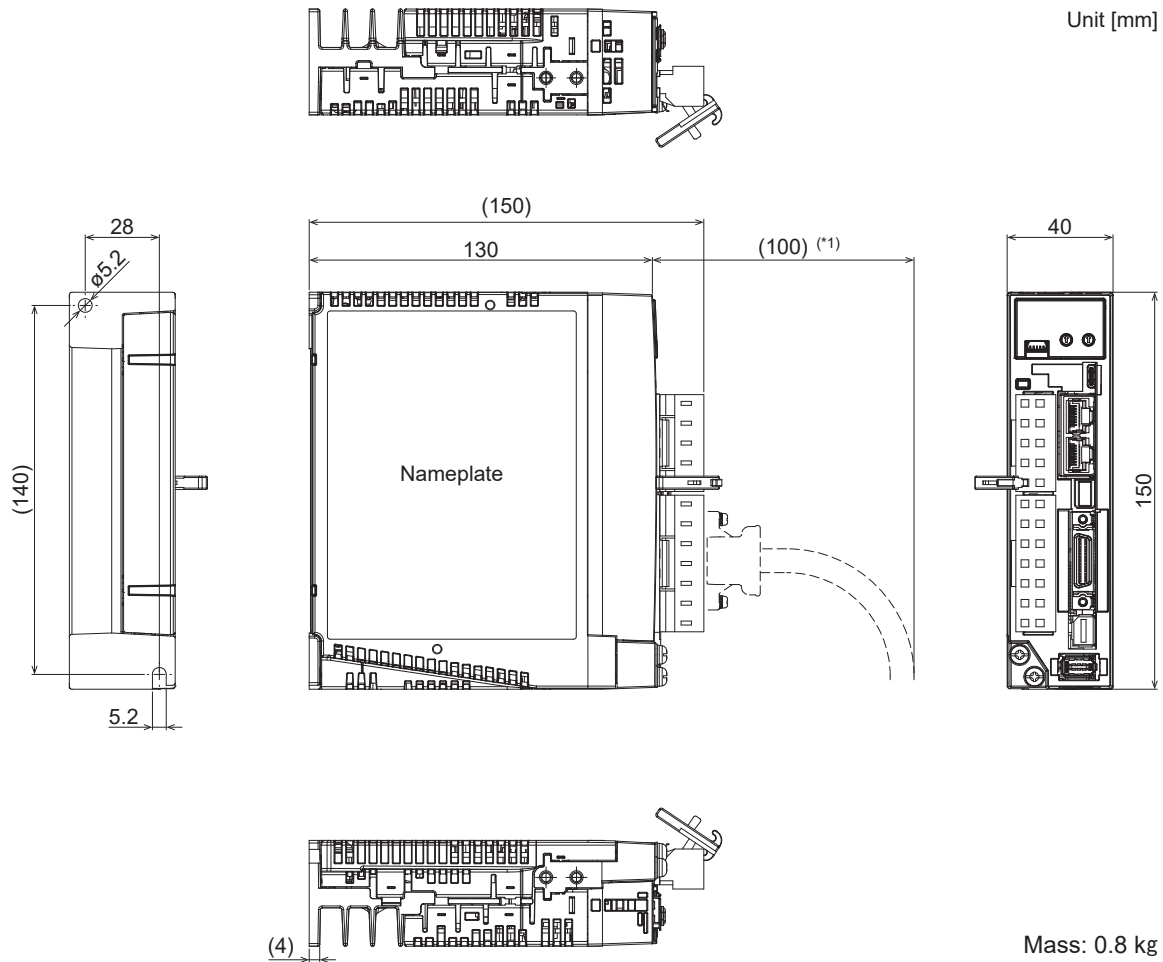
Unit [mm]

(150)

130

(100) (*1)

28

φ5.2

(140)

Nameplate

5.2

40

150

(4)

Mass: 0.8 kg

*1    Ensure an appropriate distance for the cables used.

*    Do not use screw holes for which no dimensions are shown.

■ **Rack mount (using optional parts: front-mount)**

Unit [mm]

Mounting bracket screws
(Included with Mounting bracket)

Mounting bracket
(optional)

(150)
130
(109)
2.5

Nameplate

(121) (*1)

40
28
7
φ5.2
9.5
15

(180)
(170)
150

15
9.5   5.2
21
28

Mounting bracket
(optional)

Mounting bracket screws
(Included with Mounting bracket)

2.5

(4)

Mass: 0.9 kg

*1   Ensure an appropriate distance for the cables used.

*   Do not use screw holes for which no dimensions are shown.

*   Mounting brackets are optional parts. They are not included with the product.

## 7.2   Size B (100 V/200 V)

■ **Base mount (standard: rear-mount)**

Unit [mm]

(170)

150

(100) (*1)

28

φ5.2

(140)

5.2

Nameplate

40

150

(4)

Mass: 1.0 kg

*1    Ensure an appropriate distance for the cables used.

*    Do not use screw holes for which no dimensions are shown.

■ **Rack mount (using optional parts: front-mount)**

Unit [mm]

Mounting bracket screws
(Included with Mounting bracket)

Mounting bracket
(optional)

(170)

150

(129)

(121) (*1)

2.5

Nameplate

2.5

Mounting bracket
(optional)

Mounting bracket screws
(Included with Mounting bracket)

(4)

40

28

7

φ5.2

9.5

15

(180)

(170)

150

15

9.5

5.2

21

28

Mass: 1.1 kg

*1    Ensure an appropriate distance for the cables used.

*    Do not use screw holes for which no dimensions are shown.

*    Mounting brackets are optional parts. They are not included with the product.

## 7.3   Size C (100 V/200 V)

■   **Base mount (standard: rear-mount)**
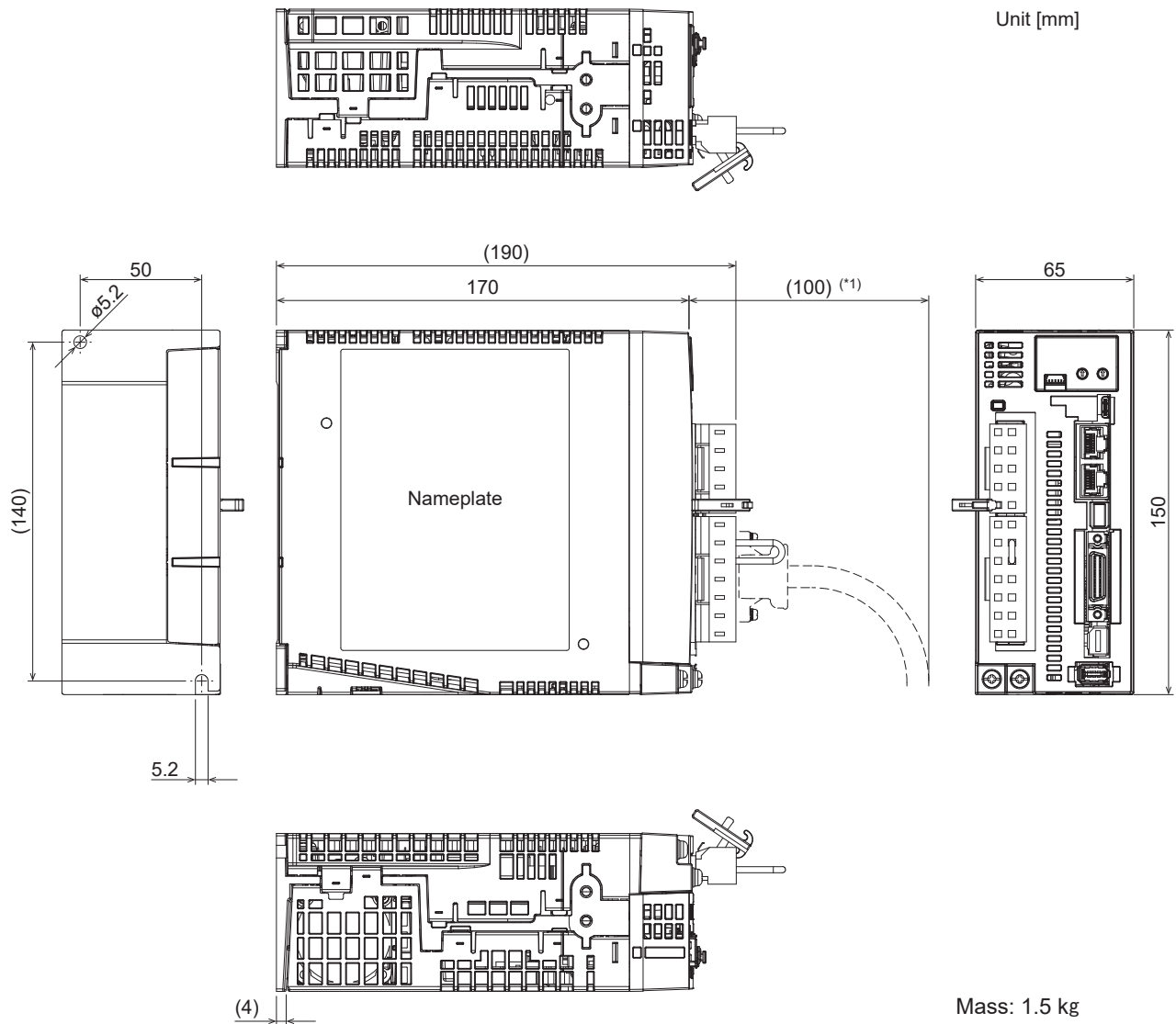
Unit [mm]

(190)

170

(100) <sup>(*1)</sup>

50

ø5.2

(140)

Nameplate

65

150

5.2

(4)

Mass: 1.5 kg

*1    Ensure an appropriate distance for the cables used.

*    Do not use screw holes for which no dimensions are shown.

■　**Rack mount (using optional parts: front-mount)**

Unit [mm]

Mounting bracket screws
(Included with Mounting bracket)

Mounting bracket
(optional)

(190)

170

(150.8)

(119.2) [*1]

2.5

Nameplate

65

60

20

⌀5.8

9.5

15

(180)

(170)

150

15

9.5

5.8

20

60

2.5

Mounting bracket
(optional)

Mounting bracket screws
(Included with Mounting bracket)

(4)

Mass: 1.6 kg
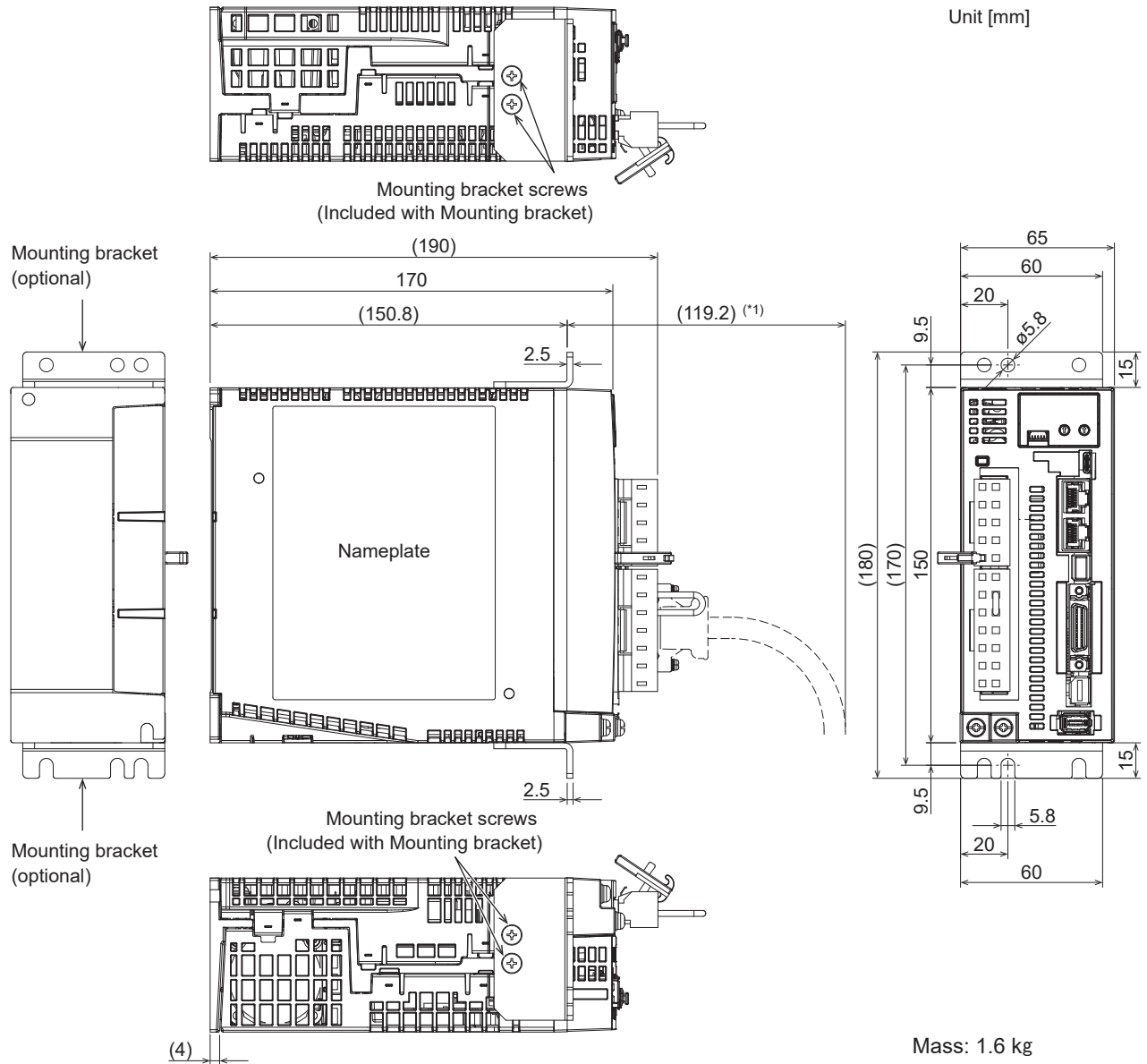
*1　Ensure an appropriate distance for the cables used.

*　Do not use screw holes for which no dimensions are shown.

*　Mounting brackets are optional parts. They are not included with the product.

## 7.4　Size D (200 V)

■　**Base mount (standard: rear-mount)**
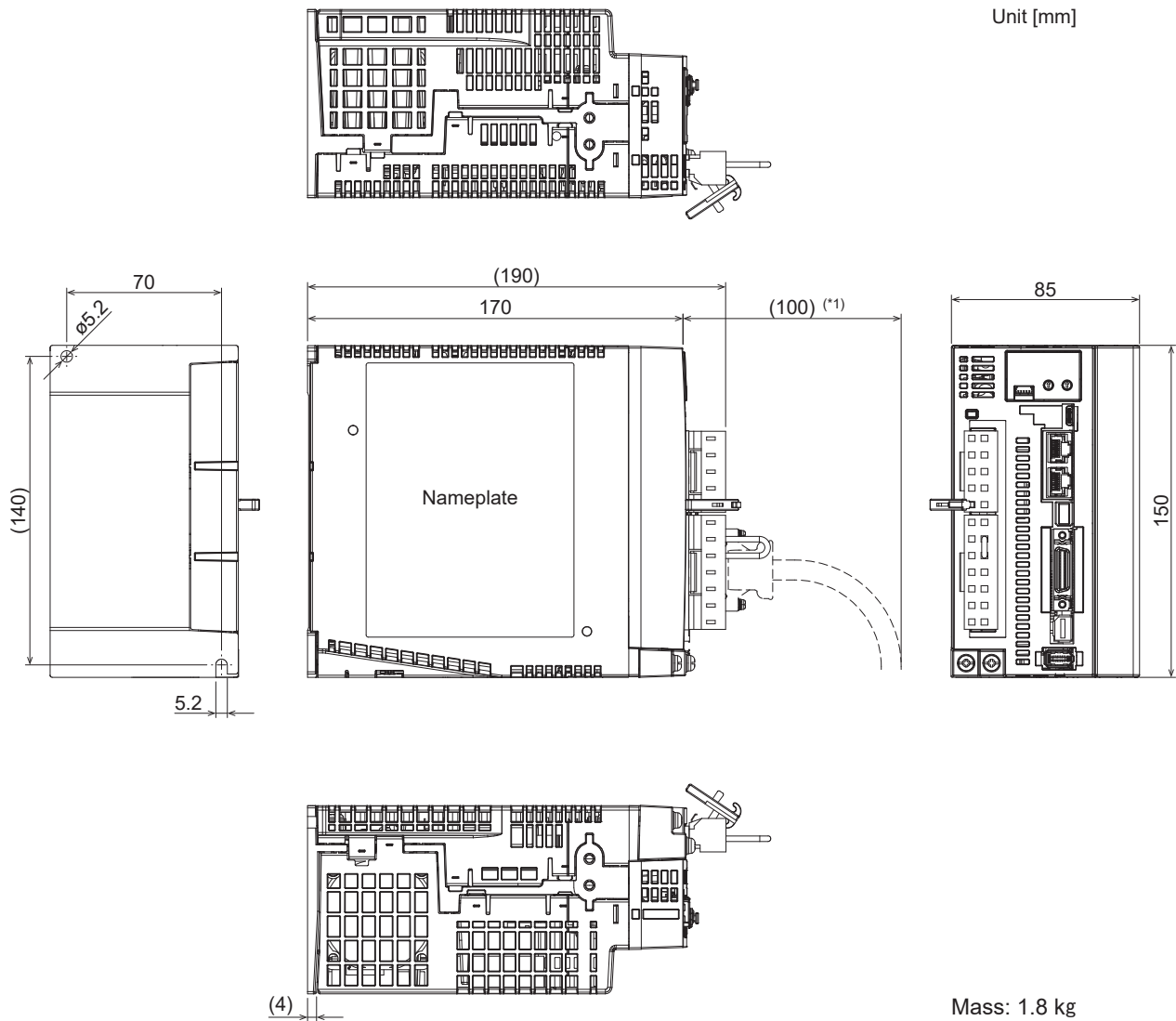
Unit [mm]

70

ø5.2

(140)

5.2

(190)

170

(100) (*1)

Nameplate

85

150

(4)

Mass: 1.8 kg

*1　Ensure an appropriate distance for the cables used.

*　Do not use screw holes for which no dimensions are shown.

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■ **Rack mount (using optional parts: front-mount)**

Unit [mm]

Mounting bracket screws
(Included with Mounting bracket)

Mounting bracket
(optional)

(190)
170
(150.8)
(119.2) (*1)
2.5

Nameplate

2.5

Mounting bracket
(optional)

Mounting bracket screws
(Included with Mounting bracket)

(4)

85
60
40
10
9.5
2-ø5.8
15
(180)
(170)
150
9.5
2-5.8
40
60
10
15

Mass: 1.9 kg
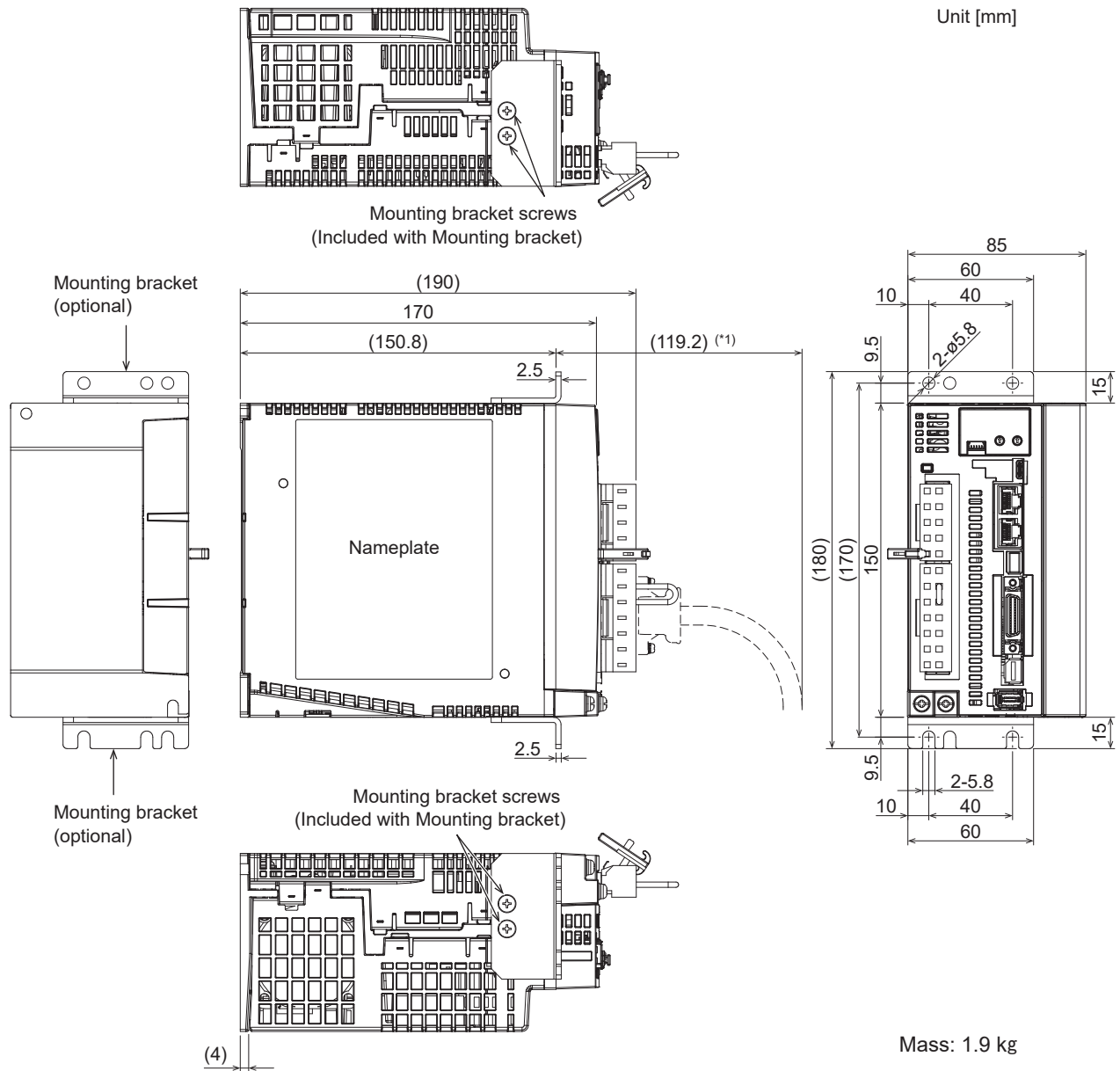
*1    Ensure an appropriate distance for the cables used.

*   Do not use screw holes for which no dimensions are shown.

*   Mounting brackets are optional parts. They are not included with the product.

## 7.5   Mounting Hole Dimensions

Use mounting holes to firmly fix the servo driver to a surface.

**Recommended mounting hole drilling diagram**
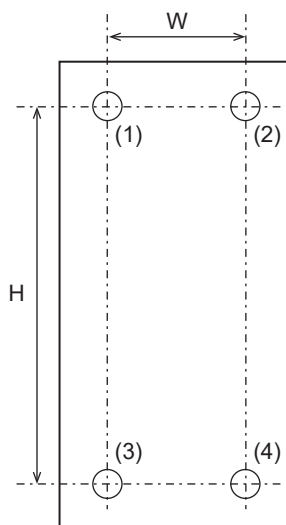


| Size | Mounting hole machining dimensions [mm] | | | | Mounting holes | | Mounting screws (*1) | |
|------|------|------|------|------|------|------|------|------|
| | Base mount | | Rack mount | | Base mount | Rack mount | Nomi-nal | Tightening torque [N·m] |
| | H | W | H | W | | | | |
| A | 140 ± 0.5 | 28 ± 0.5 | 170 ± 0.5 | — | (2), (3) | (1), (3) | M5 | 2.7 to 3.3 |
| B | 140 ± 0.5 | 28 ± 0.5 | 170 ± 0.5 | — | (2), (3) | (1), (3) | M5 | 2.7 to 3.3 |
| C | 140 ± 0.5 | 50 ± 0.5 | 170 ± 0.5 | — | (2), (3) | (1), (3) | M5 | 2.7 to 3.3 |
| D | 140 ± 0.5 | 70 ± 0.5 | 170 ± 0.5 | 40 ± 0.5 | (2), (3) | (1), (2), (3), (4) | M5 | 2.7 to 3.3 |

*1    Hexagon socket head cap screws (JIS B 1176:2006) are recommended for use as mounting screws. If the thickness of the mounting plate is 10 mm, use mounting screws with a minimum length of 14 mm.

# 8   Configuration of Connectors

## 8.1   Power Connectors XA and XB

### 8.1.1   Sizes A, B (100 V/200 V)

Connect main power supply and control power to XA. Connect motor and regenerative resistor to XB.

**Pinout diagram**



| Name | | | Symbol | Connector pin no. | Description |
|---|---|---|---|---|---|
| Connector | XA | Main power supply input terminal | L1 | 1 | 100 V system: Input single-phase 100 to 120 V +10%/-15% 50/60 Hz.<br>200 V system: Input single-phase/three-phase 200 to 240 V +10%/-15% 50/60 Hz.<br>For single phase, connect to terminals L1 and L3. |
| | | | L2 | 2 | |
| | | | L3 | 3 | |
| | | Control power supply input terminal | L1C | 4 | 100 V system: Input single-phase 100 to 120 V +10%/-15% 50/60 Hz.<br>200 V system: Input single-phase 200 to 240 V +10%/-15% 50/60 Hz. |
| | | | L2C | 5 | |
| | XB | Regenerative resistor connection terminal | P | 1 | When adding an external regenerative resistor, connect the external regenerative resistor (prepared by customer) between P and B. Then, set Pr0.16. to 1 or 2.<br>Do not connect anything to the RB terminal.<br>Do not connect anything to the N terminal. |
| | | | RB | 2 | |
| | | | B | 3 | |
| | | | N | 4 | |
| | | Motor connection terminal | U | 5 | Connect each phase of the motor coil.<br>U: U-phase<br>V: V-phase<br>W: W-phase |
| | | | V | 6 | |
| | | | W | 7 | |
| Earth terminal | | | ⏚ | | Terminal for grounding. There are two terminals. One should be connected to the earth, and the other should be connected to the motor earth wire. |

\*   Tighten earth screws with a torque of M4: 0.7 to 0.8 N·m.

<div style="border:1px solid;">

**Wiring Procedure**

</div>

1    Connect the power supply and motor to Connector XA and Connector XB.

2    Connect the wired connector to the driver.

Insert the connector securely until it is locked.

**Precautions**

- Wiring should be performed by a qualified electrician.

- In order to prevent electric shocks, do not connect to a power source until the wiring is complete.

- The power connectors (XA and XB) conduct high voltages and carry a risk of electric shock.

**Notes**

- When carrying out wiring work, check *"9.3.1.4 How to Wire to the Power Connector"* for the wiring method of the XA and XB power connectors and Operating Instructions (MINAS A7B Series) "3.2.1.4 Motor Connector Specifications" for the specifications of the motor connector.

R1.0

### 8.1.2  Sizes C, D (100 V/200 V)

Connect main power supply and control power to XA. Connect motor and regenerative resistor to XB.

**Pinout diagram**



| Name | | | Symbol | Connector pin no. | Description |
|---|---|---|---|---|---|
| Connector | XA | Main power supply input terminal | L1 | 1 | 100 V system: Input single-phase 100 to 120 V +10%/-15% 50/60 Hz. |
| | | | L2 | 2 | 200 V system: Input single-phase/three-phase 200 to 240 V +10%/-15% 50/60 Hz. |
| | | | L3 | 3 | For single phase, connect to terminals L1 and L3. |
| | | Control power supply input terminal | L1C | 4 | 100 V system: Input single-phase 100 to 120 V +10%/-15% 50/60 Hz. |
| | | | L2C | 5 | 200 V system: Input single-phase 200 to 240 V +10%/-15% 50/60 Hz. |
| | XB | Regenerative resistor connection terminal | P | 1 | Normally, short the circuit between RB and B. |
| | | | RB | 2 | When adding an external regenerative resistor, disconnect the short wire between RB and B, connect the external regenerative resistor between P and B, and set Pr0.16 to 1 or 2. |
| | | | B | 3 | |
| | | | N | 4 | Do not connect anything to the N terminal. |
| | | Motor connection terminal | U | 5 | Connect each phase of the motor coil. |
| | | | V | 6 | U: U-phase |
| | | | W | 7 | V: V-phase W: W-phase |
| Earth terminal | | | ⏚ | | Terminal for grounding. There are two terminals. One should be connected to the earth, and the other should be connected to the motor earth wire. |

\*   Tighten earth screws with a torque of M4: 0.7 to 0.8 N·m.

| Wiring Procedure |
| --- |

1   Connect the power supply and motor to Connector XA and Connector XB.

2   Connect the wired connector to the driver.

   Insert the connector securely until it is locked.

**Precautions**

- Wiring should be performed by a qualified electrician.

- In order to prevent electric shocks, do not connect to a power source until the wiring is complete.

- The power connectors (XA and XB) conduct high voltages and carry a risk of electric shock.

**Notes**

- When carrying out wiring work, check *"9.3.1.4 How to Wire to the Power Connector"* for the wiring method of the XA and XB power connectors and Operating Instructions (MINAS A7B Series) "3.2.1.4 Motor Connector Specifications" for the specifications of the motor connector.

## 8.2   USB Connector X1

Connecting to a PC or host device via USB allows for parameter setting/changing, control status monitoring, error status/history reference, parameter saving/loading, and other operations.

The driver uses USB Type-C connectors. Use a commercially available USB Type-C cable.

## 8.3 Connector X2 for EtherCAT

Connect an EtherCAT communication cable to connector X2 in order to connect to the host device.

This connector is an RJ45 connector used with EtherCAT and consists of an input X2 IN Connector and an output X2 OUT Connector.

**Pinout diagram**

Connector: X2 IN
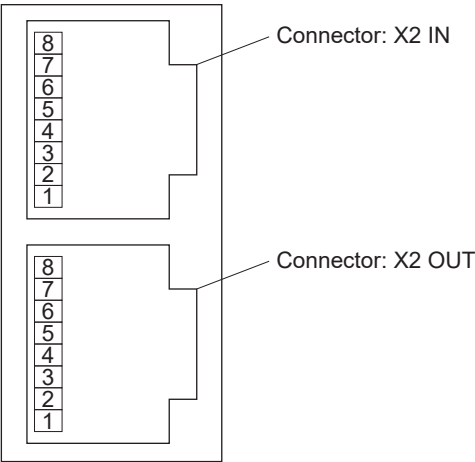
Connector: X2 OUT

Specifications for each connector shown below.

[X2 IN] and [X2 OUT] connectors

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| Transmission/Reception + | TX/RX+ | 1 | Connect to communication partner 1-pin |
| Transmission/Reception - | TX/RX- | 2 | Connect to communication partner 2-pin |
| Reception/Transmission + | RX/TX+ | 3 | Connect to communication partner 3-pin |
| NC | — | 4 | Connect to communication partner 4-pin |
| NC | — | 5 | Connect to communication partner 5-pin |
| Reception/Transmission - | RX/TX- | 6 | Connect to communication partner 6-pin |
| NC | — | 7 | Connect to communication partner 7-pin |
| NC | — | 8 | Connect to communication partner 8-pin |
| Frame ground | FG | Shell | Connect to the cable shield. |

Be sure to use industrial 2P4C or 4P8C shielded twisted pair (STP) Ethernet cables compatible with TIA/EIA-568 CAT5e or higher.

For details, see ETG (EtherCAT Technology Group) specifications.

## 8.4   Safety Function Connector X3

- This is a connector that is compatible with Functional Safety (Safety) specifications, and supports both the multi-function type and application specialized type.
- A safety bypass plug is connected as standard, and set to not use the safety function. If not using the safety function, do not remove the safety bypass plug.
- When using the safety function, remove the safety bypass plug and connect to the host device. For details on the safety functions, see Operating Instructions (MINAS A7B Series) "9 Safety Functions" .

**Pinout diagram**

```
2 1
4 3
6 5
8 7
```
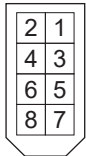
**Safety bypass plug supplied with driver (internal wiring)**

Pin No.

```
1
2
3
4
5
6
7
8
```
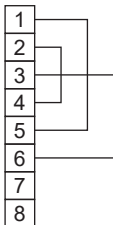
This is the wiring for when no safety circuit is constructed.

Do not connect in this way when using safety functions.

| Name | Symbol | Con-nector pin no. | Description |
|---|---|---|---|
| — | — | 1 | This terminal is for the safety bypass, so do not connect anything other than the safety bypass plug. |
| | — | 2 | |
| Safety input 1 | SF1- | 3 | • Input 1 for operating the STO function. This input interrupts the power transistor upper arm driving signal. <br> • Make sure that it is connected so that the input circuit photocoupler turns OFF when the STO function is activated. |
| | SF1+ | 4 | |
| Safety input 2 | SF2- | 5 | • Input 2 for operating the STO function. This input interrupts the power transistor lower arm driving signal. <br> • Make sure that it is connected so that the input circuit photocoupler turns OFF when the STO function is activated. |
| | SF2+ | 6 | |
| EDM output | EDM- | 7 | This is a monitoring output for monitoring safety function failures. <br> Do not use this monitor output when using the SSU function. |
| | EDM+ | 8 | |
| Frame ground | FG | Shell | Connected to the earth terminal inside the servo driver. |

For information on safety connectors, see Operating Instructions (MINAS A7B Series) "12.4.8.6 Safety Connector Kit" .

In order to achieve the safety levels SIL3 and PL e, EDM output or SSU function is needed for STO function diagnosis (maximum diagnosis interval is 3 months).

Safety levels are SIL2 and PL d when no STO function diagnosis with EDM output or the SSU function is performed.

For details on diagnostics via the STO function, see Operating Instructions (MINAS A7B Series) "9.1.4 STO Function Diagnostics" .

### Precautions

- The unit will stop immediately if the connection cable to the host device or the safety bypass plug is unplugged during operation.

**Safety input signal interface**
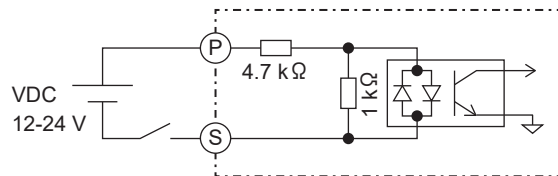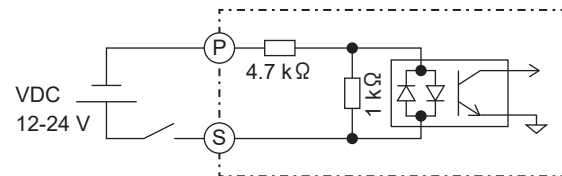


P: 4 and 6-pin

S: 3 and 5-pin

**EDM output signal interface**
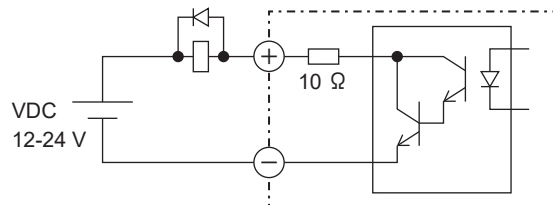


+: 8-pin

-: 7-pin

● Note the polarity of the control signal power supply (VDC). The servo driver will be damaged if connected in reversed polarity to that shown in the diagram.

● When the relay is directly driven, install a diode in parallel with the relay and in the direction as shown in the figure.

## 8.5   Parallel I/O Connector X4

This is a connector for external input/output (I/O) to which interface cables (26-strand) are connected.

**Pinout diagram**
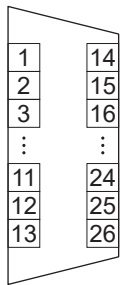


* (View from the cable side)

Connector (Plug): DF02P026F22A1 (Japan Aviation Electronics Industry, Ltd. or equivalent)

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| General-purpose output 1 | SO1+ | 1 | Assign the desired function using parameters and output the signal for that function. For example, the external brake release signal outputs the alarm. |
| | SO1- | 2 | |
| General-purpose output 3 | SO3+ | 3 | |
| | SO3- | 4 | |
| General-purpose input 1 | SI1 | 5 | ● SI-COM: Shared terminal for general-purpose inputs 1 to 8. Connect to either terminal of the external DC power supply. ● SI1 to 8: When the desired function is assigned using parameters, they operate as signal input terminals for that function. For example, general-purpose motor input, or positive direction over-travel inhibit input. |
| General-purpose input common | SI-COM | 6 | |
| General-purpose input 2 | SI2 | 7 | |
| General-purpose input 3 | SI3 | 8 | |
| General-purpose input 4 | SI4 | 9 | |
| General-purpose input 5 | SI5 | 10 | |
| General-purpose input 6 | SI6 | 11 | |
| General-purpose input 7 | SI7 | 12 | |
| General-purpose input 8 | SI8 | 13 | |
| Absolute encoder battery input | BTP-I | 14 | Connect the battery for the absolute encoder. |
| | BTN-I | 15 | |
| Signal ground | GND | 16 | Signal ground. |
| A-phase output/position comparison output 1 | OA+/OCMP1+ | 17 | The following outputs are available using parameter settings. ● OA ± and OB ±: Differential output of divided feedback scale signals (A/B-phase). ● OCMP1 to 3 ± : Can be used as position comparison output. |
| | OA-/OCMP1- | 18 | |
| B-phase output/position comparison output 2 | OB-/OCMP2- | 19 | |
| | OB+/OCMP2+ | 20 | |
| Position comparison output 3 | OCMP3+ | 21 | |
| | OCMP3- | 22 | |
| Analog input (NC) | AI (NC) | 23 | Analog input with 16-bit resolution. (*1) |
| Signal ground (NC) | GND (NC) | 24 | Signal ground. (*1) |
| General-purpose output 2 | SO2+ | 25 | Assign the desired function using parameters and output the signal for that function. |
| | SO2- | 26 | |
| Frame ground | FG | Shell | Connected to the earth terminal inside the servo driver. |

*1    Analog input and signal ground are supported only by the application specialized type. Do not connect to standard type or multi-function type.

## 8.5.1   Input Signal

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| General-purpose input common | SI-COM | 6 | ● Connect to either the + or - terminal of the external DC power supply (12 to 24 V).<br>● Use a power supply with voltage in the range of 12 V ±5% to 24 V ±5%.<br>● This must be isolated from the primary power supply. Do not connect it to the same power supply.<br>  Primary power supply: power supply for motor brake |
| General-purpose input 1 | SI1 | 5 | ● Functions are allocated using parameters.<br>  For details, see the "Technical Reference - Functional Specification". |
| General-purpose input 2 | SI2 | 7 | |
| General-purpose input 3 | SI3 | 8 | |
| General-purpose input 4 | SI4 | 9 | |
| General-purpose input 5 | SI5 | 10 | |
| General-purpose input 6 | SI6 | 11 | |
| General-purpose input 7 | SI7 | 12 | |
| General-purpose input 8 | SI8 | 13 | |

### Signal interface
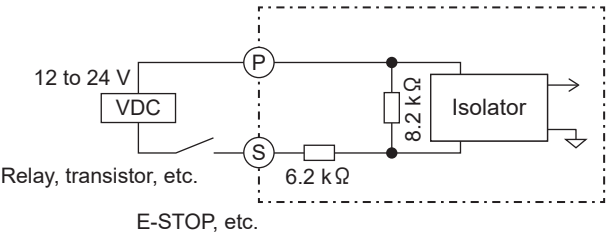


P: 6-pin

S: 5-, 7-, 8-, 9-, 10-, 11-, 12-, or 13-pin

● The polarity of the control signal power supply (VDC) is random (+ or - polarity).

### 8.5.2  Output Signal

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| General-purpose output 1 | SO1+<br>SO1- | 1<br>2 | ● Any function can be assigned by using parameters.<br>● The logic of the output pins cannot be changed. |
| General-purpose output 2 | SO2+<br>SO2- | 25<br>26 | ● For details on assigning parameters, see Operating Instructions (MINAS A7B Series) "When changing and using the output signal assignment" in "3.2.5.5.1 Control Output Signals" . |
| General-purpose output 3 | SO3+<br>SO3- | 3<br>4 | ● For factory standard parameters, see Operating Instructions (MINAS A7B Series) "Default setting assignment status" in "3.2.5.5.1 Control Output Signals" . |

**Signal interface**



VDC 12-24 V

10 Ω

+: 1-, 3-, and 25-pin

-: 2-, 4-, and 26-pin

● Note the polarity of the control signal power supply (VDC). The servo driver will be damaged if connected in reversed polarity to that shown in the diagram.

● When the relay is directly driven, install a diode in parallel with the relay and in the direction as shown in the figure.

### 8.5.3 Encoder Output Signal/Position Comparison Output Signal

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| A-phase output / Position comparison output 1 | OA+ / OCMP1+ | 17 | ● Differential output of divided feedback scale signal (A/B phase) (AM26C31 or equivalent). <br> ● The division ratio can be set by the parameters. <br> ● The ground of the line driver for the output circuit is connected to the signal ground (GND) and is not insulated. |
| | OA- / OCMP1- | 18 | |
| B-phase output / Position comparison output 2 | OB+ / OCMP2+ | 20 | ● The maximum output frequency is 4 Mpulse/s (after being multiplied by 4). <br> ● Pr4.47 "Pulse output selection" can be set to 1 and used as position comparison output. <br> ● This differential signal should be received by a line receiver (AM26C32 or equivalent), and a terminating resistor (approx. 330 Ω) should be connected between the line receiver inputs. |
| | OB- / OCMP2- | 19 | |
| Position comparison output 3 | OCMP3+ | 21 | ● Use shielded twisted-pair cables for wiring, and connect the shielded wires to the connector shell. |
| | OCMP3- | 22 | |
| Signal ground | GND | 16 | ● Signal ground. <br> ● Always connect the line receiver ground to this terminal. |

**Signal interface**
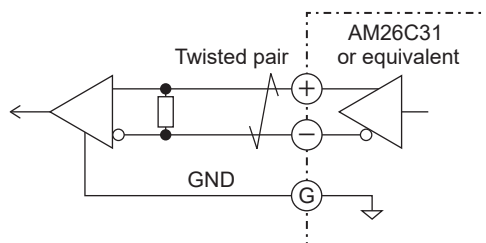


+: (X4) 17-, 20-, and 21-pin

-: (X4) 18-, 19-, and 22-pin

G: (X4) 16-pin

● Install a terminating resistor (approx. 330 Ω) between line receiver inputs.

### 8.5.4 Encoder Backup Battery Input

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| Battery input for absolute encoder | BTP-I | 14 | ● Connect the battery for the absolute encoder. For details, see _"9.3.4 Wiring to Connector X6"_ . <br> BTP-I: Positive+ BTN-I: Negative- <br> ● Connect the power for multi-turn data storage to the absolute encoder through BTP-O (3-pin) and BTN-O (4-pin) of encoder connector X6. <br> ● Connect the absolute encoder battery using any of the below methods. <br>   1   Connect to motor side directly <br>   2   Connect to encoder cable <br>   3   Connect to this connector |
| | BTN-I | 15 | |

### 8.5.5  Analog Input Signal

Analog input and signal ground are supported only by the application specialized type. Do not connect to standard type or multi-function type.

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| Analog input | AIN | 23 | • Analog input with 16-bit resolution.<br>• The maximum allowable input voltage is ±10 V.<br>• Accuracy of analog input values is not guaranteed.<br>• Assign functions using parameters. For details, see the "Technical Reference - Functional Specification". |
| Signal ground | GND | 24 | • Signal ground. |

**Signal interface**
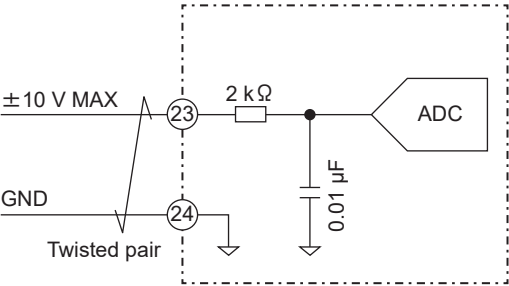


### 8.5.6  Other

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| Frame ground | FG | Shell | • Connected to the earth terminal inside the servo driver. |

## 8.6   External Scale Connector X5

Used to connect to an external scale.

This connector is compatible with both the multi-function type and application specialized type.

**Pinout diagram**

```
10
 9
 8
 7
 6
 5
 4
 3
 2
 1
```
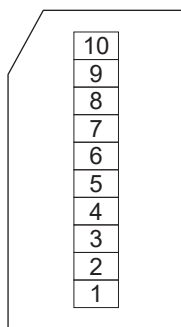
*   Connector (Plug): MUF-PK10K-X (made by J.S.T. Mfg. Co., Ltd. ) or equivalent

| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| External scale power supply output | EX5V | 1 | Provides power to external scales (for serial signals and ABZ-phase signals). [*1] [*2] |
| | EX0V | 2 | Connect with the signal ground using the external scale power supply output ground. |
| External scale signal input/output (Serial signal) | EXPS | 3 | Serial signal Sending and receiving |
| | /EXPS | 4 | |
| External scale signal input/output (ABZ-phase signal) | EXA | 5 | A-/B-/Z-phase pulse signals are received in parallel Supported speed: approx. 4 Mpulse/s (after being multiplied by 4) [*3] |
| | /EXA | 6 | |
| | EXB | 7 | |
| | /EXB | 8 | |
| | EXZ | 9 | |
| | /EXZ | 10 | |
| Frame ground | FG | Shell | Connected to the earth terminal inside the servo driver. |

*1   EX5V power supply output for external scale is 5 V ±5 %, 300 mA MAX.

A customer-supplied power supply is necessary if using an external scale with a consumption current higher than this.

Also, some external scales may take time to initialize when powering on. In such a case, it can be handled by adjusting the power-up wait time, which is a function of the servo driver.

*2   If the external scale is powered by an external power supply, the EX5V pin should be open to prevent external voltage from being supplied to this pin.

*3   Note that if the duty ratio of the input signal waveform from the external scale is not 50%, it may not be read correctly.

**Signal interface**



EXA, EXB, EXZ

$\overline{EXA}$, $\overline{EXB}$, $\overline{EXZ}$

120 Ω   27 kΩ   27 kΩ   27 kΩ   27 kΩ

R1.0
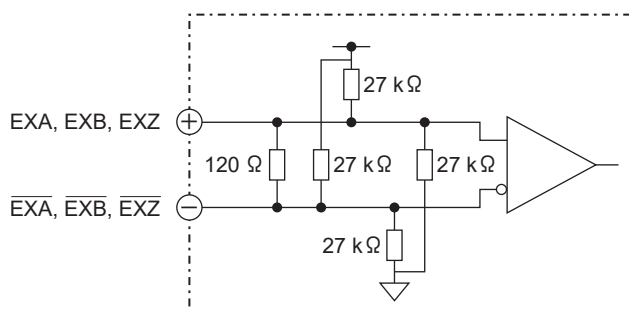
+: 5-, 7-, and 9-pin

-: 6-, 8-, and 10-pin

**Precautions**

- This product supports two types of external scales for serial signals: incremental type and absolute type. Please visit the Panasonic website to check if the external scale of the manufacturer you are using is compatible.

- We recommend a scale ratio of 1/40 ≤ External Scale Ratio ≤ 20480 for external scales.

  Increasing the external scale ratio may increase operating noise.

## 8.7   Encoder Connector X6

Connect the encoder relay cable to the X6 connector.

**Pinout diagram**
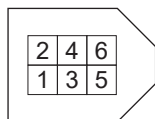


| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| Encoder power supply output | E5V | 1 | Encoder power supply. |
| | E0V | 2 | Connect with the signal ground using the encoder power supply output ground. |
| Absolute encoder battery output ([*1]) | BTP-O | 3 | Use the battery output (positive+) to connect the connector X4 absolute encoder battery output BTP-I. |
| | BTN-O | 4 | Use the battery output (negative-) to connect the connector X4 absolute encoder battery output BTN-I. |
| Encoder signal input/output | PS | 5 | Serial signal |
| | $\overline{PS}$ | 6 | Sending and receiving |
| Frame ground | FG | Shell | Connected to the earth terminal inside the servo driver. |

*1    When directly connecting the battery to the encoder connection cable, do not connect this terminal to anything.

For details on the optional encoder relay cable and connector, see Operating Instructions (MINAS A7B Series) "12.4 Optional Parts" .

R1.0

## 8.8   Analog Monitor Connector X7

The connector X7 of the front panel is for monitor output.

The monitor output has two systems of analog output signals for monitoring.

Output signals can be switched by parameter settings.
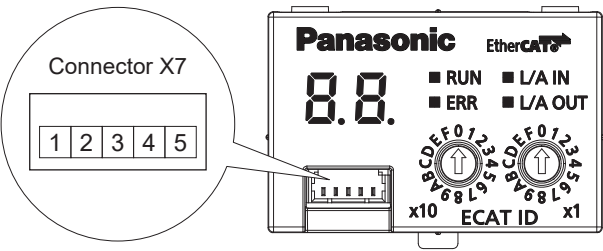


| Name | Symbol | Connector pin no. | Description |
|---|---|---|---|
| Analog monitor output 1 | AM1 | 1 | Outputs analog signals for the monitor. Parameter settings alter the meaning of output signals. |
| Analog monitor output 2 | AM2 | 2 | |
| Signal ground | GND | 3 | Connected to the signal ground. |
| NC | — | 4 | Do not connect. |
| NC | — | 5 | Do not connect. |

**Signal interface**
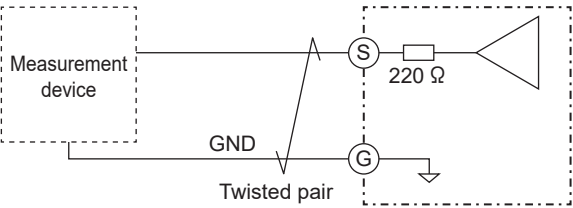


S: 1- and 2-pin

G: 3-pin

● Output signal amplitude is ±10 V.

# 9   Wiring and System Configuration

## 9.1   Wires and Maximum Cable Length

| Name | Symbol | Maximum Cable Length (*1) | Wires Used |
|---|---|---|---|
| Main power supply input | L1, L2, L3 | – | See *"13 Model Specifications"* . |
| Control power supply input | L1C, L2C | – | |
| Motor output | U, V, W, ⏚ | 20 m | |
| Earth cable | ⏚ | – | |
| Encoder connection | X6 | 10 m | Shielded twisted-pair wire |
| External scale connection (*3) | X5 | 20 m | 0.18 mm² or larger cross-sectional area of core wire |
| Parallel I/O connection | X4 | 3 m | |
| Safety connection (*3) | X3 | 3 m | 0.18 mm² or larger cross-sectional area of core wire |
| EtherCAT connection | X2 | 100 m (*2) | TIA/EIA-568 CAT5e STP |

*1   The above wiring lengths are the maximum lengths used in Panasonic's evaluation environment, and do not guarantee operation in customers' operating environments.

*2   For details, see *"9.3.5 Wiring to Connector X2"* .

*3   Compatible with both the multi-function type and application specialized type. For supported functions by driver type, see Operating Instructions (MINAS A7B Series) "2.1.4.5 Supported Functions (by driver type)" .

## 9.2   Cable-side connectors

| Connector symbol | Product Name | Product number | Manufacturer |
|---|---|---|---|
| X3 | Connector | 2013595-1 | Tyco Electronics Japan G.K. |
| X4 | Solder plug (soldered type) | DF02P026F22A1 | Japan Aviation Electronics Industry, Ltd. |
| | Plug hood | DF02D026B22 | |
| X5 | Connector | MUF-PK10K-X | J.S.T. Mfg. Co., Ltd. |
| X6 | Receptacle | 3E206-0100 KV | 3M Japan |
| | Shell kit | 3E306-3200-008 | |
| X7 | Connector | 51021-0500 | Molex Japan LLC |
| | Terminal | 50058-8020 | |

*   Use the connectors above or an equivalent.

## 9.3    Precautions for Wiring

### 9.3.1    Wiring to Power Connectors and Terminal Blocks

#### 9.3.1.1    Sizes A, B (100 V/200 V)
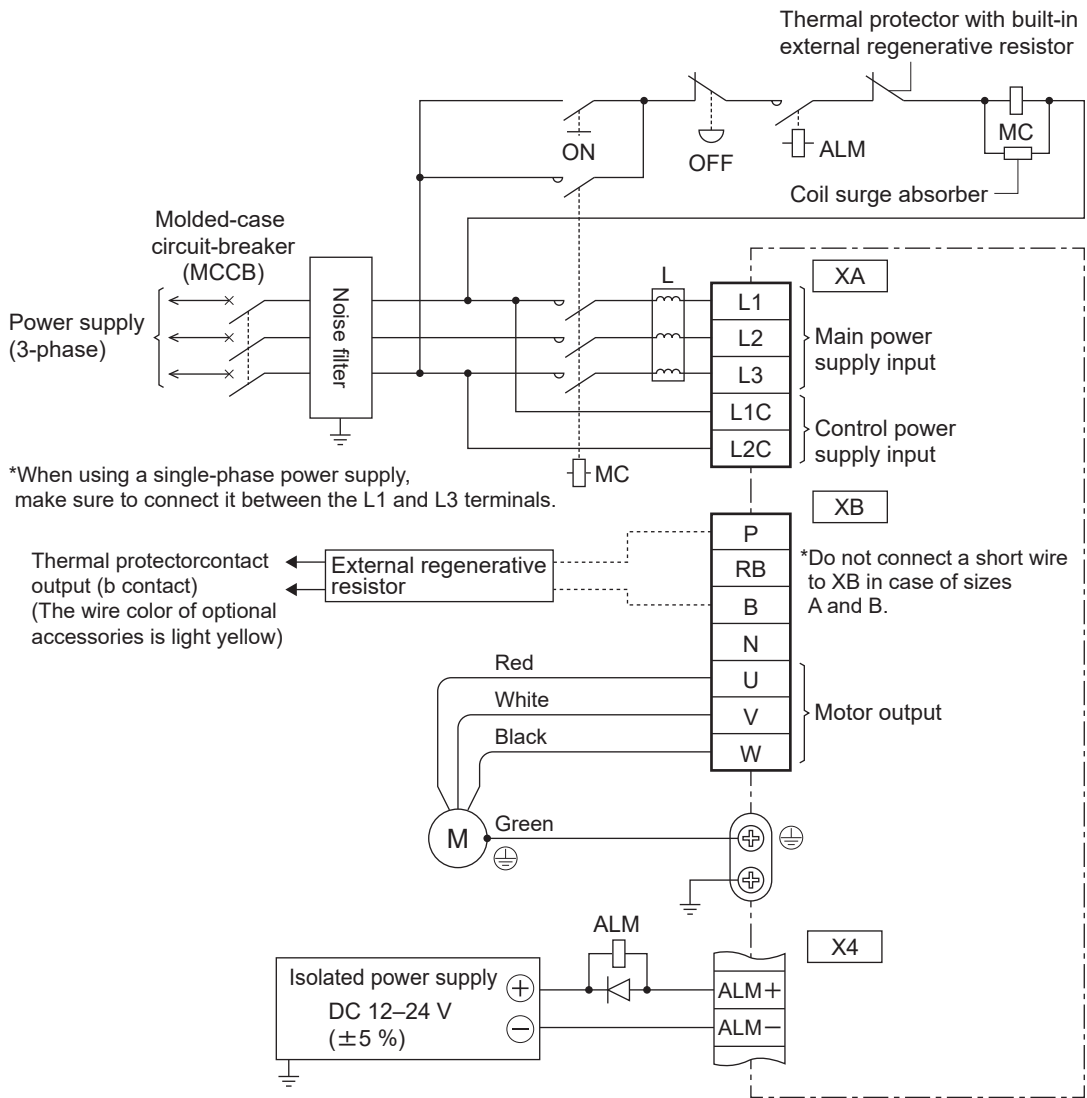


Regenerative resistor connection

| Size | Short wire (accessory) | Built-in regenerative resistor | Connection of connector XB | |
|---|---|---|---|---|
| | | | When using an external regenerative resistor | When not using an external regenerative resistor |
| Size A Size B | None | None | Between P and B: Connect the external regenerative resistor. | Between P and B: Keep open. |

* Connectors X1–X7 are secondary-side circuits (Refer to *"6 Part Names"* ).

  The primary-side power supply (power supply for the motor brake) must be isolated.

  Do not connect it to the same power supply.

* Refer to *"8.1.1 Sizes A, B (100 V/200 V)"* for details.

### 9.3.1.2 Sizes C, D (100 V/200 V)



Regenerative resistor connection

| Size | Short wire (accessory) | Built-in regenerative resistor | Connection of connector XB | |
|---|---|---|---|---|
| | | | When using an external regenerative resistor | When not using an external regenerative resistor |
| Size C Size D | Provided | Provided | Between the RB and B: Disconnect the short wire. Between P and B: Connect the external regenerative resistor. | Between RB and B: Short circuit with the short wire. |

*   Connectors X1–X7 are secondary-side circuits (Refer to *"6 Part Names"* ).

    The primary-side power supply (power supply for the motor brake) must be isolated.

    Do not connect it to the same power supply.

*   Refer to *"8.1.2 Sizes C, D (100 V/200 V)"* for details.

### 9.3.1.3  Precautions

1   When the servo driver uses a single-phase power supply for sizes A–D, connect the servo driver to main power supply input terminals L1 and L3. Do not connect anything to the terminal L2.

2   Insert the connector securely until it is locked.

3   Apply the power supply of the voltage indicated on the nameplate.

4   Do not reverse-connect the power supply input terminals (L1, L2, and L3) and the motor output terminals (U, V, and W).

5   Do not connect the motor output terminals (U, V, and W) to ground or short circuit them.

6   Power connectors XA and XB are supplied with high voltage, so do not touch them while the charge lamp is lit. There is a danger of electric shock.

7   The short-circuit current of the power supply used should be capable of not more than 5,000 Arms symmetrical amperes, below the maximum input voltage of the product.

   If the short-circuit current of the power supply exceeds this, limit the short-circuit current by using a current-limiting device (such as a current-limiting fuse, current-limiting breaker, transformer).

8   Unlike an induction motor, an AC servo motor cannot change the rotation direction by exchanging three phases. Make sure to match the motor output terminals (U, V, and W) of the servo driver with the colors (pin number for cannon plugs) of the motor output cables.

9   Make sure to connect the earth terminal of the motor to the earth terminal of the servo driver and ground it together with the earth terminal of the noise filter. Also ground the machine body. Use a D model ground (grounding resistance: 100 Ω or less). Tighten the servo driver's ground screw with the appropriate torque specified for each size.

   Use an earth cable with a wire diameter equal to or larger than the wire diameter specified in "Model Specifications".

   Also, avoid direct contact between aluminum and copper to avoid the effects of electrolytic corrosion.

10  Insert surge absorbing circuits for preventing noise to electromagnetic contactors placed around the servo driver, to coils between relay contact points, and to the brake windings of motors with a brake.

11  Install a molded case circuit breaker (MCCB) and make sure to shut off the power supply from outside the servo driver in case of an emergency.

   When using a residual current device, use one with countermeasures for high frequencies.

12  Install a noise filter to reduce terminal noise voltage.

13  The power supply for the brake of motors with a brake must be supplied by the customer.

14  Ensure that voltage is applied to the power supply only after wiring has been completed.

15  External regenerative resistor

   ● Sizes A and B do not have built-in regenerative resistors.

   ● Sizes C and D have built-in regenerative resistors which are activated by shorting between RB and B.

   ● If tripping occurs due to a regenerative overload protection error (Err18.0), an external regenerative resistor must be installed. For external regenerative resistors, remove the short wire or short bar between RB and B and connect it between P and B. In addition, parameters must be used for regenerative resistor settings.

   For details, refer to "Technical Reference - Basic Function Specifications".

## Optional Parts

The following resistors are recommended for use as external regenerative resistors.

| Product name | Optional product number | Manu-facturer (*3) format | Specifications | | | | | Internal thermal protector operating temperature |
|---|---|---|---|---|---|---|---|---|
| | | | Resist-ance value | Core cable outer diameter | Mass | Rated power (reference value) (*1) | | |
| | | | | | | Free air | Fan used (*2) | |
| | | | Ω | mm | kg | W | W | |
| External regenerative resistor | DV0P4280 | RF70M | 50 | φ1.27 (AWG18) Stranded wire | 0.1 | 10 | 25 | 140 ± 5 °C B contact Switching capacity (resistance load) 1 A 125 V AC 6000 times 0.5 A 250 V AC 10000 times |
| | DV0P4281 | RF70M | 100 | | 0.1 | 10 | 25 | |
| | DV0P4282 | RF180B | 25 | | 0.4 | 17 | 50 | |
| | DV0P4283 | RF180B | 50 | | 0.2 | 17 | 50 | |
| | DV0P4284 | RF240 | 30 | | 0.5 | 40 | 100 | |

*1   Power available without running the built-in thermal protector

Each regenerative resistor has a built-in thermal fuse and thermal protector for safety.

When using a thermal protector, configure the circuit to turn off the power supply (Refer to *"9 Wiring and System Configuration"* ).

The built-in thermal fuse may break due to heat dissipation conditions, operating temperature range, power supply voltage, or load fluctuation.

When operating in conditions where the regenerative resistor is likely to generate heat (e.g., when the power supply voltage is high, when load inertia is large, or when deceleration times are short), incorporate it into the device to ensure that the surface temperature of the regenerative resistor remains at less than 100°C and confirm the operation thereof.

*2   If the fan is used for wind speeds of at least 1 m/s

*3   Manufacturer: Iwaki Musen Kenkyusho

Driver and external regenerative resistor combinations are shown below.

| Driver part no. | Driver voltage specifications | Regenerative resistor |
|---|---|---|
| | | Optional product number |
| MADN061□□ | Single phase 100 V | DV0P4280 |
| MADN081□□ | | |
| MBDN121□□ | | DV0P4283 |
| MCDN201□□ | | DV0P4282 |
| MADN065□□ | Single phase/3-phase 200 V | DV0P4281 |
| MADN085□□ | | DV0P4283 |
| MBDN125□□ | | |
| MCDN205□□ | | |
| MDDN405□□ | | DV0P4284 |

### DV0P4280, DV0P4281



70 W 50 Ω

[Unit: mm]
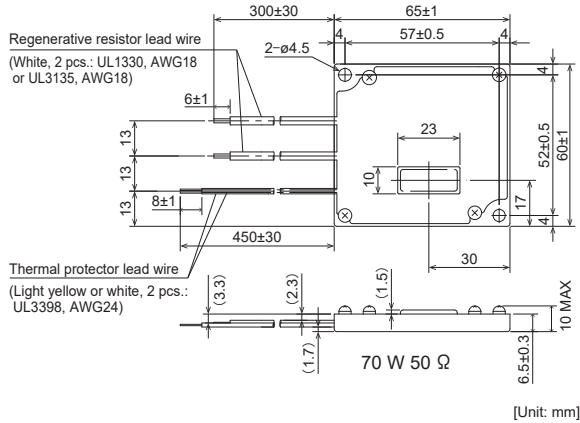
### DV0P4282, DV0P4283



180 W 25 Ω

[Unit: mm]

### DV0P4284



[Unit: mm]
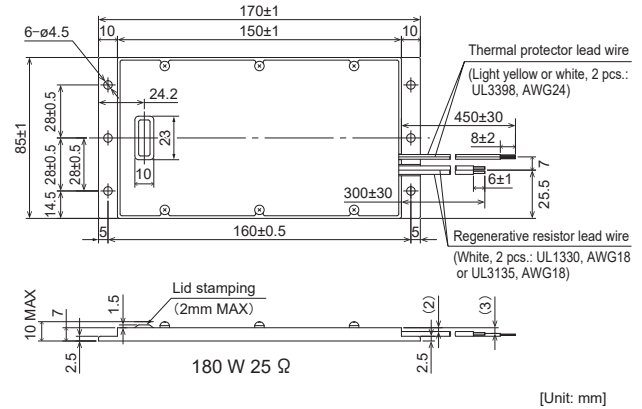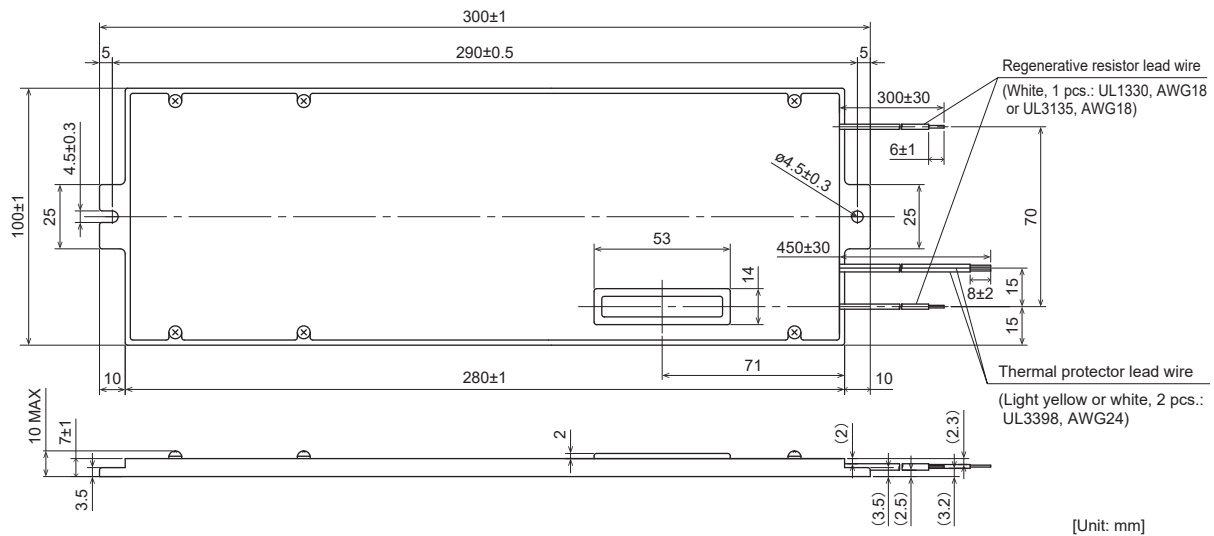
**Precautions**

- ● Regenerative resistors can become hot.

  - • Structure circuits such that the thermal protector in the regenerative resistor works by cutting off the power supply.

  - • The thermal protectors recover automatically. Create an external self-holding circuit to prevent unsafe conditions if the thermal protector activates suddenly.

  - • When drivers malfunction, the outer surface of the regenerative resistor may reach temperatures higher than operating temperatures before the thermal protector activates.

  - • The thermal fuses in regenerative resistors are intended to prevent combustion of regenerative resistors when drivers malfunction, and not for control of resistor surface temperatures.

- ● Install the regenerative resistor to nonflammable materials such as metal.

- ● Install the regenerative resistor so that it cannot be touched directly, such as by covering it with non-combustible material.

- ● Sections that can be touched directly should be kept to less than 70°C.

- ● Do not install regenerative resistors near flammable materials.

### 9.3.1.4  How to Wire to the Power Connector

Follow the procedures below to wire the power supply and motor to connectors XA and XB.

**Procedure**

*1.* Strip the wires for use.



10 mm (Sizes A to D)
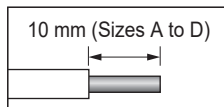
**Precautions**

● Be careful not to damage or cut the core wire when stripping the wire.

For single wires, refer to the dimensions in the figure above.

For stranded wires, be sure to use terminals. Examples given for reference below.

**(Example) AI Series terminals with insulating sleeves made by Phoenix Contact**



(1) A＞B          A          B

(2)

1 mm or more

(3)
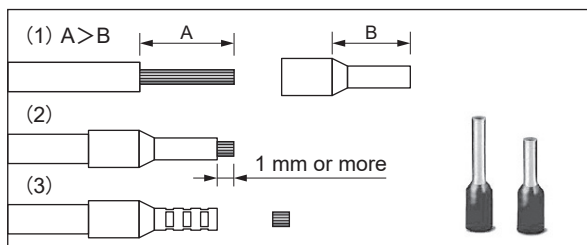
1   Peel off the sheath so that the conductor portion of the wire protrudes from the tip of the terminal (It should protrude 1 mm or more from the terminal.).

2   Insert the wire into the terminal and crimp it with an appropriate crimping tool.

   Part No. of the crimping tool: CRIMPFOX U-D66 (1204436) made by Phoenix Contact

3   After crimping, cut off the wire conductor portion protruding from the terminal (The allowable protruding length after cutting should be 0 to 0.5 mm.).

**(Example) VTUB Series vinyl-insulated terminal made by J.S.T. Mfg. Co., Ltd.**



(1) A≧B   A≦B+C
         A          B   C

(2)
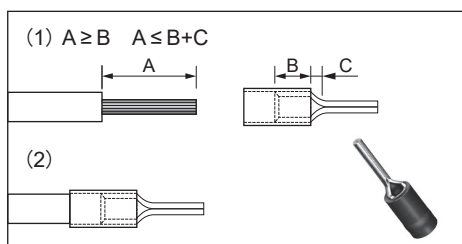
1   Peel off the sheath of the wire conductor portion to the length equal to that of the sheath on the terminal.

2   Insert the wire into the terminal and crimp it with an appropriate crimping tool.

   Part No. of the crimping tool: YNT-1614 made by J.S.T. Mfg. Co., Ltd.

● When peeling off the sheath of the wire, take care not to damage other portions.

● If the conductors of the wire stick out from the insulation cover or protrude excessively from the tip of the terminal, accidents such as electric shocks or fires caused by short circuits may result. When crimping the terminal, carefully check the status of the terminal and wire.

The specifications for adaptive wires for connectors and recommended terminals are shown below.

|  |  | Sizes A to C (100 V/200 V) | Size D (200 V) |
|---|---|---|---|
| Compatible wires | Conductor size | AWG18 to 14 | |
|  | Sheath outline | Φ2.1 to 3.8 mm | |
| Recommended terminals | Conductor size | AWG18 | |
|  | Terminal model number | AI0.75-8GY (Phoenix Contact ) | |

**2.** Insert the wire into the connector.

**Connector external appearance**



**Insertion procedure**

（1）Mount the opening tool　　（2）Operate the opening tool



When the spring is open　　When the spring is closed
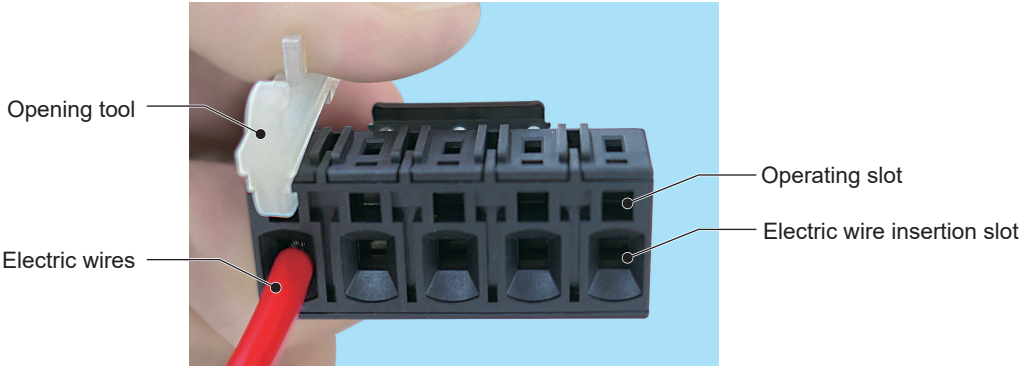
（3）Insert the electric wire　　（4）Lock the electric wire
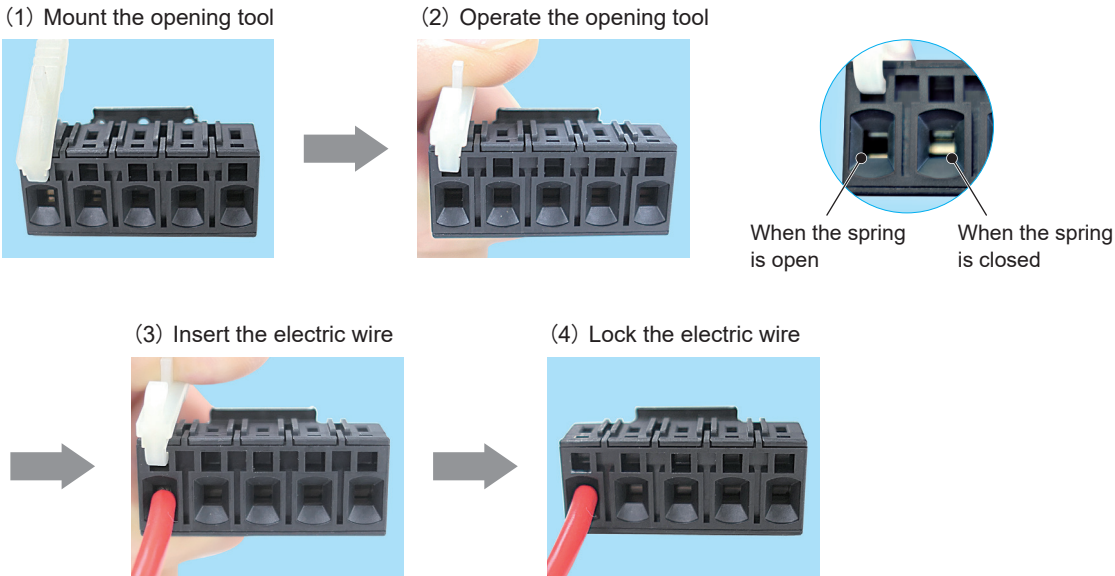


1　Insert the opening tool through the operating slot and attach it to the connector.

2　Push the opening tool down to open the spring.

　*The wire can be removed by pressing down on the spring in the same manner as the insertion operation.

3　While holding the opening tool down, insert the wire straight into the wire insertion hole.

　*Make sure that the entire strand section that has been peeled is inserted into the spring opening.

4　Release the opening tool and lock the wire. Gently pull on the wires to make sure they are securely connected. Make sure that the wire coating is not pinched by the spring. Remove the opening tool once the wiring has been completed.

**Precautions**

● Remove the connector from the driver before making the connection.

- Insert only one wire into each wire insertion hole of the connector.
- Keep the opening tool for the next time you may need to use it.
- Since the strip length of the wire depends on the type of wire, decide the optimum strip length according to the processing condition.

### 9.3.2　Wiring to Connector X4

1　The customer is required to prepare provide a DC 12 - 24 V control signal power supply for external control to be connected to SI-COM.

It must be isolated from the primary power supply (motor brake power supply).

Do not connect to the same power supply.

2　Install peripheral devices as close to the servo driver as possible to minimize the wiring length (within 3 m).

3　Keep the cables as far away from the wiring of the power lines (L1, L2, L3, L1C, L2C, U, V, W, ⏚) as possible (at least 30 cm). Do not pass the wires through the same duct or bundle them together.

#### 9.3.2.1　Control Input
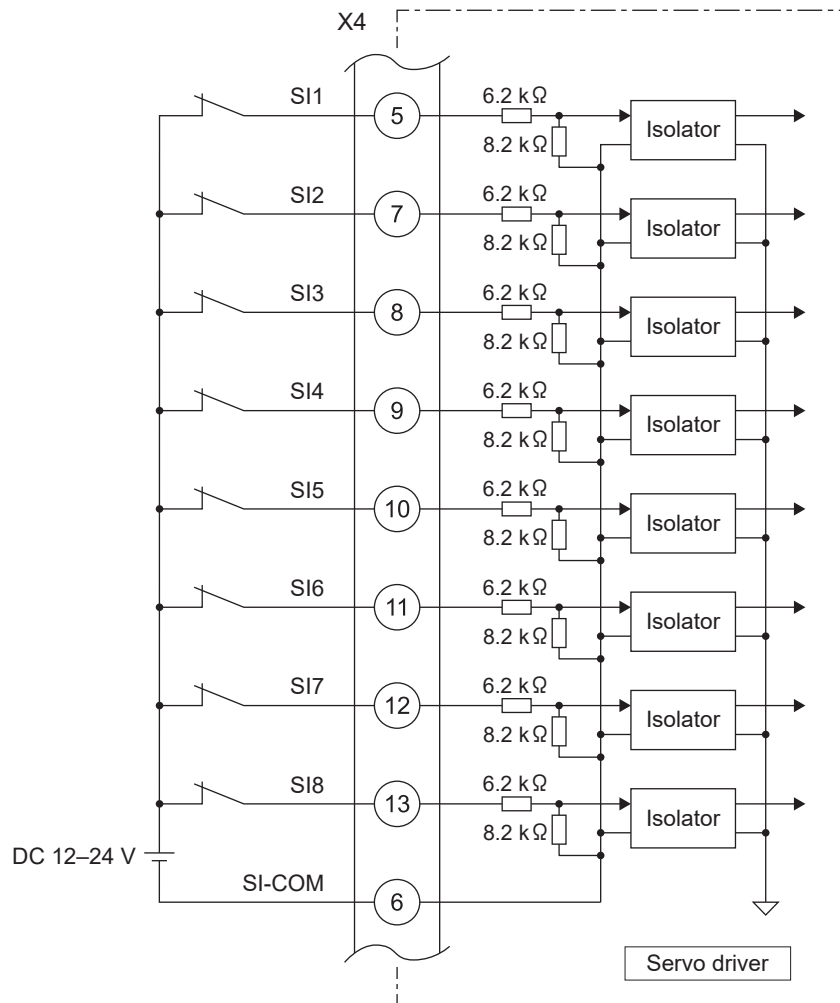


The functions of SI1 to SI8 are assigned using parameters.

For details, refer to "Technical Reference - Basic Function Specifications".

### 9.3.2.2　Control output

1　Be aware of the polarity of the power supply for control signals. Polarity connections contrary to the figure shown above can damage the servo driver.

2　If the relay is to be driven directly by the output signal, install a diode in parallel with the relay in the direction shown below. Failure to install a diode or installing it in the opposite direction will damage the servo driver.

3　When each output signal is received by a logic circuit such as a gate, ensure that it is not affected by noise.

4　The current to be passed through each output must not exceed a rated current of 40 mA, a maximum current of 50 mA, or an inrush current of 90 mA.

5　The output circuit is equipped with a limiting resistor (10 $\Omega$).

Also, because the output transistor is a Darlington connection, voltage $V_{CE}$ (SAT) is approx. 1 V between the collector and emitter when the transistor is ON, meaning that direct connections are not possible due to the fact that $V_{IL}$ cannot be satisfied with a normal TTL IC.
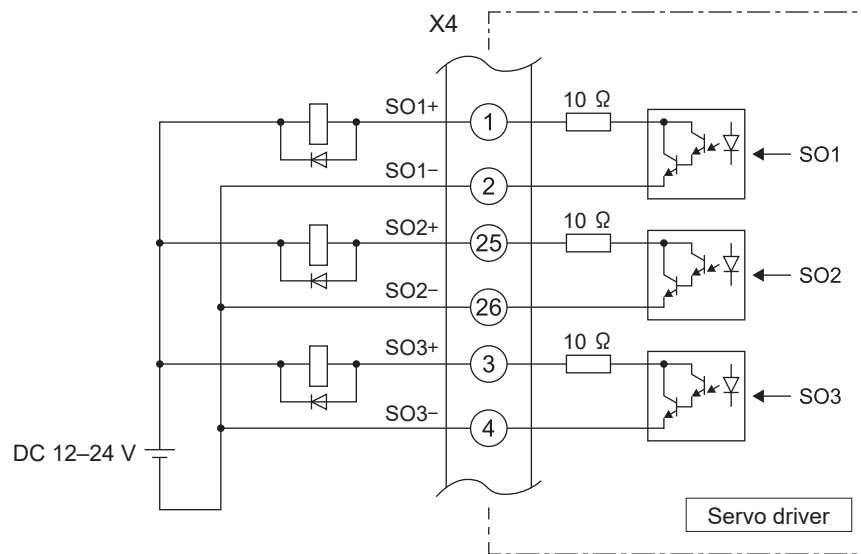


The functions of SO1 to SO3 are assigned using parameters.

For details, refer to "Technical Reference - Functional Specification".

## 9.3.2.3  Encoder output signal/position compare signal output
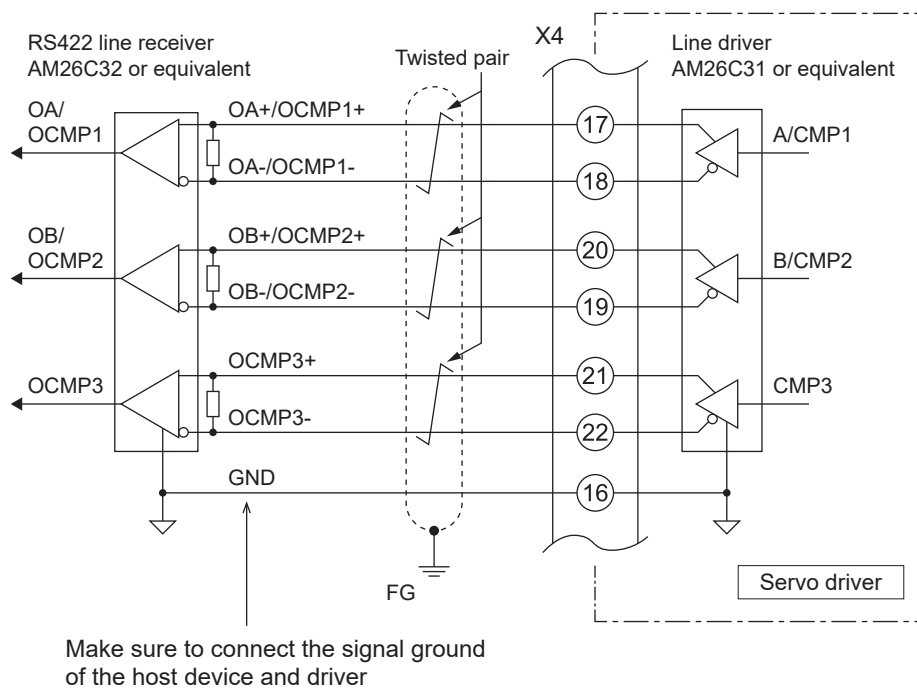


1   Use an RS422 line receiver (AM26C32 or equivalent) to receive output pulses. Ensure that an appropriate terminating resistor (approx. 330 Ω) is installed between the line receiver inputs.

2   Use at a maximum output frequency of 4 Mpps (after being multiplied by 4) or less.

R1.0

### 9.3.3   Wiring to Connector X5

● Wire the signals from the external scale to the X5 connector of the external scale.

● The core wire used to connect to the external scale cable should be a stranded wire of 0.18 mm$^2$ or more. Use a shielded twisted-pair wire.

● Keep cable lengths within 20 m. If using a long cable lengths, double wiring (with the wires connected in parallel) is recommended for the cable connecting to the external scale in order to slightly reduce the impact of voltage drops on the 5 V power supply.

● Make sure to connect the jacket of the external scale side cable shield to the shell (FG) of the driver connector X5.

  Note that the relay cable shield and the shell (FG) of connector X5 are connected via connecting the shell of the external scale-side cable connector plug CN1 and the external scale-side cable shield.

**When there is no relay cable**
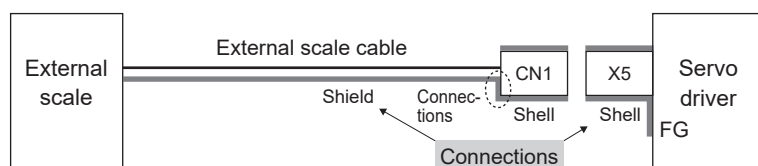


  \*   The connector X5 shell is connected to the servo driver FG.

● Connect the relay cable shield to the external scale-side cable shield when using a relay cable for the external scale connection. Also make sure to connect the relay cable shield to the shell (FG) of the connector X5 on the driver-side too.

  Note that the relay cable shield and the shell (FG) of connector X5 are connected via connecting the shell of the relay cable connector plug CN3 and the relay cable shield.

**When there is a relay cable**
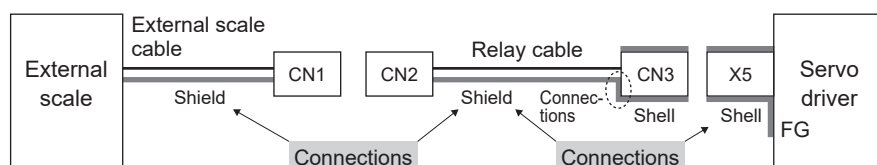


  \*   The connector X5 shell is connected to the servo driver FG.

● Keep as much distance from the main circuit (L1, L2, L3, L1C, L2C, U, V, W ⏚) wiring as possible (at least 30 cm). Do not pass the wires through the same duct or bundle them together.

● Do not connect anything to the vacant pins of the X5 connector.

● If the external scale is powered by an external power supply, the EX5V pin should be open to prevent external voltage from being supplied to this pin. Connect the external power supply of 0 V (GND) to EX0V (connector X5: 2-pin) of the driver to eliminate potential difference.

**Wiring Example**

The wiring diagram of the X5 connector is shown below.
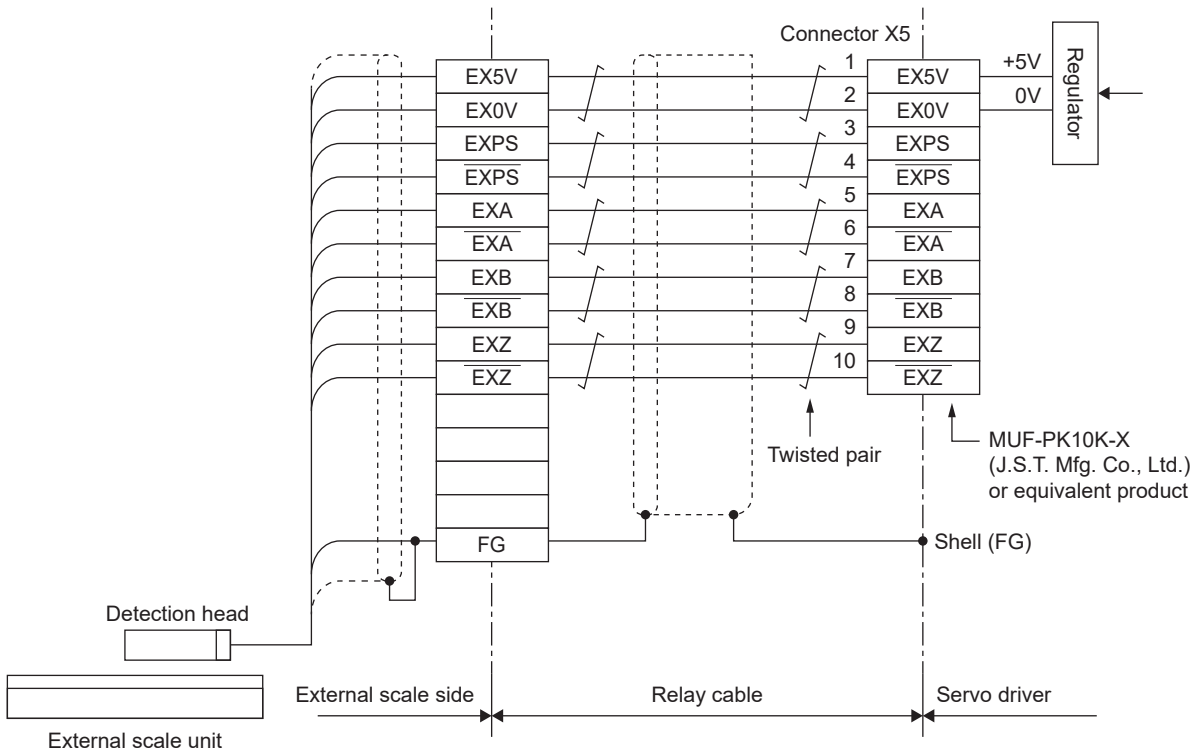
### 9.3.4  Wiring to Connector X6
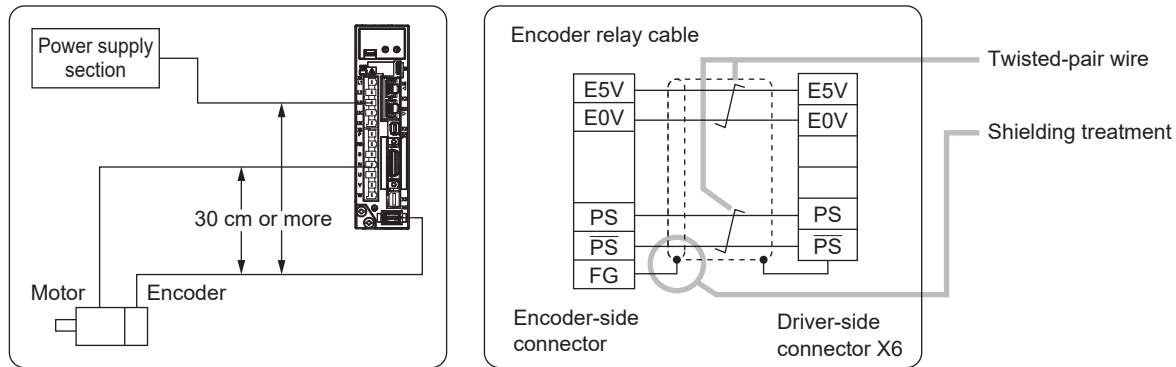


- Maintain at least a 30 cm distance from the main circuit wiring (L1, L2, L3, L1C, L2C, U, V, W,⏚). Do not pass the wires through the same duct or bundle them together.

Check the description below if making your own encoder relay cable.

- Refer to the wiring diagram in the figure above for details on the wiring.

- Select cables and wires to ensure that the DC input voltage of the connector on the encoder side is within 5 V ±5 %.

  Reference:

  Use stranded, highly bend-resistant, shielded twisted pair wire with a cross-section area of min. 0.18 mm$^2$ (24 AWG) if the cable length is max. 10 m. Optional accessories are listed in Operating Instructions (MINAS A7B Series) "12.4.4 Encoder Relay Cable" .

- Use twisted-pair wire for the corresponding signal/cable wiring.

- Shield relay cables in the following manner.

  • Driver-side shield jacket

    Connect to connector X6 shell

  • Motor-side shield jacket

    Connect to FG terminal

- Do not connect anything to the empty terminals of each connector.

#### 9.3.4.1   When Using Multi-turn Data (Constructing an Absolute System)

The absolute encoder is an encoder that can back up motor position information when the power supply is off.

A system using an absolute encoder is called an "absolute system". The absolute system eliminates the need for homing operations when the power is on and can be useful for robots and other applications.

For details on how to use absolute encoders, see Operating Instructions (MINAS A7B Series) "7.2.7 Absolute Encoder" .

There are two types of absolute encoder as described below.

● Absolute Encoder (Battery Backup)

● Batteryless absolute encoder

The absolute encoder (battery backup) requires the connection of an absolute encoder battery to back up multi-turn data.

Specifications mainly describes this absolute encoder (battery backup).

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**Lead wire-type motor (for multi-turn data)**

MHMG 50 W and 1000 W (□80)



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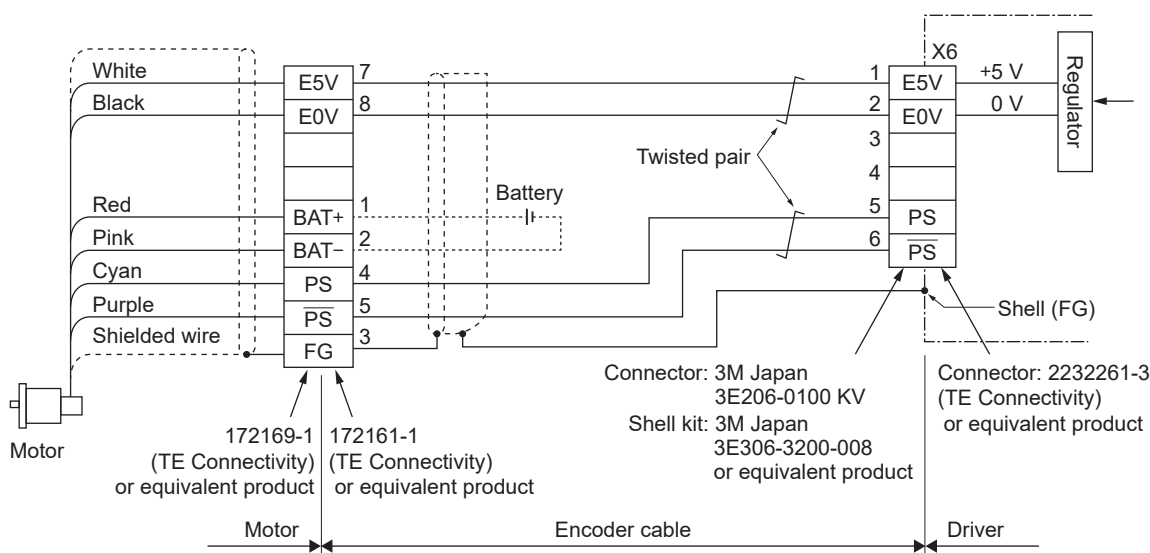
■   **Connecting the absolute encoder battery**

1   Connecting on the motor side using optional accessories (recommended)

● Connect between encoder connectors BAT+ (1-pin) and BAT- (2-pin) on the motor side as shown in *"Lead wire-type motor (for multi-turn data)"* . In practice, a relay cable or other means is used between the battery and the BAT+ and BAT- terminals.

● For the actual connection method, see *"9.3.4.3 Precautions for Absolute Encoder Battery Usage"* .

2   Directly connect to motor side

● Connect a battery directly between encoder connectors BAT+ (1-pin) and BAT- (2-pin) on the motor side as shown in *"Lead wire-type motor (for multi-turn data)"* .

● Batteries and cables must be purchased by the customer. The recommended battery is the Toshiba Lifestyle ER6V 3.6 V. Consult the battery manufacturer for information on the configuration of the battery's peripheral circuit and how to refresh the battery.

3   Connecting on the driver side

- Connect the battery between BTP-I (14-pin) and BTN-I (15-pin) of the X4 connector and to BAT+ (1-pin) and BAT- (2-pin) of the motor via BTP-O (3-pin) and BTN-O (4-pin) of the X6 connector as shown in *"When connecting a battery to X4"* .

- Batteries and cables must be purchased by the customer. The recommended battery is the Toshiba Lifestyle ER6V 3.6 V. Consult the battery manufacturer for information on the configuration of the battery's peripheral circuit and how to refresh the battery.

**When connecting a battery to X4**
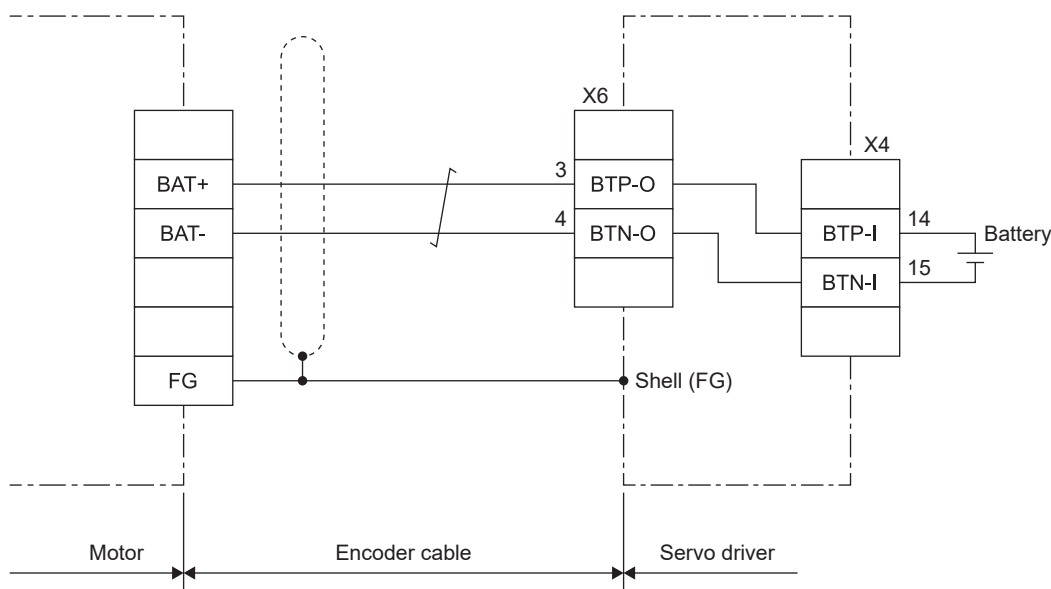


**Precautions**

- When directly connecting the battery to the motor-side encoder connector (connecting "1"), do not connect anything to connector X6 3-pin and 4-pin.

- For battery boxes and battery connection cables, use the optional relay cable or prepare a cable yourself.

**Notes**

- The following is the configuration used for optional accessories. The following information is only provided for reference when implementing connections 2 and 3. Please consult the battery manufacturer for the final configuration.

  • Connect a diode to prevent charging and an electric double layer capacitor to reduce voltage drop against the battery, as shown in *"Protection Circuit"* . Note that with lithium batteries, the voltage may drop temporarily (voltage delay phenomenon) when the battery begins to discharge current. Connect an electric double layer capacitor to reduce this voltage drop. Also, use diodes of a type with low leakage current.

  • As shown in *"Battery Refresh Circuit"* , connect a resistor when refreshing the battery.

  • Do not connect anything to BTP-O (3-pin) or BTN-O (4-pin) of the X6 connector.

R1.0

**Protection Circuit**
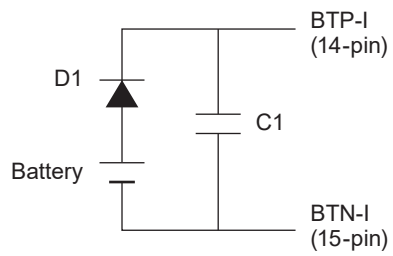


C1 (electric double layer capacitor) : 0.1 µF
D1: Diode (low leakage current)

**Battery Refresh Circuit**
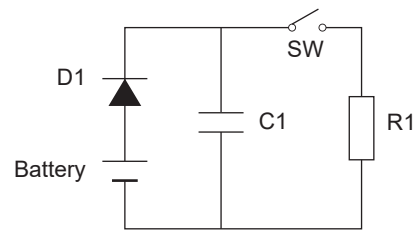


C1 (electric double layer capacitor) : 0.1 µF
D1: Diode (low leakage current)
R1: 220 Ω
SW: Switch (closed during refresh)

### 9.3.4.2   If Not Using Multi-Turn Data

When using as an incremental encoder or single-turn absolute encoder.

| Lead wire-type motor (without multi-turn data) |

When using as an incremental encoder or single-turn absolute encoder.

MHMG 50 W and 1000 W (□80)
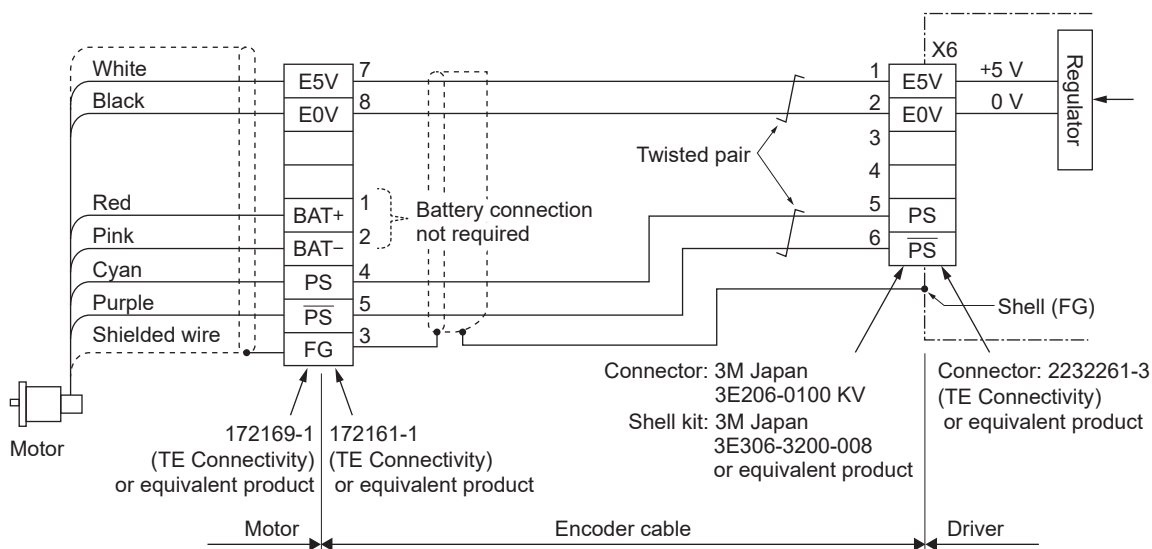
### 9.3.4.3   Precautions for Absolute Encoder Battery Usage

When using the optional battery unit provided by our company, install, replace, and set up (initialize) batteries in an absolute system using an absolute encoder (battery backup) according to the following procedure.

For details of battery product numbers and specifications, see Operating Instructions (MINAS A7B Series) "12.4.9 Battery for Absolute Encoder" .

#### 9.3.4.3.1   How to Install Batteries (How to Install to Encoder Junction Cable)

Follow the procedure below to install batteries.

**Procedure**

*1.* Perform a refresh of the new battery.

CN601
Remove after being connected for 5 minutes.
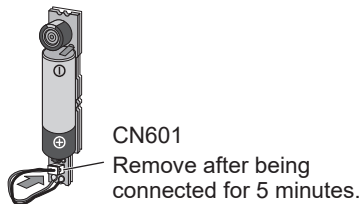
Connect the connector with battery lead wire to CN601 and leave for 5 minutes.
After five minutes, remove the connector from CN601.

*2.* Remove the battery box cover.

Raise the hatch and take off the cover.
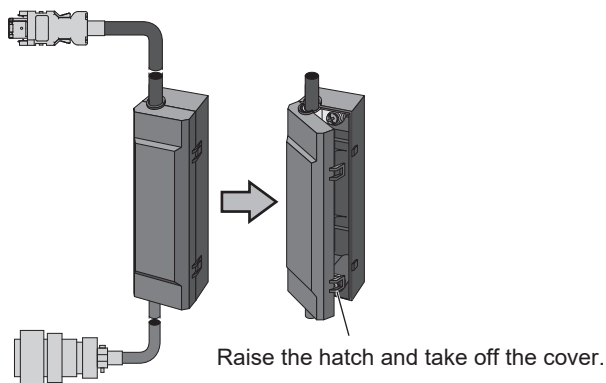
*3.* Install the battery to the battery box.

Rear of battery (board)

Insert the battery so that it faces the back side of the box.

Connect the connector

R1.0
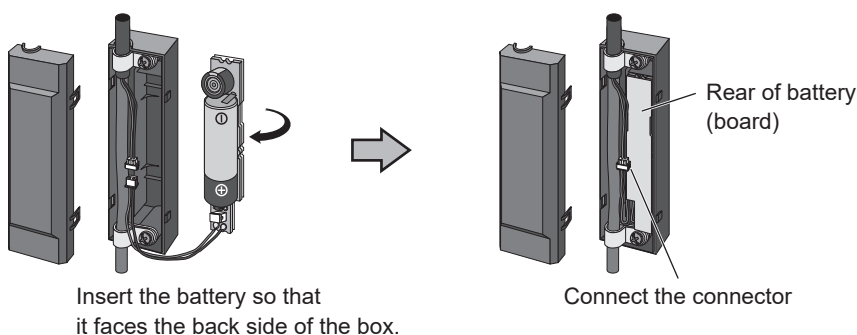
**4.** Close the cover of the battery box.



Close the battery box cover carefully so that the connector cables do not become pinched.
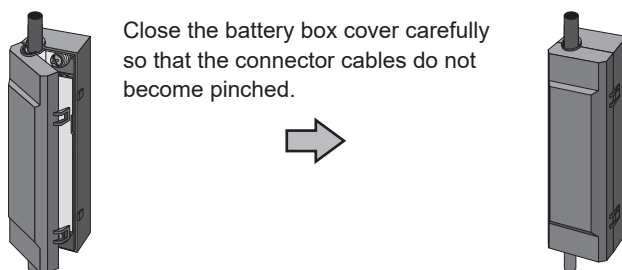
**Precautions**

● Using batteries incorrectly may result in product corrosion due to battery leakage and in damage to the battery. When using batteries, be sure to observe the following.

1   The positive and negative poles of the battery must be correctly oriented and the CN601 connector with lead wires must be correctly connected.

2   Because leaving batteries that have been used for long periods of time or that are no longer usable inside the device may cause problems such as leaks, make sure to replace them promptly. (Replacement is recommended roughly every two years). The electrolyte in the battery is highly corrosive and can corrode peripheral parts. It is also conductive and can cause issues such as short circuits. Therefore, make sure to replace the battery periodically.

3   Do not attempt to disassemble the battery or place it in a fire. Do not attempt to disassemble the battery as it is very dangerous if contents are splashed into your eyes. It may also explode if put into a fire or heated.

4   Do not short-circuit the battery. Do not remove the battery tube. If metal or other such materials come into contact with the positive or negative pole terminals of the battery, a large current flows all at once, which would not only weaken the battery, but also generate severe heat and possibly cause the battery to explode.

5   Do not attempt to charge it. This battery cannot be charged.

---

● Disposal of batteries after replacement is regulated by municipalities in some cases. Please dispose of batteries according to local regulations.
● Applications for shipment as a hazardous material may be required for air shipments (both passenger and cargo aircraft). Consult with the shipping company when requesting air shipments.

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### 9.3.4.3.2   First Installation of the Battery

After installing and connecting the absolute encoder battery to the motor, set up the absolute encoder. For details, see *"9.3.4.3.5 Setup (Initialization) of Absolute Encoder"* .

We recommend turning the control power supply ON/OFF (battery refresh operation) after installing the battery for the absolute encoder. For details on refreshing the battery, see *"9.3.4.3.3 Battery Refresh (Method Using Set-up Support Software (PANATERM ver.7) )"* .

Lithium batteries have a transient minimum voltage (voltage delay phenomenon), which causes a temporary voltage drop when the battery begins to discharge current. A battery error might occur due to this phenomenon if you fail to refresh the battery.

We recommend that the battery be refreshed about once a day after the battery unit is installed.

We also recommend that you refresh the battery even if you have prepared it yourself. Please consult with the battery manufacturer regarding the method of doing so.

"A voltage drop in the battery may be primarily caused by battery life. Battery life may be shortened depending on ambient conditions.

### 9.3.4.3.3  Battery Refresh (Method Using Set-up Support Software (PANATERM ver.7) )

If the battery (battery for absolute encoder) is not discharged continuously, a battery alarm may be triggered. Perform the battery refresh process (forced discharge) to prevent this from happening.

The battery refresh process is required in cases such as the following:

- When replacing with a new battery
- When operating after a period of inactivity

**Procedure**

*1.* Right-click on the motor information area of the device tree and select "Battery Refresh" from the context menu.
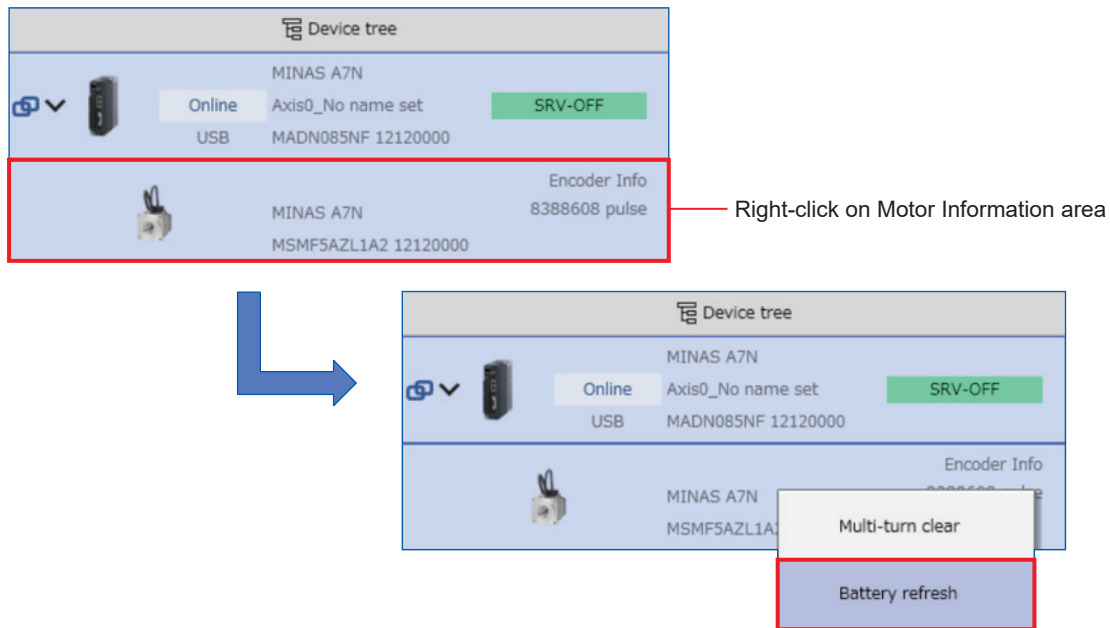


The Battery Refresh dialog box appears.

*2.* Click the "[Execute]" button.
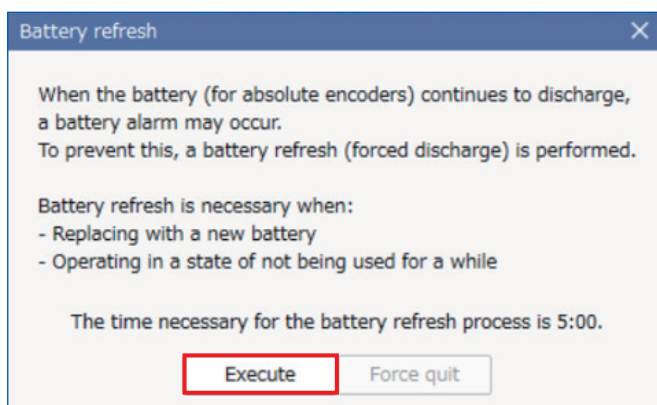


The remaining time for the battery refresh process will start counting down.

**3.** The battery refresh process starts.
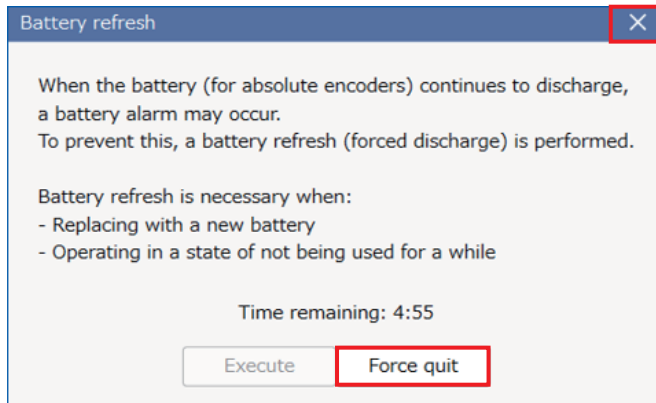


For clicking the [Force Quit] button during the battery refresh process, see"Step 5". For clicking the [×] button, see"Step 6".

**4.** The following screen will appear once the battery refresh process is complete.

Click the [Execute] button to refresh the battery again, or click the [×] button to exit.
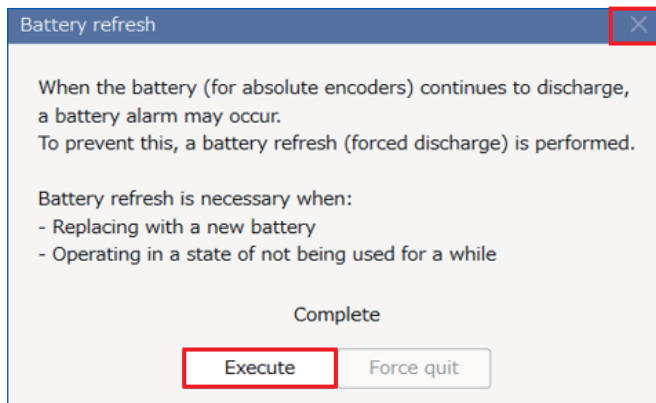


**5.** Clicking the [Force Quit] button during the battery refresh process forcefully terminates the battery refresh process. Click the [Execute] button to refresh the battery again, or click the [×] button to exit.
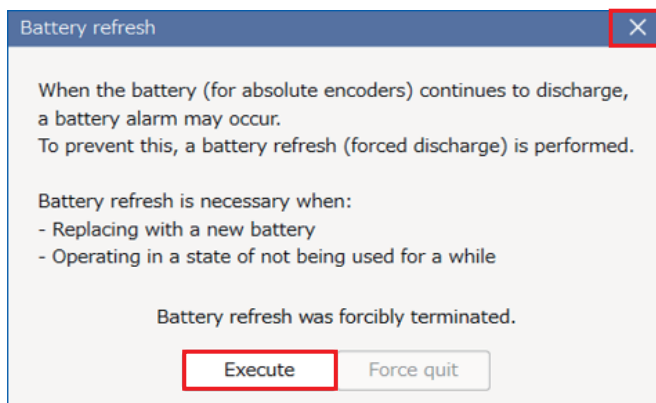
**6.** Clicking the [×] button during battery refresh displays a dialog box.

Clicking the [Yes] button will cancel the battery refresh process and return you to main screen operations.

Clicking the [No] button will return you to main screen operations while the battery refresh process continues.
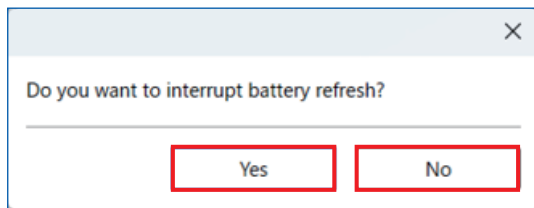


**Precautions**

- The battery refresh process is not available for batteryless or incremental encoders.
- The battery refresh process cannot be used in full-closed control mode.
- Be aware that a battery alarm may be triggered. during the battery refresh process.

### 9.3.4.3.4   Replacement of the Battery

It is necessary to replace the absolute encoder battery if a battery warning occurs.

Replace the battery with the driver control power ON. Data stored in the encoder might be lost if you replace the battery while the control power of the driver is OFF.

After replacing the absolute encoder battery, clear the battery warning. Click the warning clear button on the Set-up Support Software (PANATERM ver.7) monitor display window to clear alarms, or do so via EtherCAT communication.

**Precautions**

- If you clear the absolute encoder rather than the alarm, all error and multi-turn data will be cleared together with the warning.

### 9.3.4.3.5   Setup (Initialization) of Absolute Encoder

Absolute multi-turn data is retained by the absolute encoder battery. When operating the machine for the first time after installing an absolute encoder battery, you must clear the absolution encoder data (multi-turn data) to 0 at the origin by clearing the encoder at the home position. This clearing operation is called "multi-turn data clear".

Multi-turn data is cleared with Set-up Support Software (PANATERM ver.7) or EtherCAT communication. After performing the multi-turn data clearing operation, turn off the control power supply once, and then turn it back on.

For the method and procedure for clearing the multi-turn data using EtherCAT communication, check the host device specifications.

### 9.3.5  Wiring to Connector X2

- Be sure to use shielded twisted pair cables (STP) compatible with CAT5e or higher.

- If both ends of the shield are not grounded, EMC characteristics will degrade.

  When attaching the connector plug to each end of the cables, ensure that the shielded wire of the cable is connected to the metal shell of the plug.

- For lead wire colors and matching connector terminals, follow TIA/EIA-568B (see *"9.3.5.1 X2 IN/X2 OUT Connections"* ).

  The two pairs of pins 1-2 and 3-6 are for signal wire. Make sure you also wire connectors for the two unused 4-5 and 7-8 pin pairs.

- Communication cable length should meet both of the below conditions for use.

  - Length of each node: Max. 100 m

- Cable specifications such as bending characteristics, temperature ranges, and covering materials will vary by manufacturer.

  Select a cable that meets the usage conditions at your company.

  Also select a movable cable that meets the usage conditions at your company.

#### 9.3.5.1  X2 IN/X2 OUT Connections



RJ45 plug pin
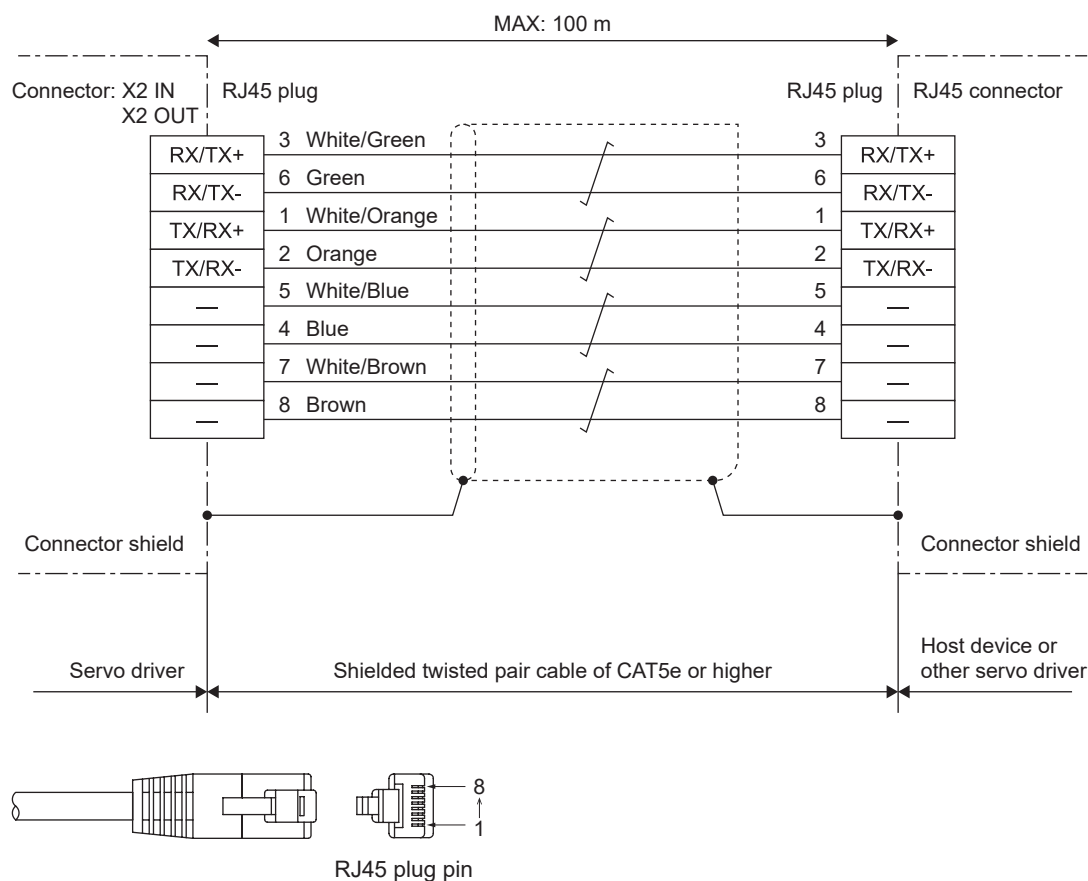
## 9.4  Dynamic Brake

Servo drivers (sizes A–D) feature a built-in dynamic brake for emergency stopping.

The dynamic brake can be activated when the:

1    main power supply is off;

2    servo is off;

3    protection function is activated;

4    over-travel inhibit inputs (POT, NOT) of connector X4 are operated.

Under conditions (1) to (4) above, dynamic brake operation or free running can be selected using parameters during deceleration or after stopping.

However, when the control power supply input is off, the dynamic brake continues operating for servo driver sizes A–D.


Because the dynamic brake is only designed to be used for short time periods for emergency stopping, please adhere to the following.

1    Do not start or stop the device by turning the servo-on signal (SRV-ON) on or off.

This may damage the dynamic braking circuit incorporated into the servo drive.

2    Do not run the motor using an external power source.

If the motor is run externally, it will start acting as an electricity generator. This may cause it to short-circuit during operation of the dynamic brake, resulting in smoke or fire.

Doing so may also cause the dynamic brake to become disconnected, preventing it from functioning.

3    If the dynamic brake is applied when the device is operating at a high speed, allow a stop time of approximately 10 minutes.

Failure to do so may cause the dynamic brake to disconnect or the brake to no longer be operable.

## 9.5　Mounting Orientation and Intervals

1　The servo driver is a vertically mounted type. Ensure that it is mounted vertically.

2　Servo driver sizes A–D come standard as base-mounted types (rear-mounted).

3　If changing the mounting surface of servo driver sizes A–D, use a separately sold mounting bracket. During installation, use the mounting screws provided with the product and the following tightening torque.

●　1.0 to 1.35 N·m

For optional mounting brackets, see Operating Instructions (MINAS A7B Series) "12.4.10 Mounting Bracket" .

4　Select a tightening torque for the mounting screws used to secure your product by considering screw strength and the material to which it will be mounted.

Example: Mounting to steel with steel screws

Sizes A–D: M5 2.7–3.3 N·m

5　To ensure effective cooling, ensure surrounding space for airflow.

6　Install a fan to achieve a uniform temperature within the control panel.

7　Size D frames are equipped with a cooling fan on the bottom.

8　Observe the environmental conditions for the control panel as described in *"10.2.1 Installation Environment"* .

9　The servo driver must be secured to a grounded conductive frame.

10　If the areas where the servo driver and fan are to be mounted are painted, removing the paint before installation may help to prevent noise.

11　If using custom brackets, the bracket surface must have a conductive plating.

12　Measure the ambient temperature of the servo driver at a location that is 50 mm from the side or bottom of the servo driver.

If measuring from a distance of 50 mm is not possible, instead measure at the midpoint of the gap between the obstacle preventing measurement and the servo driver.
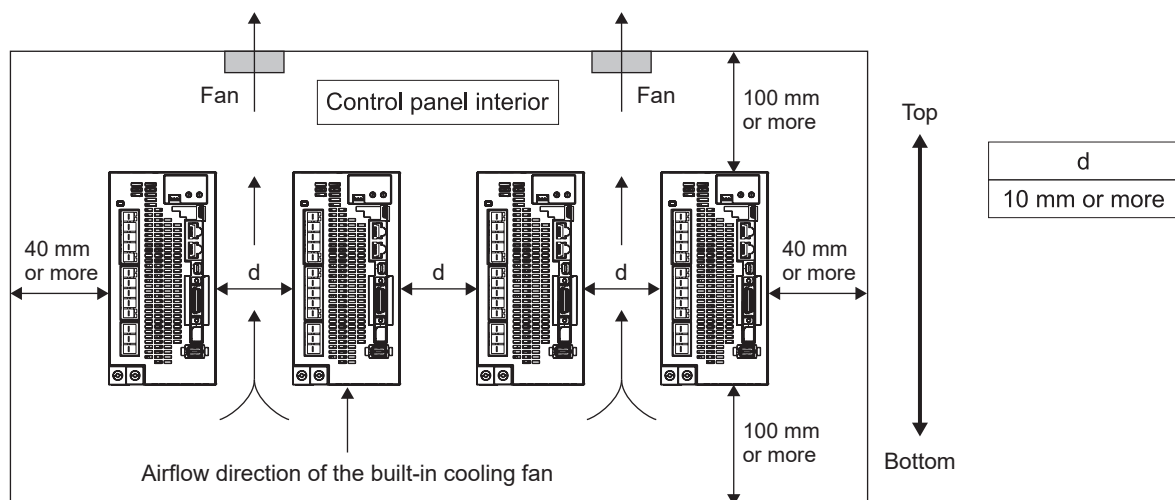


Can be used derated when mounting interval d is 1–10 mm. Refer to *"Derated Specifications"* for details on derating.

# 10   Compliance with International Standards

## 10.1   Conforming Standards

### 10.1.1   List of Conforming Standards

A list of conforming standards is shown below.



Multi-function type
Application specialized type

Standard type

**Servo Driver Conforming Standards**

| Conforming Standard Name | | Servo Driver |
| --- | --- | --- |
| EU/UK Standards | EMC | EN 55011 (Group1, Class A)<br>EN 61000-6-2<br>EN 61000-6-4<br>EN 61800-3 (CategoryC2, Second environment) |
| | Low Voltage | EN 61800-5-1 |
| | Machinery<br>(Functional Safety) | EN ISO 13849-1:2015<br>EN 61508<br>EN IEC 62061<br>EN 61800-5-2<br>EN 61326-3-1<br>IEC 60204-1 |
| UL Standards | | UL 61800-5-1 (File No. E164620) |
| CSA Standards | | C22.2 No. 274 |
| Radio Waves Act (South Korea) (KC) | | KN 11<br>KN 61000-4-2, 3, 4, 5, 6, 8, 11 |

### Safety Parameters

| Parameters | With SSU diagnostic | With EDM diagnostic | With neither EDM nor SSU diagnostic |
|---|---|---|---|
| Safety integrity level | EN 61508 (SIL3)<br>EN IEC 62061 (maximum SIL 3) | EN 61508 (SIL3)<br>EN IEC 62061 (maximum SIL 3) | EN 61508 (SIL2)<br>EN IEC 62061 (maximum SIL 2) |
| Performance level | EN ISO 13849-1:2015<br>Category 3 PL e | EN ISO 13849-1:2015<br>Category 3 PL e | EN ISO 13849-1:2015<br>Category 3 PL d |
| Safety function | EN 61800-5-2 (SIL 3, STO) | EN 61800-5-2 (SIL 3, STO) | EN 61800-5-2 (SIL 2, STO) |
| Probability of dangerous failure per unit of time | $PFH=0.88 \times 10^{-8}$ [1/h]<br>(% SIL3=8.8 %) | $PFH=0.88 \times 10^{-8}$ [1/h]<br>(% SIL3=8.8 %) | $PFH=0.91 \times 10^{-8}$ [1/h]<br>(% SIL2=0.91 %) |
| Average time to dangerous failure | MTTFd: High (100 years) | MTTFd: High (100 years) | MTTFd: High (100 years) |
| Average self-diagnosis coverage | DC: Medium 94.6 [%] | DC: Medium 94.6 [%] | DC: Low 68.1 [%] |
| Mission time | 15 years | 15 years | 15 years |
| Stop category | IEC 60204-1 (stop category 0) | IEC 60204-1 (stop category 0) | IEC 60204-1 (stop category 0) |

For details about diagnostics via SSU and EDM, see Operating Instructions (MINAS A7B Series) "9.1.4 STO Function Diagnostics" .

When exporting, follow the statutory provisions of the destination country.

**Precautions**

● The standard type does not support the functional safety standards.

● This product is not subject to China Compulsory Certification (CCC).

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### 10.1.2　EU Directives and UK Regulations

Panasonic complies with the low voltage regulations of the EU and UK, in order to facilitate compliance of built-in equipment and devices with EU Directive/UK Regulations.

### 10.1.3　Compliance with EU Directives/UK Regulations

1　EN 55011

Warning: Class A equipment is intended for use in an industrial environment. Conductive and radioactive interference can make it difficult to ensure electromagnetic compatibility in other environments.

Note: This product is not intended for use in a residential environment, and protection against radio reception may be inadequate in such an environment.

2　EN 61800-3

This product is not intended for ordinary home use, or for connection to low-voltage public communication circuits. Radio frequency interference may occur when connected to such circuits.

In order to comply with EU EMC Directives and UK EMC Regulations, use a noise filter, a surge absorber, and a ferrite core. Compliance with EU EMC Directives and UK EMC Regulations must be confirmed using final equipment and devices with built-in servo drivers and servo motors.

### 10.1.4　Compliance with UL Standards

1　Installation Environment

IEC 60664-1 に規定されている汚損度 2 の環境下で使用してください。

Make sure to connect a UL-approved (with LISTED mark) molded-case circuit-breaker (MCCB) and fuse to the main power supply.

Only use copper conductor wires with a temperature rating of 75°C for wiring.

2　Short-Circuit Current Rating (SCCR)

The servo driver of this product is compatible with power supplies with a symmetrical current of 5000 Arms or less at less than the maximum input voltage of the product.

3　Branch Circuit Protection

Implement branch circuit protection in accordance with National Electrical Code (NEC) standards and local standards.

### 10.1.5   Support for SEMI F47 Momentary Power Failure Standard

The SEMI F47 standard includes requirements for voltage drops in semiconductor manufacturing equipment.

The control power supply for the servo driver complies with the SEMI F47 standard. The main circuit power supply complies with the SEMI F47 standard with no load or light loads.

**Precautions**

- The single phase 100 V specification servo driver is excluded.
- Always use the actual equipment for evaluation and review with respect to the SEMI F47 standard.

### 10.1.6   Radio Waves Act (South Korea) (KC)

The servo driver in this product is Class A device (broadcast communication device for business use) under the South Korea Radio Waves Act.

Please be aware of the following precautions before using this product.

A 급 기기 (업무용 방송통신기자재)

이 기기는 업무용(A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

( 대상기종 : Servo Driver  )

[Reference translation]

Class A device (broadcast communication device for business use)

This device is an electromagnetic wave generating device for business use (Class A),

and is intended for non-household use.

Users and distributors should note this fact.

(Applicable model: Servo Driver)

## 10.1.7   Compliance with China RoHS

Hazardous material content information (English, Chinese)

**AC Servo Driver**

Applicable models and components

| Applicable models | | Components | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Printed circuit board | Heat sink | Plastic case | Screw | Fan | Cable | Accessory plug |
| A7 series | MADN * * * * * * * * | ● | ● | ● | ● | — | — | ● |
| | MBDN * * * * * * * * | ● | ● | ● | ● | — | — | ● |
| | MCDN205 * * * * * | ● | ● | ● | ● | — | ● | ● |
| | MCDN245 * * * * * | ● | ● | ● | ● | ● | ● | ● |
| | MDDN * * * * * * * * | ● | ● | ● | ● | ● | ● | ● |
| ● : With components　 — : Without components | | | | | | | | |

Name and content of hazardous material in a product

| Name of component | Hazardous material | | | | | |
|---|---|---|---|---|---|---|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent chromium (Cr (VI)) | Polybrominated biphenyl (PBB) | Polybrominated diphenyl ether (PBDE) |
| Printed circuit board | × | ○ | ○ | ○ | ○ | ○ |
| Heat sink | ○ | ○ | ○ | ○ | ○ | ○ |
| Plastic case | ○ | ○ | ○ | ○ | ○ | ○ |
| Screw | ○ | ○ | ○ | ○ | ○ | ○ |
| Fan | × | ○ | ○ | ○ | ○ | ○ |
| Cable | ○ | ○ | ○ | ○ | ○ | ○ |
| Accessory plug | ○ | ○ | ○ | ○ | ○ | ○ |

This table is prepared based on the rules specified in SJ/T11364.

○ : The amount of hazardous materials in materials of all applicable components does not exceed the limit specified in GB/T26572.

× : The amount of hazardous material in the material of at least one of applicable components exceeds the limit specified in GB/T26572.

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**交流伺服驱动器**

对象机型及构成部位

| | 型号 | 构成部位 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 印刷电路板完成品 | 散热器 | 树脂机箱 | 螺丝 | 风扇 | 配线类 | 附带连接器 |
| A7 系列 | MADN＊＊＊＊＊＊＊＊ | ● | ● | ● | ● | － | － | ● |
| | MBDN＊＊＊＊＊＊＊＊ | ● | ● | ● | ● | － | － | ● |
| | MCDN205＊＊＊＊＊ | ● | ● | ● | ● | － | ● | ● |
| | MCDN245＊＊＊＊＊ | ● | ● | ● | ● | ● | ● | ● |
| | MDDN＊＊＊＊＊＊＊＊ | ● | ● | ● | ● | ● | ● | ● |
| ●：有构成部位　－：无构成部位 | | | | | | | | |

产品中有害物质的名称及含量

| 部件名称 | 有害物质 | | | | | |
|---|---|---|---|---|---|---|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr (VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 印刷电路板完成品 | × | ○ | ○ | ○ | ○ | ○ |
| 散热器 | ○ | ○ | ○ | ○ | ○ | ○ |
| 树脂机箱 | ○ | ○ | ○ | ○ | ○ | ○ |
| 螺丝 | ○ | ○ | ○ | ○ | ○ | ○ |
| 风扇 | × | ○ | ○ | ○ | ○ | ○ |
| 配线类 | ○ | ○ | ○ | ○ | ○ | ○ |
| 附带连接器 | ○ | ○ | ○ | ○ | ○ | ○ |
| 本表格依据 SJ/T11364 的规定编制。<br>○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T26572 规定的限量要求以下。<br>×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 规定的限量要求。 | | | | | | |

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## 10.2　Configuration of Peripheral Devices

### 10.2.1　Installation Environment

- IEC 60664-1 に規定されている汚損度 2 の環境下で使用してください。

  (Example) Installation in an IP54 metal control panel.

- Make sure to connect an IEC Standard and UL-approved (with LISTED mark) molded-case circuit-breaker (MCCB) and fuse to the main power supply.

- Use a 24 V DC power supply with double insulation or reinforced insulation for the parallel I/O power supply.

**Example installation in a metal control panel**

100 V/200 V System specifications
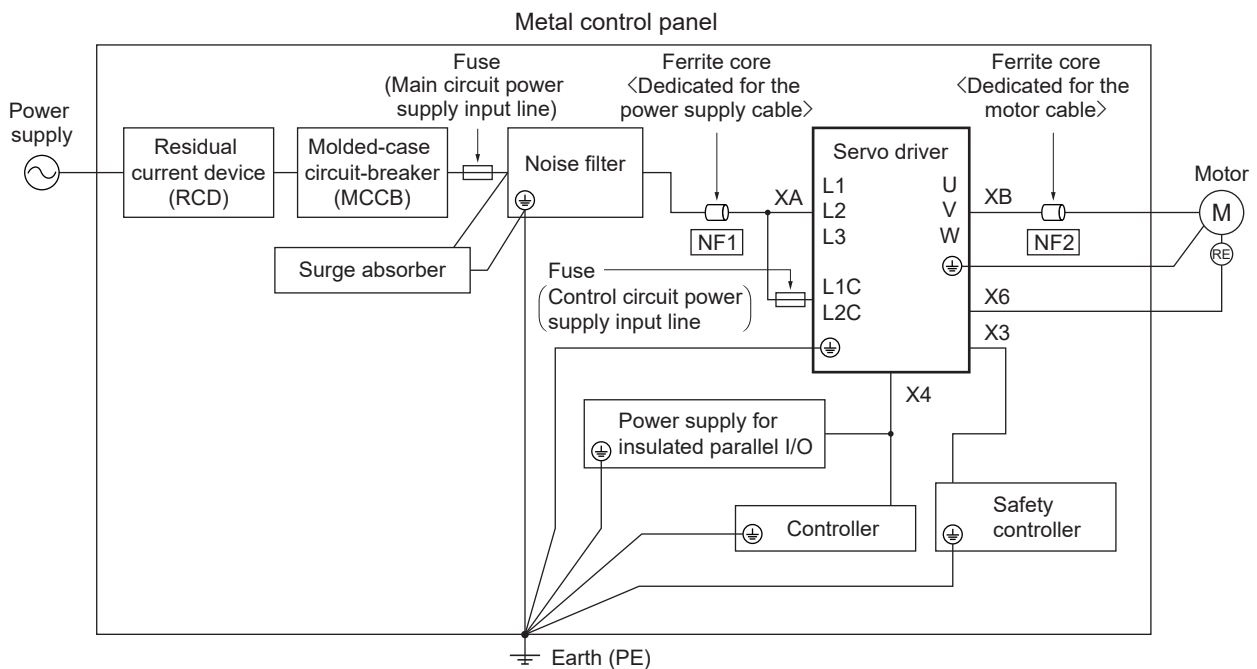


The conditions required for compliance with EU EMC Directive/UK EMC Regulations are indicated below.

- Install the servo driver on the metallic casing (control panel).

- Install a noise filter and surge absorber in the power supply line.

- Shielded twisted-pair cables must be used for input/output signal cables and encoder cables. Use tin plated annealed copper wire for the shield.

- Provide a ferrite core, according to the diagram, for each power source cable and motor cable to be connected to the servo driver.

- Cable shields (not shown in the diagram) should be directly grounded to protective earth (PE).

The foregoing are conditions for compliance with EU EMC Directives and UK EMC Regulations, and since installation and wiring conditions are affected by the statuses of connected devices and wiring when incorporated into the equipment used, compatibility with all devices must be confirmed.

### Notes

- For details on the structures of the wires, cables, peripheral devices, and control panel in the above diagram, see *"10.2.2 List of Peripheral Devices"* to *"10.2.14 Overload Protection and Overheating Protection"* from the next section onwards.

**Precautions**

● Use the parts correctly after reading the respective operating instructions for each, and sufficiently reviewing the precautions. Also, ensure that excessive stress is not applied to the parts.

## 10.2.2  List of Peripheral Devices

Peripheral devices used together with the servo driver, as well as device installation methods, methods of use, and installation precautions are indicated below. For an installation example, see *"10.2.1 Installation Environment"* .

| Servo Driver (*1) | Voltage Specification | Motor rated output | Power Supply Capacity (At rated load) | Molded-case Circuit-Breaker (MCCB) Rated Current | Short protection element (fuse) | | Noise filter (*3) | Surge absorber (*3) | Ferrite core (*3) | | Electro-magnetic Contactor (Rated carrying current/Open thermal current) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Main circuit power supply input line | Control circuit power supply input line | | | Power Supply Cable | Motor cable | |
| MADN061□□ | Single phase 100 V | 50 W | Approx. 0.4 kVA | 15 A | 10 A | 1 A | DV0P4170 | RSPD-250-Q4 | — | DV0P1460 | 20 A |
| MADN081□□ | | 100 W | Approx. 0.4 kVA | | | | | | — | | |
| MBDN121□□ | | 200 W | Approx. 0.5 kVA | | | | | | — | | |
| MCDN201□□ | | 400 W | Approx. 0.9 kVA | | 20 A | | DV0PM20042 | | — | | |
| MADN065□□ | Single phase/3-phase 200 V | 50 W | Approx. 0.5 kVA | | 10 A | | DV0P4170 (for single phase) / DV0PM20042 (for 3-phase) | RSPD-250-Q4 (for single phase) / RSPD-250-U4 (for 3-phase) | — | | |
| | | 100 W | | | | | | | — | | |
| MADN085□□ | | 200 W | Approx. 0.6 kVA | | | | | | — | | |
| MBDN125□□ | | 400 W | Approx. 1.0 kVA | | | | | | — | | |
| MCDN205□□ | | 750 W | Approx. 1.9 kVA | | 20 A | | DV0PM20042 | | — | | |
| MDDN405□□ (*2) | | 1000 W | Approx. 2.4 kVA | | 35 A | | DV0P4220 | | — | | 32 A |

*1    The "□" in the model number represents the difference in specification.

*2    When using a single-phase power supply, the driver input RMS current must be derated to 12 Arms or less for UL certification.

*3

| | Optional Product Number | Manufacturer Product Number | Manufacturer |
|---|---|---|---|
| Surge absorber | — | RSPD-250-U4 | Okaya Electric Industries |
| | — | RSPD-250-Q4 | |
| Ferrite core | DV0P1460 | ZCAT3035-1330 | TDK Corporation |
| Noise filter | DV0P4170 | SUP-EK5-ER-6 | Okaya Electric Industries |
| | DV0P4220 | 3SUP-HU30-ER-6 | |
| | DV0PM20042 | 3SUP-HU10-ER-6 | |

**Notes**

● For models with single-phase/3-phase 200 V specifications, select the peripheral devices according to the power source used.

● For details on servo driver product numbers, see *"3 How to Read Product Numbers"* and *"4 Model Product Numbers"* .

● For details on peripheral device specifications, see Operating Instructions (MINAS A7B Series) "12.4 Optional Parts" .

**Precautions**

● Select a molded-case circuit-breaker (MCCB) noise filter with a capacity that matches the power supply capacity (considering load conditions).

- Earth terminal

   Use copper conductor wires with a temperature rating of 75°C or higher for wiring.

   Protective earth terminals are M4 for sizes A to D.

- The wire diameter of the earth wire cable should be 2.0 mm$^2$ (AWG 14) or more for outputs of 50 W to 2.5 kW, 3.5 mm$^2$ (AWG 12) or more for outputs of 3.0 kW to 5.0 kW, 8.0 mm$^2$ (AWG 8) or more for 7.5 kW, 22 mm$^2$ (AWG 4) or more for 15.0 kW, and 38 mm$^2$ (AWG 2) or more for 22.0 kW.

- For sizes A to D, use the included dedicated connectors.

- The tightening torque of the screws used for connecting the host controller to connector X4 should be 0.2 ± 0.05 N·m.

   The servo driver-side connector may break if you exceed the maximum screw tightening torque.

### 10.2.3  Electric Wires

For details on electric wires, see *"9.1 Wires and Maximum Cable Length"* .

### 10.2.4  Power Supply

- 本製品は、IEC 60664-1 で規定されている過電圧 Category III の環境下で使用してください。

- パラレル I/O 用電源は、CE マーキング適合品、または EN 規格 (EN 60950) 適合の絶縁タイプの DC12～24 V 電源を使用してください。

- The power supply voltage specifications are as follows.

| Voltage | Servo Driver Size | Voltage Specification | Frequency |
|---|---|---|---|
| 100 V | A to C | Single phase: 100 to 120 V, -15% to +10% | 50/60 Hz |
| 200 V | A to D | Single phase/3-phase: 200 to 240 V, -15% to +10% | 50/60 Hz |

**Precautions**

- Power cable and signal wires must be isolated from each other in wiring.

- Use a sheathed (jacketed) cable, twisted cable (illustrated on the left below), or closely bundled cable (illustrated on the right below) for the power cable.
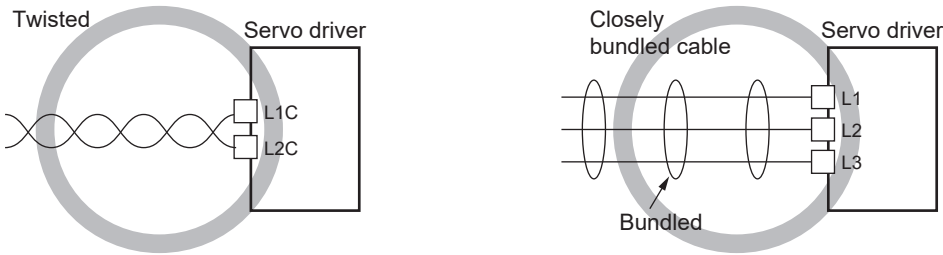
### 10.2.5  Molded-Case Circuit-Breaker (MCCB)

● In order to ensure compliance with EU Directives/UK Regulations, make sure to connect a molded-case circuit-breaker (MCCB) between the power supply and noise filter.

The short-circuit current of the power supply used should be a symmetrical current of 5,000 Arms or less, at or below the maximum input voltage of the product.

If the short-circuit current of the power supply exceeds this, limit the short-circuit current by using a current-limiting device (such as a current-limiting fuse, current-limiting breaker, transformer).

● The product's short-circuit protection circuit is not intended to protect branch circuits. Select branch circuit protection in accordance with the NEC standard and local standards.

● This product does not have earth fault protection functions. Please install a molded-case circuit-breaker or residual current device that corresponds to the corresponding earthing system.

Earth fault protection conditions for when using a molded-case circuit-breaker are as shown below. These conditions satisfy the requirements of EN 60364-4-41.

| Servo driver | Molded-case circuit-breaker | | | Voltage to ground [V] | Maximum allowable fault loop impedance (Ω) |
|---|---|---|---|---|---|
| | Rating [A] | Recommended model | Manufacturer | | |
| MADN061☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 100 | 0.25 |
| MADN081☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 100 | 0.31 |
| MBDN121☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 100 | 0.31 |
| MCDN201☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 100 | 0.42 |
| MADN065☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 115 | 0.33 |
| MADN085☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 115 | 0.39 |
| MBDN125☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 115 | 0.42 |
| MCDN205☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 115 | 0.50 |
| MDDN405☐☐ | 15 | BW50RAGU | Fuji Electric Co., Ltd. | 115 | 0.51 |

**Notes**

● Select a molded-case circuit-breaker (MCCB) with a capacity that matches the power supply capacity (considering load conditions).

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### 10.2.6   Noise Filter

- Select a noise filter with a capacity that matches the power supply capacity (considering load conditions).

- For the detailed specifications of each noise filter, contact the manufacturer.

- Consult with the manufacturer of the noise filter if using multiple servo drivers and installing one noise filter for all power supplies.

- Noise immunity is reduced if the same wiring is used for input and output (Illustrated on the right below.).

- Isolate input from output (Illustrated on the left below.).
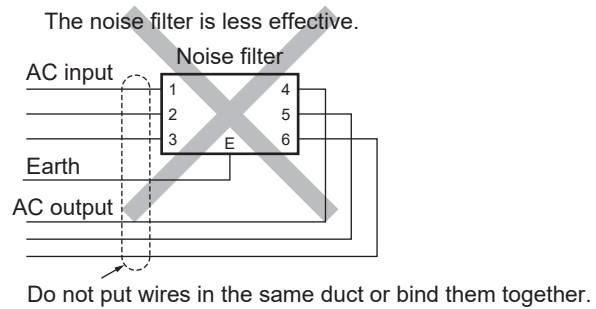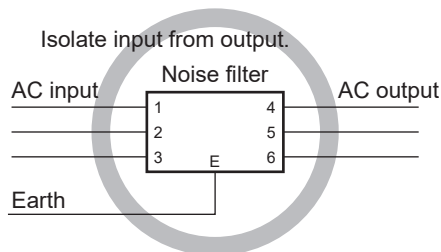


**Notes**

- For details of optional product numbers and specifications, see Operating Instructions (MINAS A7B Series) "12.4.1 Noise Filter" .

### 10.2.7   Surge Absorber

- Install the surge absorber on the primary side of the noise filter.

- For details of optional product numbers and specifications, see Operating Instructions (MINAS A7B Series) "12.4.2 Surge Absorber" .

**Precautions**

- Always remove the surge absorber before high voltage insulation testing machinery and equipment. Failure to do so may result in damage to the surge absorber.

## 10.2.8  Ferrite Core

● Ensure all cables (motor cables, encoder cables, interface cables, USB cables) have a ferrite core.

| Symbol (*1) | Place of use | Applicable size | Option product number | Manufacturer product number | Manufacturer | Number required |
|---|---|---|---|---|---|---|
| NF1 | Power supply cable | (100 V) A, B, C<br>(200 V) A, B, C, D | — | — | — | 0 |
| NF2 | Motor cable | (100 V) A, B, C<br>(200 V) A, B, C, D | DV0P1460 | ZCAT3035-1330 | TDK Corporation | 1 (*2) |

*1    For symbols, see *"10.2.1 Installation Environment"* .

*2    For ferrite cores, attach the motor cables (U, V, and W) together into a single unit using 1 turn (once through).

● Attach ferrite cores according to the following procedure.

| Signal cables | Wind the ferrite cores for the required number of turns. |
|---|---|
| Motor cable | When attaching ferrite cores (including those that are power line-dedicated) to Panasonic's optional cables, remove the sheaths (jackets) from the parts attached, and combine the motor cables (U, V, and W) to obtain a noise reducing effect.<br>If there is no effect, take measures such as increasing the number of ferrite cores (including those that are power line-dedicated) (See the figure below.). |
| Encoder wires | Wind the ferrite cores for the required number of turns. |
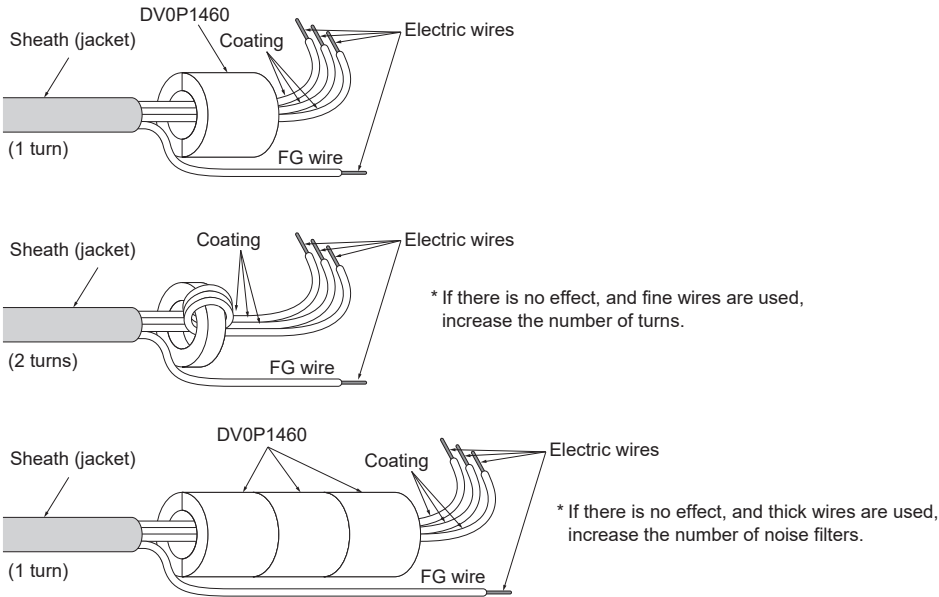
### 10.2.9   Residual Current Device

- Install a residual current device (RCD) on the primary side of the power supply.
- Use IEC 60947-2/JISC 8201-2-2 Type B (DC sensing type) for the residual current devices.
- This product does not have earth fault protection. Please install a molded-case circuit-breaker or residual current device that corresponds to the corresponding earthing system.

Earth fault protection conditions for when using residual current devices are as shown below. These conditions satisfy the requirements of EN 60364-4-41.

Ensure your TT system complies with your local national or regional laws and regulations. The rated sensed current and loop impedance of residual current devices may sometimes be stipulated by law or regulation. Further, Type B residual current devices may be mandatory.

| Servo driver | Residual current device | | | | Voltage to ground [V] | Maximum allowable loop impedance [Ω] |
|---|---|---|---|---|---|---|
| | Rating [A] | Rated sensed current [mA] | Recommended model | Manufacturer | | |
| MADN061□□ | 15 | 30 | EW50RAGU | Fuji Electric Co., Ltd. | 100 | 360 |
| MADN081□□ | 15 | 30 | EW50RAGU | Fuji Electric Co., Ltd. | 100 | 360 |
| MBDN121□□ | 15 | 30 | EW50RAGU | Fuji Electric Co., Ltd. | 100 | 360 |
| MCDN201□□ | 15 | 30 | EW50RAGU | Fuji Electric Co., Ltd. | 100 | 360 |
| MADN065□□ | 15 | 100 | EW50RAGU | Fuji Electric Co., Ltd. | 115 | 207 |
| MADN085□□ | 15 | 100 | EW50RAGU | Fuji Electric Co., Ltd. | 115 | 207 |
| MBDN125□□ | 15 | 100 | EW50RAGU | Fuji Electric Co., Ltd. | 115 | 207 |
| MCDN205□□ | 15 | 100 | EW50RAGU | Fuji Electric Co., Ltd. | 115 | 207 |
| MDDN405□□ | 15 | 100 | EW50RAGU | Fuji Electric Co., Ltd. | 115 | 207 |

### 10.2.10   Earth

- To prevent electric shock, make sure to connect the earth terminal (⏚) of the servo driver to the earth (PE) of the control panel.
- Do not tighten the connection to the protective earth terminal (⏚). Two earth terminals are provided.

### 10.2.11   Control Panel Structure

- If there is a gap at a cable inlet/outlet, the mounting hole of operation panel, a door, etc., radio waves may leak out of or penetrate into the control panel. In order to prevent this, please observe the following in designing or selecting the control panel.
  - The control board should be made of metal and ensure that it is electrically conductive.
  - The control board should not have electrically floating conductive parts.
  - The units mounted inside the case should be connected to the case.

### 10.2.12  Control Input/Output Signal Noise Immunity Enhancement

● When noise is introduced to the control input/output, it causes displacement and input/output signal malfunction.

• Connectors X1 to X7 are used for the secondary circuit.

The 24 V DC power supply for brakes requires insulation. Do not connect to the same power supply. Do not connect a ground wire. This may cause erroneous operation of the input/output signal.

• The control power source should be completely isolated from external operating power sources. Take care not to connect the ground wire of the control power source to that of external power source.

• Use a shielded cable as the signal cable, and earth both of the shielded ends.

### 10.2.13  Installing Short Protection Elements

● Connect fuses on the main circuit power supply input and control circuit power supply input lines. For details on fuse insertion locations, see below.

• A, B Frames: Operating Instructions (MINAS A7B Series) "3.2.1.1.2 Overall Connection Example" "3.2.1.1.3 Key Points on Wiring"

• C, D Frames: Operating Instructions (MINAS A7B Series) "3.2.1.2.2 Overall Connection Example" "3.2.1.2.3 Key Points on Wiring"

● Refer to the descriptions in the below table when selecting fuse rated currents. If compliance with UL61800-5-1 is required, use UL Listed fuses.

| Servo driver | Main circuit power supply input line fuse | | | | Control circuit power supply input line fuse | | | |
|---|---|---|---|---|---|---|---|---|
| | Rat-ing | Options | | | Rat-ing | Options | | |
| | | UL class | Recom-mended model | Manufacturer | | UL class | Product number | Manufacturer |
| MADN061□□ | 10 A | CC | LP-CC-10 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MADN081□□ | 10 A | CC | LP-CC-10 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MBDN121□□ | 10 A | CC | LP-CC-10 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MCDN201□□ | 20 A | CC | LP-CC-20 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MADN065□□ | 10 A | CC | LP-CC-10 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MADN085□□ | 10 A | CC | LP-CC-10 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MBDN125□□ | 10 A | CC | LP-CC-10 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MCDN205□□ | 20 A | CC | LP-CC-20 | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |
| MDDN405□□ | 35 A | J | LPJ-35SP | COOPER BUSSMANN LLC | 1 A | CC | LP-CC-1 | COOPER BUSSMANN LLC |

### 10.2.14   Overload Protection and Overheating Protection

● The servo driver has a built-in servo motor overload protection function. The overload protection function operates on the basis of specified time characteristics at 115% or more of the rated current.

● The servo motor does not have an overheating protection function. If NEC standard compliance is required, implement overheating protection measures for the servo motor.

● The servo driver is equipped with a thermal memory (shutdown) as required by EN 61800-5-1/UL 61800-5-1; however, it does not have thermal memory (power loss) or velocity sensor functions.

**Notes**

● For overload protection characteristics, see *"Overload Protection Time Characteristics (Driver)"* in *"5 Basic Specifications"* and Operating Instructions (MINAS A7B Series) "2.2.5 Overload Protection Time Characteristics (Motor)" .

### 10.2.15   Harmonics Suppression Measures

● Harmonics suppression measures vary by country. Install in accordance with local regulations.

● Servo drivers for Japan whose input current exceeds 20 A are subject to the "Guidelines for harmonic suppression measures for users who receive high-voltage or extra-high voltage power". Calculate the equivalent capacity and harmonic outflow current based on the guidelines. If the harmonic current is found to exceed the limit value predetermined for the contract demand, appropriate measures must be taken. Furthermore, when calculating the equivalent capacity, assume that the conversion factor of the servo driver is $K_{31}=3.4$ (Refer to JEM-TR210 and JEM-TR225*.).

*These are technical references issued by JEMA (Japan Electrical Manufacturers' Association).

## 11   Life Span

(Life span is not guaranteed.)

### 11.1   Expected Life Span of Servo Driver

When used continuously under the following conditions, the expected life span is 28,000 hours.

Definition of life span:   "Life span" is defined as the time it takes for the electrolytic capacitor to decrease in capacity by 20% once shipped from the factory.

Condition   Input power supply    :   Single-phase 100 V 50/60 Hz
Single-phase/3-phase 200 V 50/60 Hz

Ambient temperature  :   55°C

Output torque    :   Constant rated torque

Speed    :   Constant rated speed

The life span varies greatly depending on the conditions of use.

### 11.2   Standard Life Span

■   **Inrush Current Prevention Circuit**

The expected life span of the inrush current prevention circuit is approximately 20,000 cycles. Note that criteria may vary depending on environmental and working conditions.

■   **Cooling Fan**

The standard replacement time for the cooling fan is approximately 20,000 hours. Note that criteria may vary depending on environmental and working conditions.

## 12   Warranty

### 12.1   Warranty Period

The warranty period for products is 1 year from purchase, or 1 year and 6 months from the month of production by Panasonic.

However, the warranty will be void in any of the following cases, even within the warranty period:

- When caused by incorrect usage or inappropriate repairs or modifications
- When caused by falling post-purchase or damage during shipping
- When caused by usage outside the scope of product specifications
- When caused by fire, earthquake, lightning, wind or water damage, salt damage, voltage anomalies, or other natural disaster or force majeure
- When caused by infiltration of water, oil, metal flakes or other foreign matter
- When individual parts with listed standard lifetimes which have exceeded said lifetimes

### 12.2   Warranty Coverage

Only malfunctioning component replacements or repairs are covered for individual devices delivered by Panasonic, in the event of malfunctions attributable to Panasonic during the warranty period. Please note that our above-stated responsibility is limited to the replacement and repair of the equipment provided by us and that we do not accept any responsibility for damage to your company or any third party that may occur in connection with the failure of the equipment provided by us.

Panasonic is not liable in any way for device malfunctions or damages incurred by your company or third parties in the event of any exemptions listed under *"12.1 Warranty Period"* or in any of the following cases.

- When the device is assembled or used counter to the precautions and directions listed in this document
- When caused by the combination of the device and devices it is incorporated into
- When we are unable to process your request regarding this document
- When the device malfunction is otherwise not attributable to our company

### 12.3   Warranty Service

If you require warranty service (fault cause investigation, repair, etc.), please contact the retailer from which you purchased the product.

If you wish to send it directly to us with the permission of the retailer, please receive a repair/investigation request form from the place of purchase, fill out the necessary information, and send it to our motor service desk along with the product.

As a general rule, you will be responsible for shipping costs.

## 13   Model Specifications

| Product number | MADN061BE<br>MADN061BF | MADN081BE<br>MADN081BF | MADN065BE<br>MADN065BF<br>MADN065BR□ | MADN085BE<br>MADN085BF<br>MADN085BR□ |
|---|---|---|---|---|
| Power supply input | Single-phase 100 V | Single-phase 100 V | Single-phase/3-phase 200 V | Single-phase/3-phase 200 V |
| Maximum output current | 6 A | 8 A | 6 A | 8 A |
| Rotary encoder | 134217728 resolution | 134217728 resolution | 134217728 resolution | 134217728 resolution |
| Regenerative resistor | External | External | External | External |
| Auto-gain tuning function | Provided | Provided | Provided | Provided |
| Dynamic brake function | Provided | Provided | Provided | Provided |
| Absolute system | Available | Available | Available | Available |
| Control power supply cable | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ |
| | AWG14 | AWG14 | AWG14 | AWG14 |
| Main power supply cable | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ |
| | AWG14 | AWG14 | AWG14 | AWG14 |
| Earth cable | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ |
| | AWG14 | AWG14 | AWG14 | AWG14 |
| Motor cable | 0.75 mm$^2$ | 0.75 mm$^2$ | 0.75 mm$^2$ | 0.75 mm$^2$ |
| | AWG18 | AWG18 | AWG18 | AWG18 |
| Inrush current (main power supply) [*1] | Max. 7 A | Max. 7 A | Max. 14 A | Max. 14 A |
| Inrush current (control power supply) [*1] | Max. 14 A | Max. 14 A | Max. 14 A | Max. 14 A |
| Weight | Approx. 0.8 kg | Approx. 0.8 kg | Approx. 0.8 kg | Approx. 0.8 kg |
| External size | Size A | Size A | Size A | Size A |

*1    When the product power input voltage is the 100 V specification, the current is the value calculated with the voltage as 100 V. Likewise, the current is the value calculated with the voltage as 200 V when the product power input voltage is the 200 V specification.

| Product number | MBDN121BE MBDN121BF | MBDN125BE MBDN125BF MBDN125BR□ | MCDN201BE MCDN201BF | MCDN205BE MCDN205BF MCDN205BR□ |
|---|---|---|---|---|
| Power supply input | Single-phase 100 V | Single-phase/3-phase 200 V | Single-phase 100 V | Single-phase/3-phase 200 V |
| Maximum output current | 12 A | 12 A | 20 A | 20 A |
| Rotary encoder | 134217728 resolution | 134217728 resolution | 134217728 resolution | 134217728 resolution |
| Regenerative resistor | External | External | Built-in | Built-in |
| Auto-gain tuning function | Provided | Provided | Provided | Provided |
| Dynamic brake function | Provided | Provided | Provided | Provided |
| Absolute system | Available | Available | Available | Available |
| Control power supply cable | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ |
| | AWG14 | AWG14 | AWG14 | AWG14 |
| Main power supply cable | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ |
| | AWG14 | AWG14 | AWG14 | AWG14 |
| Earth cable | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ | 2.0 mm$^2$ |
| | AWG14 | AWG14 | AWG14 | AWG14 |
| Motor cable | 0.75 mm$^2$ | 0.75 mm$^2$ | 0.75 mm$^2$ | 0.75 mm$^2$ |
| | AWG18 | AWG18 | AWG18 | AWG18 |
| Inrush current (main power supply) [*1] | Max. 7 A | Max. 14 A | Max. 14 A | Max. 28 A |
| Inrush current (control power supply) [*1] | Max. 14 A | Max. 14 A | Max. 14 A | Max. 14 A |
| Weight | Approx. 1.0 kg | Approx. 1.0 kg | Approx. 1.5 kg | Approx. 1.5 kg |
| External size | Size B | Size B | Size C | Size C |

*1   When the product power input voltage is the 100 V specification, the current is the value calculated with the voltage as 100 V. Likewise, the current is the value calculated with the voltage as 200 V when the product power input voltage is the 200 V specification.

| Product number | MDDN405BE MDDN405BF MDDN405BR□ |
|---|---|
| Power supply input | Single-phase/3-phase 200 V |
| Maximum output current | 40 A |
| Rotary encoder | 134217728 resolution |
| Regenerative resistor | Built-in |
| Auto-gain tuning function | Provided |
| Dynamic brake function | Provided |
| Absolute system | Available |
| Control power supply cable | 2.0 mm$^2$ |
| | AWG14 |
| Main power supply cable | 2.0 mm$^2$ |
| | AWG14 |
| Earth cable | 2.0 mm$^2$ |
| | AWG14 |
| Motor cable | 1.25 mm$^2$ |
| | AWG16 |
| Inrush current (main power supply) [*1] | Max. 28 A |
| Inrush current (control power supply) [*1] | Max. 14 A |
| Weight | Approx. 1.8 kg |
| External size | Size D |

*1    When the product power input voltage is the 100 V specification, the current is the value calculated with the voltage as 100 V. Likewise, the current is the value calculated with the voltage as 200 V when the product power input voltage is the 200 V specification.

# 14   Appendix: List of Default Parameters and Objects

The following pages show default parameters and objects set when the servo driver is shipped from the factory.

Operation must be confirmed for each customer machine before use and the optimal parameters set.

## 14.1   How to Read the Object Table

The following is an example of entries for the Object Table shown in this section.

Example of table format

| Index | Sub-Index | Name | Units | Range | Data type (*1) | Access | PDO (*3) | Op-mode | EEPROM | Attribute (*6) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***** | *** | ******* | ***** | ***** | VS | *** | RxPDO | *** | No | A |
| ***** | *** | ******* | ***** | ***** | U16 | *** | RxPDO | *** | No | A |
| ***** | *** | ******* | ***** | ***** | VS | *** | RxPDO | *** | Yes | A |

Example of table format for describing details

| Index | Sub-Index | Name | Units | Range | Data type (*1) | Access (*2) | PDO (*3) | Op-mode (*4) | EEPROM (*5) | Attribute (*6) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***** | *** | ******* | ***** | ***** | VS | *** | RxPDO | *** | No | A |
| | ******************* | | | | | | | | | |
| ***** | *** | ******* | ***** | ***** | U16 | *** | RxPDO | *** | No | A |
| | ******************* | | | | | | | | | |
| ***** | *** | ******* | ***** | ***** | VS | *** | RxPDO | *** | Yes | A |
| | ******************* | | | | | | | | | |

*1   "NULL" is placed at the end for objects in which the data type is "VS" (Visible String).

For the size of each object, check the object description, "The size of this object is ☐ byte(s)."

Data type

| Abbreviation | Official name |
|---|---|
| U8 | Unsigned8 |
| U16 | Unsigned16 |
| U32 | Unsigned32 |
| I8 | Integer8 |
| I16 | Integer16 |
| I32 | Integer32 |
| VS | Visible String |
| BOOL | Boolean |
| OS | Octet String |

*2   Access indicates access settings.

Access

| Abbreviation | Official name |
|---|---|
| rw | read-write |
| ro | read-only |
| c | constant |

*3　PDO indicates whether PDO mapping is available.

For details of PDO mapping, see Operating Instructions (MINAS A7B Series) "6.3.3 Process Data Object (PDO) Mapping" .

No: RxRDO, TxPDO mapping not available (only SDO)

RxPDO: RxPDO mapping available

TxPDO: TxPDO mapping available

*4　Op-mode indicates the corresponding control mode.

For the abbreviations of the control modes, see Operating Instructions (MINAS A7B Series) "2.1.4.3 Supported Control Modes" .

*5　EEPROM indicates whether the object is subject to back-ups.

Yes: Backed up

No: Not backed up

*6　"Attribute" indicates when object change descriptions are enabled.

All objects for which writing to EEPROM is not possible ("No" in the "EEPROM" column) appear as RO in Set-up Support Software (PANATERM ver.7) .

Attribute

| Symbol | Description |
|---|---|
| A | Always enabled |
| B | Always enabled, but changes are prohibited while the motor is running and during command transfer. Changes while the motor is running and during position command transfer may transiently lead to unstable operation. |
| C | Enabled after control power reset and after running Config from Set-up Support Software (PANATERM ver.7) |
| R | Enabled after control power reset |
| P | Enabled when transitioning from Init to Pre-OP |
| S | Enabled when transitioning from Pre-OP to SafeOP |
| H | Enabled after determining position information |
| X | Objects that cannot be changed, such as read-only objects, or objects that aren't supported |

## 14.2   How to view the Servo Parameter Area (3000h to 3FFFh)

Servo parameters are assigned to objects in the 3000h area.

The servo parameter number and object number are supported as follows.

**When the servo parameter number is less than 100**

Servo parameter No.

| Class | No. |
|---|---|
| 4 | 10 |

(Example) — Decimal notation

Object No.

(Example)  3  4  1  0  H — BCD notation Binary-coded decimal
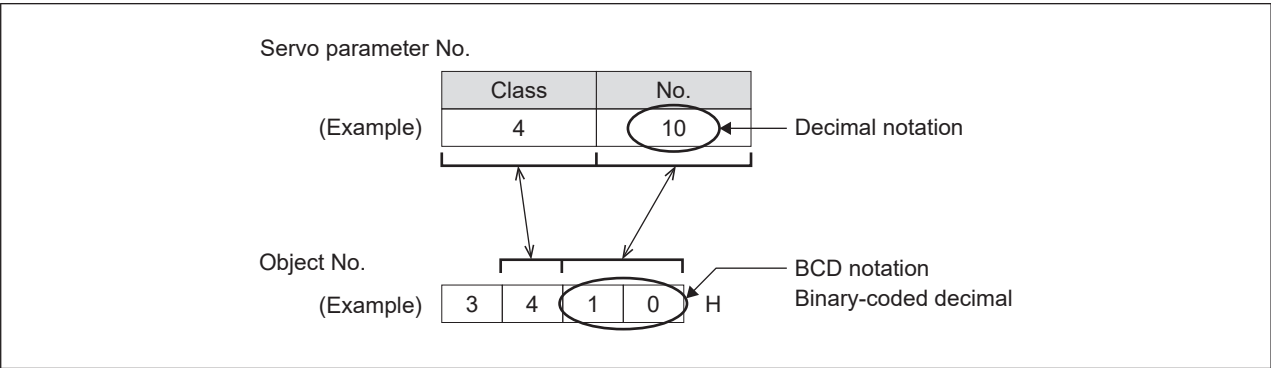
**When the servo parameter number is 100 or more**

Servo parameter No.

| Class | No. |
|---|---|
| 7 | 10  0 |

(Example) — Decimal notation

Object No.

(Example)  3  7  A  0  h

Hexadecimal notation — Decimal notation
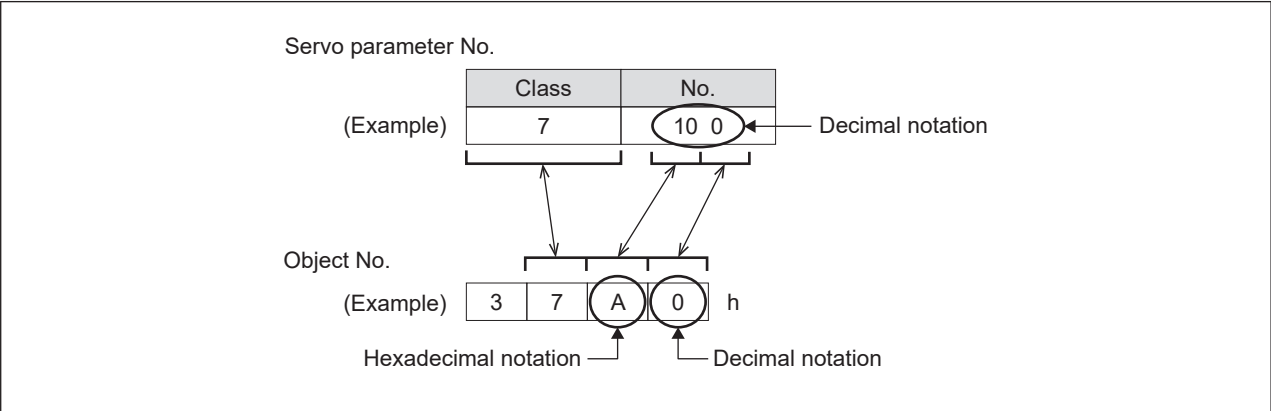
## 14.3　CoE Communication Area (1000h to 1FFFh)

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000h | 00h | Device type | – | 0 to 4294967295 | – | U32 | ro | No | ALL | No | X | – |
| 1001h | 00h | Error register | – | 0 to 255 | – | U8 | ro | No | ALL | No | X | – |
| | | ● bit 4: Generation of an alarm defined by AL status code | | | | | | | | | | – |
| | | ● bit 7: Generation of an alarm not defined by AL status code | | | | | | | | | | |
| 1008h | 00h | Manufacturer device name | – | – | – | VS | ro | No | ALL | No | X | – |
| 1009h | 00h | Manufacturer hardware version | – | – | – | VS | ro | No | ALL | No | X | |
| 100Ah | 00h | Manufacturer software version | – | – | – | VS | ro | No | ALL | No | X | |
| 1010h | – | Store parameters | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 0 to 255 | – | U8 | ro | No | ALL | No | X | |
| | 01h | Save all parameters | – | 0 to 4294967295 | 1 | U32 | rw | No | ALL | No | A | |
| 1018h | – | Identity object | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 0 to 255 | – | U8 | ro | No | ALL | No | X | |
| | 01h | Vendor ID | – | 0 to 4294967295 | – | U32 | ro | No | ALL | No | X | |
| | 02h | Product code | – | 0 to 4294967295 | – | U32 | ro | No | ALL | No | X | |
| | 03h | Revision number | – | 0 to 4294967295 | – | U32 | ro | No | ALL | No | X | |
| | 04h | Serial number | – | 0 to 4294967295 | – | U32 | ro | No | ALL | No | X | |
| 10F3h | – | Diagnosis history | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 0 to 255 | – | U8 | ro | No | ALL | No | X | |
| | 01h | Maximum messages | – | 0 to 255 | – | U8 | ro | No | ALL | No | X | |
| | 02h | Newest message | – | 0 to 255 | – | U8 | ro | No | ALL | No | X | |
| | 03h | Newest acknowledged message | – | 0 to 255 | 0 | U8 | rw | No | ALL | No | A | |
| | 04h | New messages available | – | 0 to 1 | – | BOOL | ro | No | ALL | No | X | |
| | 05h | Flags | – | 0 to 65535 | 39 | U16 | rw | No | ALL | Yes | A | – |
| | | ● bit 0: Emergency message execution permission | | | | | | | | | | – |
| | | ● bit 5: Diagnosis message clearing information | | | | | | | | | | |
| | 06h | Diagnosis message 1 | – | – | – | OS | ro | No | ALL | No | X | – |
| | | ⋮ | | | | | | | | | | |
| | 23h | Diagnosis message 30 | – | – | – | OS | ro | No | ALL | No | X | |
| 1600h | – | Receive PDO mapping 1 | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 0 to 32 | 4 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st receive PDO mapped | – | 0 to 4294967295 | 1614807056 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd receive PDO mapped | – | 0 to 4294967295 | 1616904200 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd receive PDO mapped | – | 0 to 4294967295 | 1618608160 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th receive PDO mapped | – | 0 to 4294967295 | 1622671376 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th receive PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | 06h | 6th receive PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | 07h | 7th receive PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th receive PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |

R1.0

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|-------|-----------|------|-------|-------|---------------|-----------|--------|-----|---------|--------|-----------|-----------|
| 1600h | | ⋮ | | | | | | | | | | — |
| | 20h | 32nd receive PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| 1601h | — | Receive PDO mapping 2 | — | — | — | — | — | — | — | — | — | |
| | 00h | Number of entries | — | 0 to 32 | 7 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st receive PDO mapped | — | 0 to 4294967295 | 1614807056 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd receive PDO mapped | — | 0 to 4294967295 | 1616904200 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd receive PDO mapped | — | 0 to 4294967295 | 1618018320 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th receive PDO mapped | — | 0 to 4294967295 | 1618608160 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th receive PDO mapped | — | 0 to 4294967295 | 1619001376 | U32 | rw | No | ALL | Yes | S | |
| | 06h | 6th receive PDO mapped | — | 0 to 4294967295 | 1622671376 | U32 | rw | No | ALL | Yes | S | |
| | 07h | 7th receive PDO mapped | — | 0 to 4294967295 | 1627324448 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th receive PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | | ⋮ | | | | | | | | | | |
| | 20h | 32nd receive PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| 1602h | — | Receive PDO mapping 3 | — | — | — | — | — | — | — | — | — | |
| | 00h | Number of entries | — | 0 to 32 | 6 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st receive PDO mapped | — | 0 to 4294967295 | 1614807056 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd receive PDO mapped | — | 0 to 4294967295 | 1616904200 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd receive PDO mapped | — | 0 to 4294967295 | 1618083856 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th receive PDO mapped | — | 0 to 4294967295 | 1618608160 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th receive PDO mapped | — | 0 to 4294967295 | 1622671376 | U32 | rw | No | ALL | Yes | S | |
| | 06h | 6th receive PDO mapped | — | 0 to 4294967295 | 1627324448 | U32 | rw | No | ALL | Yes | S | |
| | 07h | 7th receive PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th receive PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | | ⋮ | | | | | | | | | | |
| | 20h | 32nd receive PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| 1603h | — | Receive PDO mapping 4 | — | — | — | — | — | — | — | — | — | |
| | 00h | Number of entries | — | 0 to 32 | 8 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st receive PDO mapped | — | 0 to 4294967295 | 1614807056 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd receive PDO mapped | — | 0 to 4294967295 | 1616904200 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd receive PDO mapped | — | 0 to 4294967295 | 1618018320 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th receive PDO mapped | — | 0 to 4294967295 | 1618083856 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th receive PDO mapped | — | 0 to 4294967295 | 1618608160 | U32 | rw | No | ALL | Yes | S | |

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1603h | 06h | 6th receive PDO mapped | – | 0 to 4294967295 | 1619001376 | U32 | rw | No | ALL | Yes | S | – |
| | 07h | 7th receive PDO mapped | – | 0 to 4294967295 | 1622671376 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th receive PDO mapped | – | 0 to 4294967295 | 1627324448 | U32 | rw | No | ALL | Yes | S | |
| | 09h | 9th receive PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | ⋮ | | | | | | | | | | | |
| | 20h | 32nd receive PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| 1A00h | – | Transmit PDO mapping 1 | – | – | – | – | – | – | – | – | – | |
| | 00h | Number of entries | – | 0 to 32 | 8 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st transmit PDO mapped | – | 0 to 4294967295 | 1614741520 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd transmit PDO mapped | – | 0 to 4294967295 | 1614872592 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd transmit PDO mapped | – | 0 to 4294967295 | 1616969736 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th transmit PDO mapped | – | 0 to 4294967295 | 1617166368 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th transmit PDO mapped | – | 0 to 4294967295 | 1622736912 | U32 | rw | No | ALL | Yes | S | |
| | 06h | 6th transmit PDO mapped | – | 0 to 4294967295 | 1622802464 | U32 | rw | No | ALL | Yes | S | |
| | 07h | 7th transmit PDO mapped | – | 0 to 4294967295 | 1626603552 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th transmit PDO mapped | – | 0 to 4294967295 | 1627193376 | U32 | rw | No | ALL | Yes | S | |
| | 09h | 9th transmit PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | ⋮ | | | | | | | | | | | |
| | 20h | 32nd transmit PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| 1A01h | – | Transmit PDO mapping 2 | – | – | – | – | – | – | – | – | – | |
| | 00h | Number of entries | – | 0 to 32 | 9 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st transmit PDO mapped | – | 0 to 4294967295 | 1614741520 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd transmit PDO mapped | – | 0 to 4294967295 | 1614872592 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd transmit PDO mapped | – | 0 to 4294967295 | 1616969736 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th transmit PDO mapped | – | 0 to 4294967295 | 1617166368 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th transmit PDO mapped | – | 0 to 4294967295 | 1617690656 | U32 | rw | No | ALL | Yes | S | |
| | 06h | 6th transmit PDO mapped | – | 0 to 4294967295 | 1618411536 | U32 | rw | No | ALL | Yes | S | |
| | 07h | 7th transmit PDO mapped | – | 0 to 4294967295 | 1622736912 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th transmit PDO mapped | – | 0 to 4294967295 | 1622802464 | U32 | rw | No | ALL | Yes | S | |
| | 09h | 9th transmit PDO mapped | – | 0 to 4294967295 | 1627193376 | U32 | rw | No | ALL | Yes | S | |
| | 0Ah | 10th transmit PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | ⋮ | | | | | | | | | | | |
| | 20h | 32nd transmit PDO mapped | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1A02h | — | Transmit PDO mapping 3 | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of entries | — | 0 to 32 | 9 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st transmit PDO mapped | — | 0 to 4294967295 | 1614741520 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd transmit PDO mapped | — | 0 to 4294967295 | 1614872592 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd transmit PDO mapped | — | 0 to 4294967295 | 1616969736 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th transmit PDO mapped | — | 0 to 4294967295 | 1617166368 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th transmit PDO mapped | — | 0 to 4294967295 | 1617690656 | U32 | rw | No | ALL | Yes | S | |
| | 06h | 6th transmit PDO mapped | — | 0 to 4294967295 | 1618411536 | U32 | rw | No | ALL | Yes | S | |
| | 07h | 7th transmit PDO mapped | — | 0 to 4294967295 | 1622736912 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th transmit PDO mapped | — | 0 to 4294967295 | 1622802464 | U32 | rw | No | ALL | Yes | S | |
| | 09h | 9th transmit PDO mapped | — | 0 to 4294967295 | 1627193376 | U32 | rw | No | ALL | Yes | S | |
| | 0Ah | 10th transmit PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | ⋮ | | | | | | | | | | | |
| | 20h | 32nd transmit PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| 1A03h | — | Transmit PDO mapping 4 | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of entries | — | 0 to 32 | 9 | U8 | rw | No | ALL | Yes | S | |
| | 01h | 1st transmit PDO mapped | — | 0 to 4294967295 | 1614741520 | U32 | rw | No | ALL | Yes | S | |
| | 02h | 2nd transmit PDO mapped | — | 0 to 4294967295 | 1614872592 | U32 | rw | No | ALL | Yes | S | |
| | 03h | 3rd transmit PDO mapped | — | 0 to 4294967295 | 1616969736 | U32 | rw | No | ALL | Yes | S | |
| | 04h | 4th transmit PDO mapped | — | 0 to 4294967295 | 1617166368 | U32 | rw | No | ALL | Yes | S | |
| | 05h | 5th transmit PDO mapped | — | 0 to 4294967295 | 1617690656 | U32 | rw | No | ALL | Yes | S | |
| | 06h | 6th transmit PDO mapped | — | 0 to 4294967295 | 1618411536 | U32 | rw | No | ALL | Yes | S | |
| | 07h | 7th transmit PDO mapped | — | 0 to 4294967295 | 1622736912 | U32 | rw | No | ALL | Yes | S | |
| | 08h | 8th transmit PDO mapped | — | 0 to 4294967295 | 1622802464 | U32 | rw | No | ALL | Yes | S | |
| | 09h | 9th transmit PDO mapped | — | 0 to 4294967295 | 1627193376 | U32 | rw | No | ALL | Yes | S | |
| | 0Ah | 10th transmit PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| | ⋮ | | | | | | | | | | | |
| | 20h | 32nd transmit PDO mapped | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | Yes | S | |
| 1C00h | — | Sync manager communication type | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of used sync manager channels | — | 0 to 255 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Communication type sync manager 0 | — | 0 to 4 | — | U8 | ro | No | ALL | No | X | |
| | 02h | Communication type sync manager 1 | — | 0 to 4 | — | U8 | ro | No | ALL | No | X | |
| | 03h | Communication type sync manager 2 | — | 0 to 4 | — | U8 | ro | No | ALL | No | X | |
| | 04h | Communication type sync manager 3 | — | 0 to 4 | — | U8 | ro | No | ALL | No | X | |
| 1C12h | — | Sync manager channel 2 | — | — | — | — | — | — | — | — | — | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1C12h | 00h | Number of assigned PDOs | — | 0 to 4 | 1 | U8 | rw | No | ALL | Yes | S | — |
| | 01h | PDO mapping object index of assigned RxPDO 1 | — | 1600h to 1603h | 5632 | U16 | rw | No | ALL | Yes | S | |
| | 02h | PDO mapping object index of assigned RxPDO 2 | — | 1600h to 1603h | 5633 | U16 | rw | No | ALL | Yes | S | |
| | 03h | PDO mapping object index of assigned RxPDO 3 | — | 1600h to 1603h | 5634 | U16 | rw | No | ALL | Yes | S | |
| | 04h | PDO mapping object index of assigned RxPDO 4 | — | 1600h to 1603h | 5635 | U16 | rw | No | ALL | Yes | S | |
| 1C13h | — | Sync manager channel 3 | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of assigned PDOs | — | 0 to 4 | 1 | U8 | rw | No | ALL | Yes | S | |
| | 01h | PDO mapping object index of assigned TxPDO 1 | — | 1A00h to 1A03h | 6656 | U16 | rw | No | ALL | Yes | S | |
| | 02h | PDO mapping object index of assigned TxPDO 2 | — | 1A00h to 1A03h | 6657 | U16 | rw | No | ALL | Yes | S | |
| | 03h | PDO mapping object index of assigned TxPDO 3 | — | 1A00h to 1A03h | 6658 | U16 | rw | No | ALL | Yes | S | |
| | 04h | PDO mapping object index of assigned TxPDO 4 | — | 1A00h to 1A03h | 6659 | U16 | rw | No | ALL | Yes | S | |
| 1C32h | — | Sync manager 2 synchronization | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of sub-objects | — | 0 to 255 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Sync mode | — | 0 to 65535 | 2 | U16 | rw | No | ALL | Yes | S | |
| | 02h | Cycle time | ns | 0 to 4294967295 | 1000000 | U32 | rw | No | ALL | Yes | S | |
| | 03h | Shift time | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 04h | Sync modes supported | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | — |
| | | ● bit 0: FreeRun mode support | | | | | | | | | | — |
| | | ● bit 1: SM Synchronous mode support | | | | | | | | | | — |
| | | ● bits 4 to 2: DC synchronous mode support | | | | | | | | | | — |
| | | ● bits 6 to 5: Output shift support | | | | | | | | | | — |
| | 05h | Minimum cycle time | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | — |
| | 06h | Calc and copy time | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 08h | Command | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | |
| | 09h | Delay time | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 0Ah | Sync0 cycle time | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 0Bh | SM-event missed | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | |
| | 0Ch | Cycle time too small | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | |
| | 0Dh | Shift time too short | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | |
| | 0Eh | RxPDO toggle failed | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | |
| | 20h | Sync error | — | 0 to 1 | — | BOOL | ro | No | ALL | No | X | |
| 1C33h | — | Sync manager 3 synchronization | — | — | — | — | — | — | — | — | — | |
| | 00h | Number of sub-objects | — | 0 to 255 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Sync mode | — | 0 to 65535 | 2 | U16 | rw | No | ALL | Yes | S | |
| | 02h | Cycle time | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 03h | Shift time | ns | 0 to 4294967295 | 0 | U32 | rw | No | ALL | No | S | |
| | 04h | Sync modes supported | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | — |
| | | ● bit 0: FreeRun mode support | | | | | | | | | | — |
| | | ● bit 1: SM Synchronous mode support | | | | | | | | | | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1C33h | 04h | ● bits 4 to 2: DC synchronous mode support | | | | | | | | | | − |
| | | ● bits 6 to 5: Output Shift Support Input Shift Support | | | | | | | | | | − |
| | 05h | Minimum cycle time | ns | 0 to 4294967295 | − | U32 | ro | No | ALL | No | X | − |
| | 06h | Calc and copy time | ns | 0 to 4294967295 | − | U32 | ro | No | ALL | No | X | |
| | 08h | Command | − | 0 to 65535 | − | U16 | ro | No | ALL | No | X | |
| | 09h | Delay time | ns | 0 to 4294967295 | − | U32 | ro | No | ALL | No | X | |
| | 0Ah | Sync0 cycle time | ns | 0 to 4294967295 | − | U32 | ro | No | ALL | No | X | |
| | 0Bh | SM-event missed | − | 0 to 65535 | − | U16 | ro | No | ALL | No | X | |
| | 0Ch | Cycle time too small | − | 0 to 65535 | − | U16 | ro | No | ALL | No | X | |
| | 0Dh | Shift time too short | − | 0 to 65535 | − | U16 | ro | No | ALL | No | X | |
| | 0Eh | RxPDO toggle failed | − | 0 to 65535 | − | U16 | ro | No | ALL | No | X | |
| | 20h | Sync error | − | 0 to 1 | − | BOOL | ro | No | ALL | No | X | |

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## 14.4   Servo Parameter Area (3000h to 3FFFh)

For correspondence between parameter numbers and object numbers, see *"14.2 How to view the Servo Parameter Area (3000h to 3FFFh)"* .

### 14.4.1   Class 0: Basic Settings

—: N/A

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3000h | 00h | Reserved | — | — | 1 | I16 | — | — | — | — | — | — |
| 3001h | 00h | Control mode setup | — | 0 to 6 | 0 | I16 | rw | No | ALL | Yes | R | — |
| 3002h | 00h | Real-time auto-gain tuning setup | — | 0 to 7 | 1 | I16 | rw | No | ALL | Yes | B | — |
| 3003h | 00h | Real-time auto-tuning machine stiffness setup | — | 0 to 31 | Sizes A, B: 13 Sizes C, D: 11 (13) [*3] | I16 | rw | No | ALL | Yes | B | |
| 3004h | 00h | Inertia ratio | % | 0 to 100000 | 250 | I32 | rw | No | ALL | Yes | B | — |
| 3008h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3009h | 00h | Reserved | — | — | 1 | I32 | — | — | — | — | — | |
| 3010h | 00h | Reserved | — | — | 1 | I32 | — | — | — | — | — | |
| 3011h | 00h | Number of output pulses per motor revolution | pulse/r | 1 to 33554432 | 2500 | I32 | rw | No | ALL | Yes | R | — |
| 3012h | 00h | Reversal of pulse output logic | — | 0 to 3 | 0 | I16 | rw | No | ALL | Yes | R | |
| 3013h | 00h | 1st torque limit | % | 0 to 500 | 500 [*2] | I16 | rw | No | ALL | Yes | B | — |
| 3014h | 00h | Position deviation excess setup | Command unit | 0 to 1073741824 | 83886080 | I32 | rw | No | csp pp hm ip | Yes | A | — |
| 3015h | 00h | Absolute encoder setup | — | 0 to 4 | 1 | I16 | rw | No | csp (S) pp (S) hm (S) ip (S) csv (S) pv (S) cst (S) tq (S) | Yes | C | — |
| 3016h | 00h | External regenerative resistor set-up | — | 0 to 3 | Sizes A, B: 3 Sizes C, D: 0 | I16 | rw | No | ALL | Yes | C | — |
| 3017h | 00h | Selection of load factor for external regenerative resistor | — | 0 to 4 | 0 | I16 | rw | No | ALL | Yes | C | |
| 3018h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3022h | 00h | Sensor feedback control mode setup [*1] | — | 0 to 1 | 0 | I16 | rw | No | csp | Yes | R | — |
| 3027h | 00h | Selection of machine stiffness at real-time auto-gain tuning 2 | — | 0 to 44 | Sizes A, B: 16 Sizes C, D: 12 (16) [*3] | I16 | rw | No | ALL | Yes | B | — |
| 3028h | 00h | Selection of feed forward stiffness at real-time auto-gain tuning | — | 0 to 44 | Sizes A, B: 16 Sizes C, D: 12 (16) [*3] | I16 | rw | No | ALL | Yes | B | |

*1   Cannot be used with the standard type or multi-function type. Do not change the factory default value.

*2   Factory default values vary depending on the servo driver and motor combination.

   For details, see Operating Instructions (MINAS A7B Series) "8.1 Torque Limit Switching Function" .

*3    Values in parentheses are initial values for models with an instantaneous maximum current (peak value) of less than 24 A.

## 14.4.2 Class 1: Gain Adjustment

—: N/A

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3100h | 00h | 1st gain of position loop | 0.1 s⁻¹ | 0 to 30000 | Sizes A, B: 480<br>Sizes C, D: 320 (480) (*1) | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3101h | 00h | 1st velocity loop gain | 0.1 Hz | 1 to 32767 | Sizes A, B: 270<br>Sizes C, D: 180 (270) (*1) | I16 | rw | No | ALL | Yes | B | |
| 3102h | 00h | 1st velocity loop integration time constant | 0.1 ms | 1 to 10000 | Sizes A, B: 210<br>Sizes C, D: 310 (210) (*1) | I16 | rw | No | ALL | Yes | B | |
| 3103h | 00h | 1st filter of velocity detection | — | 0 to 5 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3104h | 00h | 1st torque filter time constant | 0.01 ms | 0 to 2500 | Sizes A, B: 84<br>Sizes C, D: 126 (84) (*1) | I16 | rw | No | ALL | Yes | B | — |
| 3105h | 00h | 2nd gain of position loop | 0.1 s⁻¹ | 0 to 30000 | Sizes A, B: 480<br>Sizes C, D: 320 (480) (*1) | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3106h | 00h | 2nd velocity loop gain | 0.1 Hz | 1 to 32767 | Sizes A, B: 270<br>Sizes C, D: 180 (270) (*1) | I16 | rw | No | ALL | Yes | B | |
| 3107h | 00h | 2nd velocity loop integration time constant | 0.1 ms | 1 to 10000 | Sizes A, B: 210<br>Sizes C, D: 310 (210) (*1) | I16 | rw | No | ALL | Yes | B | |
| 3108h | 00h | 2nd filter of velocity detection | — | 0 to 5 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3109h | 00h | 2nd torque filter time constant | 0.01 ms | 0 to 2500 | Sizes A, B: 84<br>Sizes C, D: 126 (84) (*1) | I16 | rw | No | ALL | Yes | B | — |
| 3110h | 00h | Velocity feed forward gain | 0.1% | 0 to 4000 | 1000 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3111h | 00h | Velocity feed forward filter | 0.01 ms | 0 to 6400 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3112h | 00h | Torque feed forward gain | 0.1% | 0 to 2000 | 1000 | I16 | rw | No | ALL | Yes | B | |
| 3113h | 00h | Torque feed forward filter | 0.01 ms | 0 to 6400 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3114h | 00h | 2nd gain setup | — | 0 to 1 | 1 | I16 | rw | No | ALL | Yes | B | — |
| 3115h | 00h | Mode of position control switching | — | 0 to 10 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3116h | 00h | Delay time of position control switching | 0.1 ms | 0 to 10000 | 10 | I16 | rw | No | csp pp hm ip | Yes | B | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3117h | 00h | Level of position control switching | – | 0 to 20000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | – |
| 3118h | 00h | Hysteresis at position control switching | – | 0 to 20000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3119h | 00h | Position gain switching time | 0.1 ms | 0 to 10000 | 10 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3120h | 00h | Mode of velocity control switching | – | 0 to 5 | 0 | I16 | rw | No | csv pv | Yes | B | |
| 3121h | 00h | Delay time of velocity control switching | 0.1 ms | 0 to 10000 | 0 | I16 | rw | No | csv pv | Yes | B | |
| 3122h | 00h | Level of velocity control switching | – | 0 to 20000 | 0 | I16 | rw | No | csv pv | Yes | B | |
| 3123h | 00h | Hysteresis at velocity control switching | – | 0 to 20000 | 0 | I16 | rw | No | csv pv | Yes | B | |
| 3124h | 00h | Mode of torque control switching | – | 0 to 3 | 0 | I16 | rw | No | cst tq | Yes | B | |
| 3125h | 00h | Delay time of torque control switching | 0.1 ms | 0 to 10000 | 0 | I16 | rw | No | cst tq | Yes | B | |
| 3126h | 00h | Level of torque control switching | – | 0 to 20000 | 0 | I16 | rw | No | cst tq | Yes | B | |
| 3127h | 00h | Hysteresis at torque control switching | – | 0 to 20000 | 0 | I16 | rw | No | cst tq | Yes | B | |
| 3128h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| ⋮ | | | | | | | | | | | | |
| 3178h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | |
| 31A6h | 00h | 1st position loop gain change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | – |
| 31A7h | 00h | 1st velocity integration change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31A8h | 00h | 1st torque filter change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31A9h | 00h | 2nd position loop gain change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31B0h | 00h | 2nd velocity loop gain change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31B1h | 00h | 2nd velocity integration change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31B2h | 00h | 2nd torque filter change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31B3h | 00h | Load fluctuation compensation filter change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31B4h | 00h | Smoothing filter change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |
| 31B5h | 00h | Tuning filter change ratio | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | |

*1 Values in parentheses are initial values for models with an instantaneous maximum current (peak value) of less than 24 A.

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## 14.4.3   Class 2: Vibration Suppression

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3200h | 00h | Adaptive filter mode setup | − | 0 to 6 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | − |
| 3201h | 00h | 1st notch frequency | Hz | 10 to 5000 | 5000 | I16 | rw | No | ALL | Yes | B | − |
| 3202h | 00h | 1st notch width selection | − | 0 to 20 | 2 | I16 | rw | No | ALL | Yes | B | |
| 3203h | 00h | 1st notch depth selection | − | 0 to 99 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3204h | 00h | 2nd notch frequency | Hz | 10 to 5000 | 5000 | I16 | rw | No | ALL | Yes | B | |
| 3205h | 00h | 2nd notch width selection | − | 0 to 20 | 2 | I16 | rw | No | ALL | Yes | B | |
| 3206h | 00h | 2nd notch depth selection | − | 0 to 99 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3207h | 00h | 3rd notch frequency | Hz | 10 to 5000 | 5000 | I16 | rw | No | ALL | Yes | B | − |
| 3208h | 00h | 3rd notch width selection | − | 0 to 20 | 2 | I16 | rw | No | ALL | Yes | B | |
| 3209h | 00h | 3rd notch depth selection | − | 0 to 99 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3210h | 00h | 4th notch frequency | Hz | 10 to 5000 | 5000 | I16 | rw | No | ALL | Yes | B | |
| 3211h | 00h | 4th notch width selection | − | 0 to 20 | 2 | I16 | rw | No | ALL | Yes | B | |
| 3212h | 00h | 4th notch depth selection | − | 0 to 99 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3213h | 00h | Selection of damping filter switching | − | 0 to 7 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | − |
| 3214h | 00h | 1st damping frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | − |
| 3215h | 00h | 1st damping filter setup | 0.1 Hz | 0 to 1500 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3216h | 00h | 2nd damping frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3217h | 00h | 2nd damping filter setup | 0.1 Hz | 0 to 1500 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3218h | 00h | 3rd damping frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3219h | 00h | 3rd damping filter setup | 0.1 Hz | 0 to 1500 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3220h | 00h | 4th damping frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3221h | 00h | 4th damping filter setup | 0.1 Hz | 0 to 1500 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3222h | 00h | Positional command smoothing filter | 0.1 ms | 0 to 10000 | Sizes A, B: 92 Sizes C, D: 139 (92) (*1) | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |
| 3223h | 00h | Positional command FIR filter | 0.1 ms | 0 to 10000 | 10 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3224h | 00h | 5th notch frequency | Hz | 10 to 5000 | 5000 | I16 | rw | No | ALL | Yes | B | — |
| 3225h | 00h | 5th notch width selection | — | 0 to 20 | 2 | I16 | rw | No | ALL | Yes | B | |
| 3226h | 00h | 5th notch depth selection | — | 0 to 99 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3227h | 00h | 1st damping width setting | — | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3228h | 00h | 2nd damping width setting | — | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3229h | 00h | 3rd damping width setting | — | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3230h | 00h | 4th damping width setting | — | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3231h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| ⋮ | | | | | | | | | | | | |
| 3237h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | |
| 3238h | 00h | Filter function switching | — | -32768 to 32767 | 3 | I16 | rw | No | ALL | Yes | B | — |
| | | ● bit 0: Custom notch filter | | | | | | | | | | — |
| | | ● bit 1: Tuning filter 2 | | | | | | | | | | — |
| 3239h | 00h | Custom notch compensation coefficient | 0.01 | 0 to 1000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3240h | 00h | Custom notch compensation frequency1 | 0.1 Hz | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3241h | 00h | Custom notch compensation frequency2 | 0.1 Hz | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3242h | 00h | Custom notch frequency | Hz | 10 to 5000 | 5000 | I16 | rw | No | ALL | Yes | B | |
| 3243h | 00h | Custom notch width | — | 0 to 20 | 2 | I16 | rw | No | ALL | Yes | B | |
| 3244h | 00h | Custom notch depth | — | 0 to 99 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3245h | 00h | Function expansion setup 10 | — | -2147483648 to 2147483647 | 61 | I32 | rw | No | ALL | Yes | B | — |
| | | ● bit 1 to 0: Two-degree-of-freedom control function setting | | | | | | | | | | — |
| | | ● bit 2: Friction torque compensation parameter selection | | | | | | | | | | — |
| | | ● bit 3: Load fluctuation suppression function automatic calculation | | | | | | | | | | — |
| | | ● bit 5 to 4: Stiffness setting resolution, individual FB/FF setting switching | | | | | | | | | | — |
| 3246h | 00h | Tuning filter 2 | 0.01 ms | 0 to 20000 | Size A: 110 Size B: 120 Sizes C, D: 170 (120) (*1) | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3250h | 00h | Detection start vibration count | — | 0 to 100 | 3 | I16 | rw | No | csp pp | Yes | B | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3251h | 00h | Detected vibration amplitude | Command unit | 0 to 134217728 | 0 | I32 | rw | No | csp pp | Yes | B | — |
| 3252h | 00h | Torque command additional value 2 | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |
| 3253h | 00h | Positive direction torque compensation value 2 | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3254h | 00h | Negative direction torque compensation value 2 | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3261h | 00h | Target settling time | ms | 0 to 32767 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3262h | 00h | Settling time count condition | — | 0 to 1 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3263h | 00h | Allowable overshoot amount | % | 0 to 500 | 100 | I16 | rw | No | ALL | Yes | A | |
| 3264h | 00h | Tuning amount of movement | Command unit | 0 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3265h | 00h | Tuning max speed | r/min | 0 to 20000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3266h | 00h | Tuning acceleration and deceleration time | ms | 0 to 5000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3267h | 00h | Tuning wait time | ms | 0 to 10000 | 2000 | I16 | rw | No | ALL | Yes | A | |
| 3268h | 00h | Tuning operating range upper limit | Command unit | 0 to 1073741823 | 8388608 | I32 | rw | No | ALL | Yes | A | |
| 3269h | 00h | Tuning operating range lower limit | Command unit | -1073741824 to 0 | -8388608 | I32 | rw | No | ALL | Yes | A | |
| 3270h | 00h | Tuning overspeed level setting | r/min | 0 to 20000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3271h | 00h | Tuning torque limit | % | 0 to 500 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3272h | 00h | Tuning start RTAT machine stiffness setting | — | 0 to 44 | 8 | I16 | rw | No | ALL | Yes | A | |
| 3273h | 00h | Tuning stability margin | % | 0 to 100 | 80 | I16 | rw | No | ALL | Yes | A | |
| 3274h | 00h | Tuning auto tuning application selection | — | -32768 to 32767 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3275h | 00h | Tuning step selection | — | -32768 to 32767 | 3 | I16 | rw | No | ALL | Yes | A | — |
| | | ● bit 0: Advance operation | | | | | | | | | | — |
| | | ● bit 1: Homing operation | | | | | | | | | | |
| 3276h | 00h | Tuning target function selection | — | -32768 to 32767 | 1009 | I16 | rw | No | ALL | Yes | A | — |
| | | ● bit 0: Inertia ratio | | | | | | | | | | — |
| | | ● bit 1: Unbalanced load compensation (default disabled) | | | | | | | | | | |
| | | ● bit 2: Dynamic friction compensation (default disabled) | | | | | | | | | | |
| | | ● bit 3: Viscous friction compensation (default disabled) | | | | | | | | | | |
| | | ● bit 4: RTAT machine stiffness setting (position and speed gains, speed integration time constant, torque filter) | | | | | | | | | | |
| | | ● bit 5: RTAT feedforward control section stiffness setting (smoothing filter time constant) | | | | | | | | | | |
| | | ● bit 6: Notch filter | | | | | | | | | | |
| | | ● bit 7: 1st damping filter | | | | | | | | | | |
| | | ● bit 8: 2nd damping filter | | | | | | | | | | |
| | | ● bit 9: Load fluctuation control function | | | | | | | | | | |
| 3277h | 00h | Tuning start position | Command unit | -1073741824 to 1073741823 | 0 | I32 | rw | No | ALL | Yes | A | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3278h | 00h | Tuning vibration automatic suppression ef-fective level | % | 0 to 100 | 15 | I16 | rw | No | ALL | Yes | A | — |
| 3279h | 00h | Tuning JOG test run command speed | r/min | 0 to 500 | 60 | I16 | rw | No | ALL | Yes | A | |
| 3280h | 00h | Tuning JOG test run acceleration and de-celeration time | ms | 0 to 5000 | 50 | I16 | rw | No | ALL | Yes | A | |

*1    Values in parentheses are initial values for models with an instantaneous maximum current (peak value) of less than 24 A.

### 14.4.4   Class 3: Velocity/Torque Control/Full-closed Control

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3304h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| | | | | ⋮ | | | | | | | | |
| 3307h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | |
| 3312h | 00h | Acceleration time setup | ms/ (1000 r/min) | 0 to 10000 | 0 | I16 | rw | No | csv pv | Yes | B | – |
| 3313h | 00h | Deceleration time setup | ms/ (1000 r/min) | 0 to 10000 | 0 | I16 | rw | No | csv pv | Yes | B | |
| 3314h | 00h | Sigmoid acceleration / deceleration time setup | ms | 0 to 1000 | 0 | I16 | rw | No | csv pv | Yes | B | |
| 3317h | 00h | Selection of speed limit | – | 2 | 2 | I16 | rw | No | cst tq | Yes | B | – |
| 3321h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3322h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3323h | 00h | External scale selection | – | 0 to 2 | 0 | I16 | rw | No | ALL | Yes | R | – |
| 3324h | 00h | Numerator of external scale division | – | 0 to 134217728 | 0 | I32 | rw | No | csp (F) pp (F) hm (F) ip (F) | Yes | R | – |
| 3325h | 00h | Denominator of external scale division | – | 1 to 134217728 | 10000 | I32 | rw | No | csp (F) pp (F) hm (F) ip (F) | Yes | R | |
| 3326h | 00h | Reversal of direction of external scale | – | 0 to 3 | 0 | I16 | rw | No | ALL | Yes | R | – |
| 3327h | 00h | External scale Z phase disconnection detection disable | – | 0 to 1 | 0 | I16 | rw | No | ALL | Yes | R | – |
| 3328h | 00h | Hybrid deviation excess setup | Command unit | 1 to 134217728 | 16000 | I32 | rw | No | csp (F) pp (F) hm (F) ip (F) | Yes | C | – |
| 3329h | 00h | Hybrid deviation clear setup | Rotation | 0 to 100 | 0 | I16 | rw | No | csp (F) pp (F) hm (F) ip (F) | Yes | C | |
| 3333h (*1) | 00h | Analog input gain | Command unit/mV | 0 to 30000 | 0 | I16 | rw | No | csp | Yes | B | – |
| 3334h (*1) | 00h | Analog input polarity | – | 0 to 1 | 0 | I16 | rw | No | csp | Yes | B | |
| 3335h (*1) | 00h | Analog input integration time constant | 0.01 ms | 0 to 100000 | 0 | I32 | rw | No | csp | Yes | B | |
| 3336h (*1) | 00h | Analog input integration limit | Command unit/mV | 0 to 2147483647 | 0 | I32 | rw | No | csp | Yes | B | |

*1    Cannot be used with the standard type or multi-function type. Do not change the factory default value.

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### 14.4.5   Class 4: I/O Monitor Settings

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|-------|-----------|------|-------|-------|---------------|-----------|--------|-----|---------|--------|-----------|-----------|
| 3400h | 00h | SI1 input selection | — | 0 to 16777215 | 3289650 | I32 | rw | No | ALL | Yes | C | — |
| 3401h | 00h | SI2 input selection | — | 0 to 16777215 | 8487297 | I32 | rw | No | ALL | Yes | C | |
| 3402h | 00h | SI3 input selection | — | 0 to 16777215 | 8553090 | I32 | rw | No | ALL | Yes | C | |
| 3403h | 00h | SI4 input selection | — | 0 to 16777215 | 2236962 | I32 | rw | No | ALL | Yes | C | |
| 3404h | 00h | SI5 input selection | — | 0 to 16777215 | 2105376 | I32 | rw | No | ALL | Yes | C | |
| 3405h | 00h | SI6 input selection | — | 0 to 16777215 | 2171169 | I32 | rw | No | ALL | Yes | C | |
| 3406h | 00h | SI7 input selection | — | 0 to 16777215 | 3158064 | I32 | rw | No | ALL | Yes | C | |
| 3407h | 00h | SI8 input selection | — | 0 to 16777215 | 3223857 | I32 | rw | No | ALL | Yes | C | |
| 3410h | 00h | SO1 output selection | — | 0 to 16777215 | 197379 | I32 | rw | No | ALL | Yes | C | — |
| 3411h | 00h | SO2 output selection | — | 0 to 16777215 | 1052688 | I32 | rw | No | ALL | Yes | C | |
| 3412h | 00h | SO3 output selection | — | 0 to 16777215 | 65793 | I32 | rw | No | ALL | Yes | C | |
| 3416h | 00h | Type of analog monitor 1 | — | 0 to 35 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3417h | 00h | Analog monitor 1 output gain | — | 0 to 214748364 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3418h | 00h | Type of analog monitor 2 | — | 0 to 35 | 4 | I16 | rw | No | ALL | Yes | A | |
| 3419h | 00h | Analog monitor 2 output gain | — | 0 to 214748364 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3421h | 00h | Analog monitor output setup | — | 0 to 2 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3422h (*1) | 00h | Analog input (AIN) offset setting | 0.375 mV | -26666 to 26666 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3423h (*1) | 00h | Analog input (AIN) filter setting | 0.01 ms | 0 to 6400 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3424h (*1) | 00h | Analog input (AIN) excessive setting | 0.1 V | 0 to 100 | 0 | I16 | rw | No | ALL | Yes | B | |
| 3431h | 00h | Positioning complete (In-position) range | Command unit | 0 to 2097152 | 8400 | I32 | rw | No | csp pp hm ip | Yes | A | — |
| 3432h | 00h | Positioning complete (In-position) output setup | — | 0 to 10 | 0 | I16 | rw | No | csp pp hm ip | Yes | A | — |
| 3433h | 00h | INP hold time | ms | 0 to 30000 | 0 | I16 | rw | No | csp pp hm ip | Yes | A | |
| 3434h | 00h | Zero-speed | r/min | 10 to 20000 | 50 | I16 | rw | No | ALL | Yes | A | — |
| 3435h | 00h | Speed coincidence range | r/min | 10 to 20000 | 50 | I16 | rw | No | csv pv cst tq | Yes | A | — |
| 3436h | 00h | At-speed (Speed arrival) | r/min | 10 to 20000 | 1000 | I16 | rw | No | csv pv cst tq | Yes | A | — |
| 3437h | 00h | Mechanical brake action at stalling setup | ms | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3438h | 00h | Mechanical brake action at running setup | ms | 0 to 32000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3439h | 00h | Brake release speed setup | r/min | 30 to 3000 | 30 | I16 | rw | No | ALL | Yes | B | — |
| 3440h | 00h | Selection of alarm output 1 | — | 0 to 32767 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3441h | 00h | Selection of alarm output 2 | — | 0 to 32767 | 0 | I16 | rw | No | ALL | Yes | A | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3442h | 00h | Positioning complete (In-position) range 2 | Command unit | 0 to 2097152 | 8400 | I32 | rw | No | csp pp hm ip | Yes | A | — |
| 3444h | 00h | Position comparison output pulse width setting | 0.1 ms | 0 to 32767 | 0 | I16 | rw | No | ALL | Yes | R | — |
| 3445h | 00h | Position comparison output polarity selection | — | 0 to 7 | 0 | I16 | rw | No | ALL | Yes | R | — |
| | | ● bit 0: Polarity for SO1 (general-purpose output) or OCMP1 (encoder/position comparison output terminal) | | | | | | | | | | — |
| | | ● bit 1: Polarity for SO2 (general-purpose output) or OCMP2 (encoder/position comparison output terminal) | | | | | | | | | | |
| | | ● bit 2: Polarity for SO3 (general-purpose output) or OCMP3 (encoder/position comparison output terminal) | | | | | | | | | | |
| 3447h | 00h | Pulse output selection | — | 0 to 1 | 0 | I16 | rw | No | ALL | Yes | R | — |
| 3448h | 00h | Position comparison value 1 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | — |
| 3449h | 00h | Position comparison value 2 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3450h | 00h | Position comparison value 3 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3451h | 00h | Position comparison value 4 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3452h | 00h | Position comparison value 5 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3453h | 00h | Position comparison value 6 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3454h | 00h | Position comparison value 7 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3455h | 00h | Position comparison value 8 | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | A | |
| 3456h | 00h | Position comparison output delay compensation amount | 0.1 μs | -32768 to 32767 | 0 | I16 | rw | No | ALL | Yes | R | |
| 3457h | 00h | Position comparison output assignment setting | — | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | R | — |
| | | ● bit 3 to 0: Position comparison 1 | | | | | | | | | | — |
| | | ● bit 7 to 4: Position comparison 2 | | | | | | | | | | |
| | | ● bit 11 to 8: Position comparison 3 | | | | | | | | | | |
| | | ● bit 15 to 12: Position comparison 4 | | | | | | | | | | |
| | | ● bit 19 to 16: Position comparison 5 | | | | | | | | | | |
| | | ● bit 23 to 20: Position comparison 6 | | | | | | | | | | |
| | | ● bit 27 to 24: Position comparison 7 | | | | | | | | | | |
| | | ● bit 31 to 28: Position comparison 8 | | | | | | | | | | |
| 3463h | 00h | Reserved | — | — | 5242884 | I32 | — | — | — | — | — | — |
| 3464h | 00h | Reserved | — | — | 64 | I32 | — | — | — | — | — | — |

*1 Cannot be used with the standard type or multi-function type. Do not change the factory default value.

### 14.4.6   Class 5: Enhancing Settings

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3503h | 00h | Denominator of pulse output division | — | 0 to 134217728 | 0 | I32 | rw | No | ALL | Yes | R | — |
| 3504h | 00h | Over-travel inhibit input setup | — | 0 to 2 | 1 | I16 | rw | No | ALL | Yes | C | — |
| 3505h | 00h | Sequence at over-travel inhibit | — | 0 to 2 | 0 | I16 | rw | No | ALL | Yes | C | — |
| 3506h | 00h | Sequence at Servo-Off | — | 0 to 9 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3507h | 00h | Sequence upon main power off | — | 0 to 9 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3508h | 00h | L/V trip selection upon main power off | — | 0 to 3 | 0 | I16 | rw | No | ALL | Yes | B | — |
| | | ● bit 0: Operation selection with main power supply OFF | | | | | | | | | | — |
| | | ● bit 1: Main power off warning condition detection time | | | | | | | | | | |
| 3509h | 00h | Detection time of main power off | ms | 20 to 2000 | 2000 | I16 | rw | No | ALL | Yes | C | — |
| 3510h | 00h | Sequence at alarm | — | 0 to 7 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3511h | 00h | Torque setup for emergency stop | % | 0 to 500 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3512h | 00h | Motor over-load level setup | % | 0 to 500 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3513h | 00h | Over-speed level setup | r/min | 0 to 20000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3514h | 00h | Motor working range setup | 0.1 rotation | 0 to 1000 | 10 | I16 | rw | No | csp pp hm ip | Yes | A | — |
| 3515h | 00h | Control input signal reading setup | — | 0 to 3 | 0 | I16 | rw | No | ALL | Yes | C | — |
| 3516h | 00h | Reserved | — | — | 1 | I16 | — | — | — | — | — | — |
| 3520h | 00h | Position setup unit select | — | 0 to 1 | 0 | I16 | rw | No | csp pp hm ip | Yes | C | — |
| 3521h | 00h | Selection of torque limit | — | 0 to 5 | 1 | I16 | rw | No | ALL | Yes | B | — |
| 3522h | 00h | 2nd torque limit | % | 0 to 500 | 500 (*1) | I16 | rw | No | csp pp hm ip csv pv | Yes | B | |
| 3525h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3526h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3529h | 00h | Reserved | — | — | 2 | I16 | — | — | — | — | — | — |
| 3531h | 00h | USB axis address | — | 0 to 127 | 1 | I16 | rw | No | ALL | Yes | C | — |
| 3533h | 00h | Pulse regenerative output limit setup | — | 0 to 1 | 0 | I16 | rw | No | ALL | Yes | C | — |
| 3534h | 00h | Reserved | — | — | 4 | I16 | — | — | — | — | — | — |
| 3536h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3545h | 00h | Quadrant glitch positive-direction compensation value | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3546h | 00h | Quadrant glitch negative-direction compensation value | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3547h | 00h | Quadrant glitch compensation delay time | ms | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3548h | 00h | Quadrant glitch compensation filter setting L | 0.01 ms | 0 to 6400 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3549h | 00h | Quadrant glitch compensation filter setting H | 0.1 ms | 0 to 10000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3550h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3555h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | |
| 3556h | 00h | Slow stop deceleration time setting | ms/ (1000 r/min) | 0 to 10000 | 0 | I16 | rw | No | csp (S) pp (S) hm (S) ip (S) csv (S) pv (S) cst (S) tq (S) | Yes | B | — |
| 3557h | 00h | Slow stop S-shape acceleration and deceleration setting | ms | 0 to 1000 | 0 | I16 | rw | No | csp (S) pp (S) hm (S) ip (S) csv (S) pv (S) cst (S) tq (S) | Yes | B | |
| 3566h | 00h | Deterioration diagnosis convergence judgment time | 0.1 s | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3567h | 00h | Deterioration diagnosis inertia ratio upper limit | % | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3568h | 00h | Deterioration diagnosis inertia ratio lower limit | % | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3569h | 00h | Deterioration diagnosis unbalanced load upper limit | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3570h | 00h | Deterioration diagnosis unbalanced load lower limit | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3571h | 00h | Deterioration diagnosis dynamic friction upper limit | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3572h | 00h | Deterioration diagnosis dynamic friction lower limit | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3573h | 00h | Deterioration diagnosis viscous friction upper limit | 0.1%/ (10000 r/min) | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3574h | 00h | Deterioration diagnosis viscous friction lower limit | 0.1%/ (10000 r/min) | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3575h | 00h | Deterioration diagnosis velocity setting | r/min | -20000 to 20000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3576h | 00h | Deterioration diagnosis torque average time | ms | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3577h | 00h | Deterioration diagnosis torque upper limit | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3578h | 00h | Deterioration diagnosis torque lower limit | 0.1% | -1000 to 1000 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3595h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 35B0h | 00h | Driver derating factor | % | 0 to 100 | 100 | I16 | rw | No | ALL | Yes | A | — |
| 35B2h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |

*1    Factory default values vary depending on the servo driver and motor combination.

R1.0

For details, see Operating Instructions (MINAS A7B Series) "8.1 Torque Limit Switching Function" .

R1.0

## 14.4.7  Class 6: Special Settings

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3602h | 00h | Speed deviation excess setup | r/min | 0 to 20000 | 0 | I16 | rw | No | csp (S) pp (S) hm (S) ip (S) | Yes | A | — |
| 3603h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3605h | 00h | Position 3rd gain valid time | 0.1 ms | 0 to 10000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3606h | 00h | Position 3rd gain scale factor | % | 50 to 1000 | 100 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3607h | 00h | Torque command additional value | % | -100 to 100 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |
| 3608h | 00h | Positive direction torque compensation value | % | -100 to 100 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3609h | 00h | Negative direction torque compensation value | % | -100 to 100 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3610h | 00h | Function expansion setup | — | -32768 to 32767 | 528 | I16 | rw | No | ALL | Yes | B | — |
| | | ● bit 1: Load fluctuation control function | | | | | | | | | | — |
| | | ● bit 2: Load fluctuation stabilization setting | | | | | | | | | | |
| | | ● bit 4: Current response improvement | | | | | | | | | | — |
| | | ● bit 10: Fall prevention function during an alarm | | | | | | | | | | — |
| | | ● bit 11: Encoder overheat error protection detection | | | | | | | | | | — |
| | | ● bit 14: Load fluctuation suppression function automatic tuning | | | | | | | | | | — |
| | | ● bit 15: Slow stop function | | | | | | | | | | — |
| 3611h | 00h | Current loop gain response setup | % | 10 to 300 | 100 | I16 | rw | No | ALL | Yes | B | — |
| 3614h | 00h | Emergency stop time at alarm | ms | 0 to 1000 | 200 | I16 | rw | No | ALL | Yes | B | — |
| 3615h | 00h | 2nd over-speed level setup | r/min | 0 to 20000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3618h | 00h | Power-up wait time | 100 ms | 0 to 100 | 0 | I16 | rw | No | ALL | Yes | R | — |
| 3619h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3620h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3621h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3622h | 00h | AB phase external scale pulse outputting method selection | — | 0 to 1 | 0 | I16 | rw | No | csp (F) pp (F) hm (F) ip (F) | Yes | R | — |
| 3623h | 00h | Load change compensation gain | % | -100 to 100 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3624h | 00h | Load change compensation filter | 0.01 ms | 10 to 2500 | 53 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |
| 3626h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3627h | 00h | Warning latch state setup | — | 0 to 3 | 3 | I16 | rw | No | ALL | Yes | C | — |
| | | ● bit 0: Expanded warnings | | | | | | | | | | — |
| | | ● bit 1: General warnings | | | | | | | | | | |
| 3630h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3631h | 00h | Real time auto tuning estimation speed | — | 0 to 3 | 1 | I16 | rw | No | ALL | Yes | B | — |
| 3632h | 00h | Real time auto tuning custom set-up | — | -32768 to 32767 | 0 | I16 | rw | No | ALL | Yes | B | — |
| | | ● bit 1 to 0: Load characteristics estimation | | | | | | | | | | — |
| | | ● bit 3 to 2: Inertia Ratio Update | | | | | | | | | | |
| | | ● bit 6 to 4: Torque compensation | | | | | | | | | | |
| | | ● bit 7: Stiffness Setup | | | | | | | | | | |
| | | ● bit 8: Fixed Parameter Setup | | | | | | | | | | |
| | | ● bit 10 to 9: Gain Switching Setup | | | | | | | | | | |
| | | ● bit 11: Torque compensation setting switching | | | | | | | | | | |
| | | ● bit 15 to 12: Individual torque compensation settings | | | | | | | | | | |
| 3634h | 00h | Hybrid vibration suppression gain | 0.1 s⁻¹ | 0 to 30000 | 0 | I16 | rw | No | csp (F) pp (F) hm (F) ip (F) | Yes | B | — |
| 3635h | 00h | Hybrid vibration suppression filter | 0.01 ms | 0 to 32000 | 10 | I16 | rw | No | csp (F) pp (F) hm (F) ip (F) | Yes | B | |
| 3636h | 00h | Dynamic brake operation input setup | — | 0 to 1 | 0 | I16 | rw | No | ALL | Yes | R | — |
| 3637h | 00h | Oscillation detecting level | 0.1% | 0 to 1000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3638h | 00h | Warning mask setup | — | -32768 to 32767 | 4 | I16 | rw | No | ALL | Yes | C | |
| 3639h | 00h | Warning mask setup 2 | — | -32768 to 32767 | 0 | I16 | rw | No | ALL | Yes | C | |
| 3641h | 00h | 1st damping depth | — | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3642h | 00h | 2-stage torque filter time constant | 0.01 ms | 0 to 2500 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3643h | 00h | 2-stage torque filter attenuation term | — | 0 to 1000 | 1000 | I16 | rw | No | ALL | Yes | B | |
| 3647h | 00h | Function expansion setup 2 | — | -32768 to 32767 | 1 | I16 | rw | No | ALL | Yes | R | — |
| | | ● bit 0: Two-degree-of-freedom control mode | | | | | | | | | | — |
| | | ● bit 2: Encoder communication error/warning judgment setup | | | | | | | | | | — |
| | | ● bit 3: Two-degree-of-freedom control real-time auto tuning selection | | | | | | | | | | — |
| | | ● bit 14: Quadrant glitch compensation function | | | | | | | | | | — |
| 3648h | 00h | Tuning filter | 0.1 ms | 0 to 2000 | Size A: 11 Size B: 12 Sizes C, D: 17 (12) (*1) | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3649h | 00h | Command/tuning filter damping | — | 0 to 99 | 15 | I16 | rw | No | csp<br>pp<br>hm<br>ip | Yes | B | — |
| 3650h | 00h | Viscous friction compensating gain | 0.1%/<br>(10000 r/min) | 0 to 10000 | 0 | I16 | rw | No | csp<br>pp<br>hm<br>ip<br>csv<br>pv | Yes | B | — |
| 3651h | 00h | Wait time for emergency stop | ms | 0 to 10000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3652h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| | | | | ⋮ | | | | | | | | |
| 3654h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | |
| 3657h | 00h | Torque saturation error protection detection time | ms | 0 to 5000 | 0 | I16 | rw | No | csp<br>pp<br>hm<br>ip<br>csv<br>pv | Yes | B | — |
| 3658h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3659h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3660h | 00h | 2nd damping depth | — | 0 to 1000 | 0 | I16 | rw | No | csp<br>pp<br>hm<br>ip | Yes | B | — |
| 3661h | 00h | 1st resonance frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp (S)<br>pp (S)<br>hm (S)<br>ip (S) | Yes | B | — |
| 3662h | 00h | 1st resonance attenuation ratio | — | 0 to 1000 | 0 | I16 | rw | No | csp (S)<br>pp (S)<br>hm (S)<br>ip (S) | Yes | B | |
| 3663h | 00h | 1st anti-resonance frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp (S)<br>pp (S)<br>hm (S)<br>ip (S) | Yes | B | |
| 3664h | 00h | 1st anti-resonance attenuation ratio | — | 0 to 1000 | 0 | I16 | rw | No | csp (S)<br>pp (S)<br>hm (S)<br>ip (S) | Yes | B | |
| 3665h | 00h | 1st response frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp (S)<br>pp (S)<br>hm (S)<br>ip (S) | Yes | B | |
| 3666h | 00h | 2nd resonance frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp (S)<br>pp (S)<br>hm (S)<br>ip (S) | Yes | B | |
| 3667h | 00h | 2nd resonance attenuation ratio | — | 0 to 1000 | 0 | I16 | rw | No | csp (S)<br>pp (S)<br>hm (S)<br>ip (S) | Yes | B | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3668h | 00h | 2nd anti-resonance frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp (S) pp (S) hm (S) ip (S) | Yes | B | — |
| 3669h | 00h | 2nd anti-resonance attenuation ratio | — | 0 to 1000 | 0 | I16 | rw | No | csp (S) pp (S) hm (S) ip (S) | Yes | B | |
| 3670h | 00h | 2nd response frequency | 0.1 Hz | 0 to 3000 | 0 | I16 | rw | No | csp (S) pp (S) hm (S) ip (S) | Yes | B | |
| 3671h | 00h | 3rd damping depth | — | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| 3672h | 00h | 4th damping depth | — | 0 to 1000 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3673h | 00h | Load estimation filter | 0.01 ms | 0 to 2500 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |
| 3674h | 00h | Torque compensation frequency 1 | 0.1 Hz | 0 to 5000 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | |
| 3675h | 00h | Torque compensation frequency 2 | 0.1 Hz | 0 to 5000 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | |
| 3676h | 00h | Load estimation count | — | 0 to 8 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | |
| 3685h | 00h | Retracting operation condition setting | — | -32768 to 32767 | 0 | I16 | rw | No | ALL | Yes | C | — |
| | | ● bits 3 to 0: Non-communication settings | | | | | | | | | | — |
| | | ● bits 7 to 4: Communication-related setting | | | | | | | | | | |
| | | ● bits 9 to 8: Judgment condition for stopping retracting operation | | | | | | | | | | |
| 3686h | 00h | Retracting operation alarm setting | — | 0 to 7 | 0 | I16 | rw | No | ALL | Yes | C | — |
| | | ● bit 0: Err87.1.0 "Retracting operation completion (I/O)" | | | | | | | | | | — |
| | | ● bit 1: Err87.2.0 "Retracting operation completion (communication)" | | | | | | | | | | |
| | | ● bit 2: Err87.3.0 "Retracting operation error" | | | | | | | | | | |
| 3687h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3688h | 00h | Absolute encoder multi-turn data upper-limit value | — | 0 to 65534 | 0 | I32 | rw | No | ALL | Yes | C | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3695h | 00h | Motor over-load warning detection level | % | 0 to 114 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3696h | 00h | Motor over-load warning release level | % | 0 to 114 | 0 | I16 | rw | No | ALL | Yes | A | |
| 3697h | 00h | Function expansion setup 3 | — | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | B | — |
| | | ● bit 0: Quadrant glitch compensation HPF clear | | | | | | | | | | — |
| | | ● bit 1: Deterioration Diagnosis Warning Function | | | | | | | | | | — |
| | | ● bit 2: Motor movable range error protection expansion | | | | | | | | | | — |
| | | ● bit 3: Selection of external scale single-turn data monitor | | | | | | | | | | — |
| | | ● bit 6: Switches position information during backlash correction | | | | | | | | | | — |
| | | ● bit 8: Target control mode extension of Obj.607Fh:00h "Max profile velocity" | | | | | | | | | | — |
| | | ● bit 11: External scale position latch during semi-closed control | | | | | | | | | | — |
| | | ● bit 12: Speed limit priority function during torque control | | | | | | | | | | — |
| | | ● bit 13: Touch probe latch completion status toggle output enabled | | | | | | | | | | — |
| | | ● bit 14: Over-travel inhibit warning | | | | | | | | | | — |
| | | ● bit 27: Alarm display switch setting | | | | | | | | | | — |
| 3698h | 00h | Function expansion setup 4 | — | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | R | — |
| | | ● bit 3: Effective bit expansion for multi-turn data | | | | | | | | | | — |
| | | ● bit 8: Control mode switch function expansion | | | | | | | | | | — |
| | | ● bit 10: Selection of external scale single-turn data output format | | | | | | | | | | — |
| | | ● bit 21: Expand conditions for canceling over-travel inhibit | | | | | | | | | | — |
| 36A0h | 00h | Reserved | — | — | 4000 | I16 | — | — | — | — | — | — |
| 36A1h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 36A2h | 00h | Over-travel inhibit release level setup | Command unit | 0 to 2147483647 | 0 | I32 | rw | No | csp | Yes | B | — |
| 36A4h | 00h | Open-phase monitoring setup | — | 0 to 3 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 36A6h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 36C1h | 00h | Current feed forward response setup | % | 0 to 300 | 100 | I16 | rw | No | ALL | Yes | B | — |
| 36C5h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 36C6h | 00h | Warning2 mask setup | — | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | C | — |
| 36C7h | 00h | Warning3 mask setup | — | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | C | |

*1 Values in parentheses are initial values for models with an instantaneous maximum current (peak value) of less than 24 A.

### 14.4.8 Class 7: Special Settings 2

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3700h | 00h | Display on LED | — | 0 to 32767 | 0 | I16 | rw | No | ALL | Yes | A | — |
| 3701h | 00h | Display time setup upon power-up | 100 ms | 0 to 1000 | 0 | I16 | rw | No | ALL | Yes | R | |
| 3703h | 00h | Output setup during torque limit | — | 0 to 1 | 0 | I16 | rw | No | cst tq | Yes | A | — |
| 3704h | 00h | Backlash compensation enable | — | 0 to 7 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | — |
| | | • bits 1 to 0: Enable or disable backlash compensation and select the direction of operation during compensation | | | | | | | | | | — |
| | | • bit 2: Expand backlash compensation retention conditions | | | | | | | | | | |
| 3705h | 00h | Backlash compensation value | pulse | -1073741824 to 1073741823 | 0 | I32 | rw | No | csp pp hm ip | Yes | B | — |
| 3706h | 00h | Constant for backlash compensation | 0.01 ms | 0 to 6400 | 0 | I16 | rw | No | csp pp hm ip | Yes | B | |
| 3707h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3708h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3709h | 00h | Correction time of latch delay 1 | 25 ns | -2000 to 2000 | 360 | I16 | rw | No | ALL | Yes | B | — |
| 3710h | 00h | Reserved | — | — | 3 | I16 | — | — | — | — | — | — |
| 3711h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| ⋮ | | | | | | | | | | | | |
| 3713h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3714h | 00h | Main power off warning detection time | ms | 0 to 2000 | 0 | I16 | rw | No | ALL | Yes | C | — |
| 3715h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 3716h | 00h | Torque saturation error protection frequency | Incidences | 0 to 30000 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |
| 3718h | 00h | Backlash compensation value holding range | Command unit | 0 to 2147483647 | 0 | I32 | rw | No | csp pp hm ip | Yes | B | — |
| 3722h | 00h | Communication function extended setup 1 | — | -32768 to 32767 | 0 | I16 | rw | No | ALL | Yes | R | — |
| | | • bit 4: External scale position information monitoring function setting for semi-closed control | | | | | | | | | | — |
| | | • bit 5: Command position change saturation function selection | | | | | | | | | | — |
| | | • bit 6: Homing return velocity limit enabled | | | | | | | | | | — |
| | | • bit 7: Over-travel inhibit input detection setting during Z-phase homing return operation | | | | | | | | | | — |
| | | • bit 11: LINK establishment mode selection | | | | | | | | | | — |
| 3723h | 00h | Communication function extended setup 2 | — | -32768 to 32767 | 16384 | I16 | rw | No | ALL | Yes | B | — |
| | | • bit 14: Position deviation [command unit] output setup | | | | | | | | | | — |
| 3724h | 00h | Communication function extended setup 3 | — | -32768 to 32767 | 14352 | I16 | rw | No | ALL | Yes | C | — |
| | | • bit 0: EX-OUT1 output status setting at the time of communication interrupted after EtherCAT communication is established | | | | | | | | | | — |

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3724h | 00h | ● bit 5: Latch position detection delay compensation function switching | | | | | | | | | | — |
| | | ● bit 7: TFF clear ON/OFF selection from host device | | | | | | | | | | — |
| | | ● bit 11: Condition setting for Obj.6041h: bit 12 "drive follows command value" | | | | | | | | | | — |
| 3739h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3740h | 00h | Station Alias setup (high) | — | 0 to 255 | 0 | I16 | rw | No | ALL | Yes | R | — |
| 3741h | 00h | Station Alias selection | — | 0 to 2 | 1 | I16 | rw | No | ALL | Yes | R | |
| 3742h | 00h | Maximum continuation communication error | — | -32768 to 32767 | -30584 | I16 | rw | No | ALL | Yes | R | — |
| | | ● bits 3 to 0: Err80.7.0 detection threshold | | | | | | | | | | — |
| 3743h | 00h | Lost link detection time | ms | 0 to 32767 | 0 | I16 | rw | No | ALL | Yes | R | — |
| 3744h | 00h | Software version | — | -2147483648 to 2147483647 | 16908546 | I32 | ro | No | ALL | Yes | X | — |
| 3779h | 00h | Reserved | — | — | 0 | I16 | — | — | — | — | — | — |
| 3780h | 00h | Communication function extended setup 8 | — | -32768 to 32767 | 2048 | I16 | rw | No | ALL | Yes | C | — |
| | | ● bit 6: Obj.6041h:00h "Statusword" : bit 12 Expansion setup for "homing attained" | | | | | | | | | | — |
| 3787h | 00h | Communication function extended setup 5 | — | -32768 to 32767 | 3072 | I16 | rw | No | ALL | Yes | C | — |
| 3792h | 00h | Correction time of latch delay 2 | 25 ns | -2000 to 2000 | 0 | I16 | rw | No | ALL | Yes | B | — |
| 3793h | 00h | Homing return speed limit value | r/min | 0 to 20000 | 0 | I16 | rw | No | hm | Yes | C | — |
| 3799h | 00h | Communication function extended setup 6 | — | -32768 to 32767 | 0 | I16 | rw | No | ALL | Yes | B | — |
| | | ● bit 0: Enable/disable FFT execution while EtherCAT communication is established | | | | | | | | | | — |
| | | ● bit 3: Command pulse accumulated value [command unit] output setting | | | | | | | | | | — |
| 37A0h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| | | ⋮ | | | | | | | | | | |
| 37A4h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |
| 37A8h | 00h | Reserved | — | — | 7 | I16 | — | — | — | — | — | — |
| 37A9h | 00h | Reserved | — | — | 1 | I16 | — | — | — | — | — | — |
| 37B0h | 00h | Communication function extended setup 7 | — | -2147483648 to 2147483647 | 384 | I32 | rw | No | ALL | Yes | B | — |
| | | ● bit 7: Err80.7.0 detection function expansion | | | | | | | | | | — |
| | | ● bit 8: Err80.3.0 detection function expansion | | | | | | | | | | — |
| | | ● bit 12: ERR Indicator off specification expansion | | | | | | | | | | — |
| 37B3h | 00h | Torque offset filter | 0.01 ms | 0 to 6400 | 0 | I16 | rw | No | csp pp hm ip csv pv | Yes | B | — |
| 37B7h | 00h | Reserved | — | -2147483648〜2147483647 | 0 | I32 | — | — | — | — | — | — |
| 37C0h | 00h | Absolute scale offset1 | Rotation (multi-turn data), or pulse (external scale upper 32 bits) | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | R | — |
| 37C1h | 00h | Absolute scale offset2 | pulse (single-turn data), or pulse (external scale lower 32 bits) | -2147483648 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | R | — |
| 37C7h | 00h | Reserved | — | — | 0 | I32 | — | — | — | — | — | — |

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### 14.4.9 Class 8: Special Settings 3

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3800h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3801h | 00h | Profile linear acceleration constant | 10,000 command units/s$^2$ | 1 to 429496 | 1 | I32 | rw | No | ALL | Yes | B | – |
| 3802h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3803h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3804h | 00h | Profile linear deceleration constant | 10,000 command units/s$^2$ | 1 to 429496 | 1 | I32 | rw | No | ALL | Yes | B | – |
| 3805h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3810h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | – |
| 3812h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3813h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | – |
| | | | | ⋮ | | | | | | | | |
| 3815h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | |
| 3817h | 00h | Relative movement of retracting operation | Command unit | -2147483647 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | B | – |
| 3818h | 00h | Retracting operation speed | Command unit/s | 0 to 2147483647 | 0 | I32 | rw | No | ALL | Yes | B | |
| 3819h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |

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### 14.4.10  Class 9: Linear Relationship

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3901h | 00h | Feedback scale resolution / Number of scale pulses per rotation | pulse | 0 to 536870912 | 0 | I32 | rw | No | ALL | Yes | R | — |

### 14.4.11 Class 10: Special Settings 4

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3A00h | 00h | Reserved | – | – | – | I16 | – | – | – | – | – | – |
| 3A01h | 00h | Reserved | – | 0〜4 | 0 | I16 | – | – | – | – | – | – |

### 14.4.12   Class 11: Manufacturer Use

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3B00h | 00h | Reserved | – | – | 1 | I16 | – | – | – | – | – | – |
| 3B01h | 00h | Reserved | – | – | 503578880 | I32 | – | – | – | – | – | – |
| 3B02h | 00h | Reserved | – | – | 658185 | I32 | – | – | – | – | – | – |
| 3B03h | 00h | Reserved | – | – | -1 | I32 | – | – | – | – | – | – |
| ⋮ | | | | | | | | | | | | |
| 3B06h | 00h | Reserved | – | – | -1 | I32 | – | – | – | – | – | |
| 3B07h | 00h | Reserved | – | – | 16 | I16 | – | – | – | – | – | – |
| 3B08h | 00h | Reserved | – | – | 6 | I16 | – | – | – | – | – | – |
| 3B09h | 00h | Reserved | – | – | 1 | I16 | – | – | – | – | – | – |
| 3B10h | 00h | Reserved | – | – | 129 | I16 | – | – | – | – | – | – |
| 3B11h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3B12h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | – |
| 3B13h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3B14h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3B15h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | – |
| 3B16h | 00h | Reserved | – | – | 255 | I16 | – | – | – | – | – | – |
| 3B17h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3B18h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | – |
| 3B19h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3B20h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3B21h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | – |
| 3B22h | 00h | Reserved | – | – | 0 | I16 | – | – | – | – | – | – |
| 3B23h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | |
| ⋮ | | | | | | | | | | | | |
| 3B26h | 00h | Reserved | – | – | 0 | I32 | – | – | – | – | – | |

## 14.5 User-specific Area (4000h to 4FFFh)

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4304h | 00h | Touch probe function expansion setup | — | 0 to 65535 | 0 | U16 | rw | RxPDO | ALL | Yes | B | — |
| | | ● bit 0: Touch probe 1 External scale position latch Z-phase switching in semi-closed control | | | | | | | | | | — |
| | | ● bit 1: Touch probe 1 Change storage location of external scale feedback position in semi-closed control | | | | | | | | | | |
| | | ● bit 8: Touch probe 2 External scale position latch Z-phase switching in semi-closed control | | | | | | | | | | |
| | | ● bit 9: Touch probe 2 Change storage location of external scale feedback position in semi-closed control | | | | | | | | | | |
| 4308h | 00h | History number | — | 0 to 3 | 0 | U8 | rw | No | ALL | No | A | — |
| 430Eh | — | Timestamp reference time | — | — | — | — | — | — | — | — | — | |
| | 00h | Number of entries | — | 2 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Timestamp reference time setting 1 | ns | 0 to 4294967295 | 0 | U32 | rw | No | ALL | No | A | |
| | 02h | Timestamp reference time setting 2 | ns | 0 to 4294967295 | 0 | U32 | rw | No | ALL | No | A | |
| 4310h | 00h | Alarm main no | — | 0 to 127 | 0 | U8 | rw | No | ALL | No | A | |
| 4311h | 00h | Reserved | — | — | — | U8 | — | — | — | — | — | — |
| 4312h | 00h | Velocity control loop torque limit | 0.1% | 0 to 65535 | 0 | U16 | rw | RxPDO | ALL | No | A | — |
| 4314h (*1) | 00h | Analog input internal offset | mV | -32768 to 32767 | 0 | I16 | rw | RxPDO | ALL | Yes | A | — |
| 4315h (*1) | 00h | Analog input deviation limit | mV | 0 to 65535 | 0 | U16 | rw | RxPDO | ALL | Yes | A | — |
| 4316h (*1) | — | Analog input voltage setup | — | — | — | — | — | — | — | — | — | |
| | 00h | Number of entries | — | 1 | — | U8 | ro | No | csp | No | X | |
| | 01h | Analog input voltage dead zone | mV | 0 to 65535 | 0 | U16 | rw | RxPDO | ALL | Yes | B | |
| 4317h | 00h | Alarm sub no | — | 0 to 127 | 0 | U8 | rw | No | ALL | No | A | — |
| 4320h (*5) | 00h | Analog monitor output 1 | — | -32768 to 32767 | 0 | I16 | rw | RxPDO | ALL | No | A | — |
| 4321h (*5) | 00h | Analog monitor output 2 | — | -32768 to 32767 | 0 | I16 | rw | RxPDO | ALL | No | A | — |
| 4351h (*5) | 00h | Analog input function | — | 0 to 65535 | 0 | U16 | rw | RxPDO | csp | Yes | B | — |
| | | ● bit 0: Displacement control function switch | | | | | | | | | | — |
| | | ● bit 1: Position command latch switch | | | | | | | | | | |
| 4C00h (*1) | — | Analog servo parameters | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of entries | — | 7 | — | U8 | ro | No | csp | No | B | |
| | 01h | Analog input gain | Command unit/mV | 0 to 30000 | 0 | I16 | rw | No | csp | Yes | B | |
| | 02h | Analog input polarity | — | 0 to 1 | 0 | I16 | rw | No | csp | Yes | B | |
| | 03h | Analog input integration time constant | 0.01 ms | 0 to 100000 | 0 | I32 | rw | No | csp | Yes | B | |
| | 04h | Analog input integration limit | Command unit | 0 to 2147483647 | 0 | I32 | rw | No | csp | Yes | B | |
| | 05h | Analog input (AIN) offset setting | 0.375 mV | -26666 to 26666 | 0 | I16 | rw | No | ALL | Yes | B | |
| | 06h | Analog input (AIN) filter setting | 0.01 ms | 0 to 6400 | 0 | I16 | rw | No | ALL | Yes | B | |
| | 07h | Analog input (AIN) excessive setting | 0.1 V | 0 to 100 | 0 | I16 | rw | No | ALL | Yes | B | |
| 4D00h | — | Special function start | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of entries | — | 3 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Special function start flag 1 | — | 0 to 4294967295 | 0 | U32 | rw | No | ALL | No | B | — |
| | | ● bit 9: Special function start trigger | | | | | | | | | | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4D00h | 02h | Special function start flag 2 | – | 0 to 4294967295 | 0 | U32 | rw | No | ALL | No | B | – |
| | 03h | Reserved | – | – | 0 | U32 | rw | – | – | – | – | – |
| 4D01h | 00h | Special function setting 9 | – | 0 to 65535 | 0 | U16 | rw | No | ALL | No | B | – |
| 4D0Eh | – | Expansion warning flags | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 3 | – | U8 | ro | No | ALL | No | X | |
| | 01h | Expansion warning flags 1 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 02h | Expansion warning flags 2 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 03h | Expansion warning flags 3 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| 4D0Fh | 00h | Reserved | – | – | – | U16 | – | – | – | – | – | – |
| 4D10h | – | External scale ID | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 2 | – | U8 | ro | No | ALL | No | X | |
| | 01h | External scale vendor ID | – | – | – | VS | ro | No | ALL | No | X | |
| | 02h | External scale model ID | – | – | – | VS | ro | No | ALL | No | X | |
| 4D11h | – | Reserved | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 13 | – | U8 | – | – | – | – | – | – |
| | 01h | Reserved 1 | – | – | – | U32 | – | – | – | – | – | – |
| | ⋮ | | | | | | | | | | | |
| | 0Dh | Reserved 13 | – | – | – | U32 | – | – | – | – | – | |
| 4D12h | 00h | Motor serial number | – | – | – | VS | ro | No | ALL | No | X | – |
| 4D13h | 00h | Reserved | – | – | – | VS | – | – | – | – | – | – |
| 4D14h | 00h | Reserved | – | – | – | VS | – | – | – | – | – | – |
| 4D15h | 00h | Drive serial number | – | – | – | VS | ro | No | ALL | No | X | – |
| 4D29h | 00h | Over load factor | 0.1% | 0 to 65535 | – | U16 | ro | TxPDO | ALL | No | X | – |
| 4D35h | – | Reserved | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 2 | – | U8 | – | – | – | – | – | – |
| | 01h | Reserved 1 | – | – | – | U16 | – | – | – | – | – | – |
| | 02h | Reserved 2 | – | – | – | U16 | – | – | – | – | – | – |
| 4D36h | – | Reserved | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 2 | – | U8 | – | – | – | – | – | – |
| | 01h | Reserved 1 | – | – | – | U16 | – | – | – | – | – | – |
| | 02h | Reserved 2 | – | – | – | U16 | – | – | – | – | – | – |
| 4D51h (*2) | 00h | Analog input status | – | 0 to 65535 | – | U16 | ro | TxPDO | csp | No | X | – |
| 4D52h | 00h | Reserved | – | – | – | I32 | – | – | – | – | – | – |
| 4D53h | 00h | Reserved | – | – | – | I32 | – | – | – | – | – | – |
| 4D54h | 00h | Reserved | – | – | – | I32 | – | – | – | – | – | – |
| 4D55h | 00h | Reserved | – | – | – | I32 | – | – | – | – | – | – |
| 4D57h | 00h | Driver derating monitor | % | 0 to 65535 | – | U16 | ro | TxPDO | ALL | No | X | – |
| 4DA0h (*3) | – | Alarm accessory information | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 71 | – | U8 | ro | No | ALL | No | X | |
| | 01h | History number echo | – | 0 to 3 | – | U8 | ro | No | ALL | No | X | |
| | 02h | Alarm code | – | 0 to 4294967295 | – | U32 | ro | No | ALL | No | X | |
| | 03h | Control mode | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 04h | Motor speed | r/min | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|-------|-----------|------|-------|-------|---------------|-----------|--------|-----|---------|--------|-----------|-----------|
| 4DA0h (*3) | 05h | Positional command velocity | r/min | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| | 06h | Velocity control command | r/min | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 07h | Torque command | 0.05% | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 08h | Position command deviation | Command unit | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 09h | Position actual internal value | pulse | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 0Ah | Reserved 10 | — | — | — | I32 | — | — | — | — | — | — |
| | 0Bh | Input port (logic signal) | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| | 0Ch | Output port (logic signal) | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 0Dh | Analog input | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 0Eh | Reserved 14 | — | — | — | I32 | — | — | — | — | — | — |
| | 0Fh | Reserved 15 | — | — | — | I32 | — | — | — | — | — | — |
| | 10h | Overload ratio | 0.2 % | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| | 11h | Regenerative load ratio | % | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 12h | Voltage across PN | V | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 13h | Temperature of amplifier | °C | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 14h | Warning flags | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 15h | Inertia ratio | % | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 16h | Reserved 22 | — | — | — | I32 | — | — | — | — | — | — |
| | | ⋮ | | | | | | | | | | |
| | 18h | Reserved 24 | — | — | — | I32 | — | — | — | — | — | |
| | 19h | Temperature of encoder | °C | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| | 1Ah | Reserved 26 | — | — | — | I32 | — | — | — | — | — | — |
| | | ⋮ | | | | | | | | | | |
| | 1Ch | Reserved 28 | — | — | — | I32 | — | — | — | — | — | |
| | 1Dh | U-phase current detection value | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| | 1Eh | W-phase current detection value | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 1Fh | Reserved 31 | — | — | — | I32 | — | — | — | — | — | — |
| | 20h | Reserved 32 | — | — | — | I32 | — | — | — | — | — | — |
| | 21h | Encoder single-turn data | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| | 22h | Encoder communication error count (accumulated) | Incidences | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 23h | External scale communication data error count (accumulated) | Incidences | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | 24h | Reserved 36 | — | — | — | I32 | — | — | — | — | — | — |
| | 25h | Alarm occurrence time on timestamp standard (Lower) | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | — |
| | 26h | Alarm occurrence time on timestamp standard (Higher) | ns | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4DA0h (*3) | 27h | Alarm occurrence time on power on time | 0.5 h | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | — |
| | 28h | Alarm occurrence time on power on time (detail) | 62.5 µs | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 29h | Reserved 41 | — | — | — | U32 | — | — | — | — | — | — |
| | 2Ah | Alarm code (extended) | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| | 2Bh | Warning flags1 | — | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 2Ch | Warning flags2 | — | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 2Dh | Warning flags3 | — | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 2Eh | Reserved 46 | — | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | — |
| | ⋮ | | | | | | | | | | | |
| | 3Dh | Reserved 61 | — | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 3Eh | Reserved 62 | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| | ⋮ | | | | | | | | | | | |
| | 47h | Reserved 71 | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4DB0h | — | Reserved | — | — | — | — | — | — | — | — | — | — |
| | 00h | Number of entries | — | 8 | — | U8 | — | — | — | — | — | — |
| | 02h | Reserved 2 | — | — | — | U32 | — | — | — | — | — | — |
| | 08h | Reserved 8 | — | — | — | U32 | — | — | — | — | — | — |
| 4F01h | 00h | Following error actual value (after filtering) | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm csp | No | X | |
| 4F03h (*2) | 00h | Analog input internal voltage | mV | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4F04h | 00h | Position command internal value (after filtering) | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm csp | No | X | — |
| 4F0Bh | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4F0Ch | 00h | Velocity command value (after filtering) | r/min | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm csp | No | X | — |
| 4F0Dh | 00h | External scale position | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4F11h | 00h | Regenerative load ratio | % | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4F21h | 00h | Logical input signal | — | 0 to 4294967295 | — | U32 | ro | TxPDO | ALL | No | X | — |
| 4F22h | 00h | Logical output signal | — | 0 to 4294967295 | — | U32 | ro | TxPDO | ALL | No | X | |
| 4F23h | 00h | Logical input signal (expansion portion) | — | 0 to 4294967295 | — | U32 | ro | TxPDO | ALL | No | X | |
| 4F24h | 00h | Reserved | — | — | — | U32 | — | — | — | — | — | — |
| 4F25h | 00h | Physical input signal | — | 0 to 4294967295 | — | U32 | ro | TxPDO | ALL | No | X | — |
| 4F26h | 00h | Physical output signal | — | 0 to 4294967295 | — | U32 | ro | TxPDO | ALL | No | X | |
| 4F31h | 00h | Inertia ratio | % | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4F32h | 00h | Motor automatic identification | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | – |
| 4F33h | 00h | Cause of motor no work | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| 4F34h | 00h | Warning flags | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| 4F36h | 00h | Reserved | – | – | – | I32 | – | – | – | – | – | – |
| 4F37h | – | Multiple alarm/warning information | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 35 | – | U8 | ro | No | ALL | No | X | |
| | 01h | Multiple alarm information 1 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 02h | Multiple alarm information 2 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 03h | Multiple alarm information 3 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 04h | Multiple alarm information 4 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 05h | Reserved 5 | – | – | – | I32 | – | – | – | – | – | – |
| | | ⋮ | | | | | | | | | | |
| | 0Fh | Reserved 15 | – | – | – | I32 | – | – | – | – | – | |
| | 10h | Multiple sub alarm information | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | – |
| | 11h | Multiple warning information 1 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 12h | Multiple warning information 2 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 13h | Multiple warning information 3 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 14h | Reserved 20 | – | – | – | I32 | – | – | – | – | – | – |
| | | ⋮ | | | | | | | | | | |
| | 1Fh | Reserved 31 | – | – | – | I32 | – | – | – | – | – | |
| | 20h | Multiple alarm cause information 1 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | – |
| | 21h | Multiple alarm cause information 2 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 22h | Multiple alarm cause information 3 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| | 23h | Multiple alarm cause information 4 | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| 4F41h | – | Motor encoder data | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 2 | – | U8 | ro | No | ALL | No | X | |
| | 01h | Mechanical angle (Single-turn data) | pulse | -2147483648 to 2147483647 | – | I32 | ro | TxPDO | ALL | No | X | |
| | 02h | Multi-turn data | Rotation | -2147483648 to 2147483647 | – | I32 | ro | TxPDO | ALL | No | X | |
| 4F42h | 00h | Electrical angle | 0.0879° | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | |
| 4F44h | 00h | Encoder status | – | -2147483648 to 2147483647 | – | I32 | ro | No | ALL | No | X | – |
| 4F46h | 00h | Reserved | – | – | – | U16 | – | – | – | – | – | – |
| 4F48h | 00h | External scale pulse total | pulse (External scale) | -2147483648 to 2147483647 | – | I32 | ro | TxPDO | ALL | No | X | – |
| 4F49h | 00h | External scale absolute position | pulse (External scale) | -2147483648 to 2147483647 | – | I32 | ro | TxPDO | ALL | No | X | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|-------|-----------|------|-------|-------|---------------|-----------|--------|-----|---------|--------|-----------|-----------|
| 4F4Ah | 00h | External scale position deviation | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm csp | No | X | — |
| 4F4Bh | 00h | Touch probe external scale 1 positive edge | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4F4Ch | 00h | Touch probe external scale 1 negative edge | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4F4Dh | 00h | Touch probe external scale 2 positive edge | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4F4Eh | 00h | Touch probe external scale 2 negative edge | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4F4Fh (*2) | 00h | Analog input value | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | csp | No | X | — |
| 4F51h | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4F53h | 00h | Reserved | — | — | — | U32 | — | — | — | — | — | — |
| 4F61h | 00h | Power on cumulative time | 30 minutes | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4F62h | 00h | Temperature of amplifier | °C | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F63h | 00h | Temperature of encoder | °C | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F64h | 00h | Inrush resistance relay operating count | Incidences | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F65h | 00h | Dynamic brake operating count | Incidences | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F66h | 00h | Fan operating time | 30 minutes | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F67h | 00h | Fan life expectancy | 0.1% | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F68h | 00h | Capacitor life expectancy | 0.1% | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F6Ah | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4F6Bh | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4F6Ch | 00h | Motor power consumption | W | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| 4F6Dh | 00h | Amount of motor power consumption | Wh | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F6Eh | 00h | Cumulative value of motor power consumption | Wh | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F72h | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4F73h | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4F74h | 00h | Reserved | — | — | — | U16 | — | — | — | — | — | — |
| 4F77h | 00h | Lost link error count | Incidences | 0 to 65535 | — | U16 | ro | No | ALL | No | X | — |
| 4F78h | 00h | Synchronization signal error count | Incidences | 0 to 65535 | — | U16 | ro | No | ALL | No | X | |
| 4F81h | 00h | Encoder communication error count (accumulated) | Incidences | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4F82h | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4F83h | 00h | External scale communication error count (accumulated) | Incidences | 0 to 65535 | — | U16 | ro | TxPDO | ALL | No | X | — |
| 4F84h | 00h | External scale communication data error count (accumulated) | Incidences | 0 to 65535 | — | U16 | ro | TxPDO | ALL | No | X | |
| 4F85h | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4F86h | 00h | Hybrid deviation | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm csp | No | X | — |
| 4F87h | 00h | External scale data (Higher) | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4F88h | 00h | External scale data (Lower) | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4F89h | 00h | External scale status | — | 0 to 65535 | — | U16 | ro | TxPDO | ALL | No | X | — |
| 4F8Ah | 00h | External scale Z phase counter | — | 0 to 65535 | — | U16 | ro | No | ALL | No | X | |
| 4F8Ch | 00h | External scale single-turn data | pulse | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4F91h (*4) | 00h | Estimation accuracy of magnetic pole position | Degrees | 0 to 180 | — | U8 | ro | TxPDO | ALL | No | X | |
| 4F92h (*4) | 00h | Execution time of estimation of magnetic pole position | ms | 0 to 65535 | — | U16 | ro | TxPDO | ALL | No | X | |
| 4F93h (*4) | 00h | Maximum travel distance to plus direction when estimating magnetic pole position | pulse (Feedback scale unit) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4F94h (*4) | 00h | Maximum travel distance to minus direction when estimating magnetic pole position | pulse (Feedback scale unit) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4FA1h | 00h | Velocity command value | r/min | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4FA4h | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | — |
| 4FA5h | 00h | Velocity internal position command | r/min | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm csp | No | X | — |
| 4FA6h | 00h | Velocity error actual value | r/min | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm csp | No | X | |
| 4FA7h | 00h | External scale position (Applied polarity) | pulse (External scale) | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4FA8h | 00h | Positive direction torque limit value | 0.05% | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4FA9h | 00h | Negative direction torque limit value | 0.05% | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4FABh | 00h | Gain switching flag | — | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 4FACh | 00h | Reserved | — | — | — | I32 | — | — | — | — | — | |
| 4FAFh | 00h | Estimated position for seamless mode change | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 4FB1h | 00h | Deterioration diagnosis state | — | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | — |
| 4FB2h | 00h | Deterioration diagnosis torque command average value | 0.1% | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4FB3h | 00h | Deterioration diagnosis torque command standard value | 0.1% | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4FB4h | 00h | Deterioration diagnosis inertia ratio estimate value | % | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4FB5h | 00h | Deterioration diagnosis offset load estimate value | 0.1% | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4FB6h | 00h | Deterioration diagnosis dynamic friction estimate value | 0.1% | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4FB7h | 00h | Deterioration diagnosis viscous friction estimate value | 0.1%/ (10000 r/min) | -2147483648 to 2147483647 | — | I32 | ro | No | ALL | No | X | |
| 4FC2h (*2) | 00h | Analog input voltage | mV | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4FF5h | 00h | Reserved | – | – | – | I32 | – | TxPDO | – | – | – | – |
| 4FF6h | 00h | Reserved | – | – | – | I32 | – | – | – | – | – | – |
| 4FF7h | – | Reserved | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 2 | – | U8 | ro | No | ALL | No | X | – |
| | 01h | Reserved 1 | – | – | – | I32 | – | – | – | – | – | – |
| | 02h | Reserved 2 | – | – | – | I32 | – | – | – | – | – | – |
| 4FF8h | – | Reserved | – | – | – | – | – | – | – | – | – | – |
| | 00h | Number of entries | – | 2 | – | U8 | ro | No | ALL | No | X | – |
| | 01h | Reserved 1 | – | – | – | I32 | – | – | – | – | – | – |
| | 02h | Reserved 2 | – | – | – | I32 | – | – | – | – | – | – |
| 4FFDh | 00h | Reserved | – | – | – | I32 | – | – | – | – | – | – |
| 4FFFh | 00h | Target position echo | Command unit | -2147483648 to 2147483647 | – | I32 | ro | TxPDO | ALL | No | X | – |

*1 Cannot be used with the standard type or multi-function type. Do not change the factory default value.

*2 Cannot be used with the standard type or multi-function type.

*3 Obj.4DA0h: "Alarm accessory information" is not compatible with PDO.

Each sub-index of Obj.4DA0h is read by SDO, so synchronism cannot be guaranteed.

*4 Cannot be used with the standard type, multi-function type, or application specialized type.

*5 Cannot be used with the standard type or multi-function type. Do not change the initial value.

## 14.6 Drive Profile Area (6000h to 6FFFh)

| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6007h | 00h | Abort connection option code | — | 0 to 3 | 1 | I16 | rw | No | ALL | Yes | A | — |
| 603Fh | 00h | Error code | — | 0 to 65535 | — | U16 | ro | TxPDO | ALL | No | X | — |
| 6040h | 00h | Controlword | — | 0 to 65535 | 0 | U16 | rw | RxPDO | ALL | No | A | — |
| | | ● bit 0: switch on | | | | | | | | | | — |
| | | ● bit 1: enable voltage | | | | | | | | | | |
| | | ● bit 2: quick stop | | | | | | | | | | |
| | | ● bit 3: enable operation | | | | | | | | | | |
| | | ● bit 4: operation mode specific (control mode dependent bit) | | | | | | | | | | — |
| | | ● bit 5: operation mode specific (control mode dependent bit) | | | | | | | | | | — |
| | | ● bit 6: operation mode specific (control mode dependent bit) | | | | | | | | | | |
| | | ● bit 7: fault reset | | | | | | | | | | — |
| | | ● bit 8: halt | | | | | | | | | | |
| | | ● bit 9: operation mode specific (control mode dependent bit) | | | | | | | | | | — |
| 6041h | 00h | Statusword | — | 0 to 65535 | — | U16 | ro | TxPDO | ALL | No | X | — |
| | | ● bit 0: ready to switch on | | | | | | | | | | — |
| | | ● bit 1: switched on | | | | | | | | | | |
| | | ● bit 2: operation enabled | | | | | | | | | | |
| | | ● bit 3: fault | | | | | | | | | | |
| | | ● bit 4: voltage enabled | | | | | | | | | | |
| | | ● bit 5: quick stop | | | | | | | | | | |
| | | ● bit 6: switch on disabled | | | | | | | | | | |
| | | ● bit 7: warning | | | | | | | | | | |
| | | ● bit 9: remote | | | | | | | | | | |
| | | ● bit 10: operation mode specific (control mode dependent bit) | | | | | | | | | | — |
| | | ● bit 11: internal limit active | | | | | | | | | | — |
| | | ● bit 12: operation mode specific (control mode dependent bit) | | | | | | | | | | — |
| | | ● bit 13: operation mode specific (control mode dependent bit) | | | | | | | | | | — |
| 605Ah | 00h | Quick stop option code | — | -2 to 7 | 2 | I16 | rw | No | ALL | Yes | A | — |
| 605Bh | 00h | Shutdown option code | — | 0 to 1 | 1 | I16 | rw | No | ALL | Yes | A | — |
| 605Ch | 00h | Disable operation option code | — | 0 to 1 | 1 | I16 | rw | No | ALL | Yes | A | — |
| 605Dh | 00h | Halt option code | — | -1 to 3 | 1 | I16 | rw | No | ALL | Yes | A | — |
| 605Eh | 00h | Fault reaction option code | — | 0 to 2 | 2 | I16 | rw | No | ALL | Yes | A | — |
| 6060h | 00h | Modes of operation | — | -128 to 127 | 0 | I8 | rw | RxPDO | ALL | Yes | A | — |
| 6061h | 00h | Modes of operation display | — | -128 to 127 | — | I8 | ro | TxPDO | ALL | No | X | — |
| 6062h | 00h | Position demand value | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm ip csp | No | X | — |
| 6063h | 00h | Position actual internal value | pulse | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 6064h | 00h | Position actual value | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 6065h | 00h | Following error window | Command unit | 0 to 4294967295 | 100000 | U32 | rw | RxPDO | pp csp | Yes | A | — |
| 6066h | 00h | Following error time out | ms | 0 to 65535 | 0 | U16 | rw | RxPDO | pp csp | Yes | A | |
| 6067h | 00h | Position window | Command unit | 0 to 4294967295 | 10 | U32 | rw | RxPDO | pp ip | Yes | A | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6068h | 00h | Position window time | ms | 0 to 65535 | 0 | U16 | rw | RxPDO | pp ip | Yes | A | — |
| 6069h | 00h | Velocity sensor actual value | — | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 606Ah | 00h | Sensor selection code | — | -32768 to 32767 | 0 | I16 | rw | RxPDO | pv | No | X | — |
| 606Bh | 00h | Velocity demand value | Command unit/s | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pv csv | No | X | — |
| 606Ch | 00h | Velocity actual value | Command unit/s | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 606Dh | 00h | Velocity window | Command unit/s | 0 to 65535 | 52429 | U16 | rw | RxPDO | pv | Yes | A | — |
| 606Eh | 00h | Velocity window time | ms | 0 to 65535 | 0 | U16 | rw | RxPDO | pv | Yes | A | |
| 606Fh | 00h | Velocity threshold | Command unit/s | 0 to 65535 | 52429 | U16 | rw | RxPDO | pv | Yes | A | |
| 6070h | 00h | Velocity threshold time | ms | 0 to 65535 | 0 | U16 | rw | RxPDO | pv | Yes | A | |
| 6071h | 00h | Target torque | 0.1% | -32768 to 32767 | 0 | I16 | rw | RxPDO | tq cst | Yes | A | — |
| 6072h | 00h | Max torque | 0.1% | 0 to 65535 | 5000 | U16 | rw | RxPDO | ALL | Yes | A | — |
| 6073h | 00h | Max current | 0.1% | 0 to 65535 | 0 | U16 | rw | No | tq | No | X | — |
| 6074h | 00h | Torque demand | 0.1% | -32768 to 32767 | — | I16 | ro | TxPDO | ALL | No | X | — |
| 6075h | 00h | Motor rated current | mA | 0 to 4294967295 | 0 | U32 | rw | No | ALL | No | X | — |
| 6076h | 00h | Motor rated torque | mN·m | 0 to 4294967295 | — | U32 | ro | No | ALL | No | X | — |
| 6077h | 00h | Torque actual value | 0.1% | -32768 to 32767 | — | I16 | ro | TxPDO | ALL | No | X | |
| 6078h | 00h | Current actual value | 0.1% | -32768 to 32767 | — | I16 | ro | TxPDO | ALL | No | X | — |
| 6079h | 00h | DC link circuit voltage | mV | 0 to 4294967295 | — | U32 | ro | TxPDO | ALL | No | X | |
| 607Ah | 00h | Target position | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | RxPDO | pp csp | No | A | — |
| 607Bh | — | Position range limit | — | — | — | — | — | — | ALL | — | — | — |
| | 00h | Highest sub-index supported | — | 2 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Min position range limit | Command unit | -2147483648 to 2147483647 | -2147483648 | I32 | rw | RxPDO | ALL | Yes | X | |
| | 02h | Max position range limit | Command unit | -2147483648 to 2147483647 | 2147483647 | I32 | rw | RxPDO | ALL | Yes | X | |
| 607Ch | 00h | Home offset | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | RxPDO | ALL | Yes | P, H | — |
| 607Dh | — | Software position limit | — | — | — | — | — | — | pp ip csp | — | — | — |
| | 00h | Number of entries | — | 2 | — | U8 | ro | No | pp ip csp | No | X | |
| | 01h | Min position limit | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | RxPDO | pp ip csp | Yes | P, H | |
| | 02h | Max position limit | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | RxPDO | pp ip csp | Yes | P, H | |
| 607Eh | 00h | Polarity | — | 0 to 255 | 0 | U8 | rw | No | ALL | Yes | P, H | — |
| | | ● bit 5: Torque polarity | | | | | | | | | | — |
| | | ● bit 6: Speed polarity | | | | | | | | | | |
| | | ● bit 7: Position polarity | | | | | | | | | | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 607Fh | 00h | Max profile velocity | Command unit/s | 0 to 4294967295 | 999642454 | U32 | rw | RxPDO | pp hm ip pv | Yes | B | — |
| 6080h | 00h | Max motor speed | r/min | 0 to 4294967295 | 7150 | U32 | rw | RxPDO | ALL | Yes | B | — |
| 6081h | 00h | Profile velocity | Command unit/s | 0 to 4294967295 | 0 | U32 | rw | RxPDO | pp ip | Yes | A | — |
| 6082h | 00h | End velocity | Command unit/s | 0 to 4294967295 | 0 | U32 | rw | RxPDO | pp ip | Yes | X | — |
| 6083h | 00h | Profile acceleration | Command unit/s$^2$ | 0 to 4294967295 | 4194304000 | U32 | rw | RxPDO | pp pv ip | Yes | A | — |
| 6084h | 00h | Profile deceleration | Command unit/s$^2$ | 0 to 4294967295 | 4194304000 | U32 | rw | RxPDO | pp pv ip csp csv | Yes | A | — |
| 6085h | 00h | Quick stop deceleration | Command unit/s$^2$ | 0 to 4294967295 | 4194304000 | U32 | rw | RxPDO | pp pv hm ip csp csv | Yes | A | — |
| 6086h | 00h | Motion profile type | — | -32768 to 32767 | 0 | I16 | rw | RxPDO | pp pv ip | Yes | A | — |
| 6087h | 00h | Torque slope | 0.1%/s | 0 to 4294967295 | 1000 | U32 | rw | RxPDO | tq cst | Yes | A | — |
| 6088h | 00h | Torque profile type | — | -32768 to 32767 | 0 | I16 | rw | RxPDO | tq | Yes | A | — |
| 608Fh | — | Position encoder resolution | — | — | — | — | — | — | ALL | — | — | — |
| | 00h | Highest sub-index supported | — | 2 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Encoder increments | pulse | 1 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| | 02h | Motor revolutions | r (motor) | 1 to 4294967295 | — | U32 | ro | No | ALL | No | X | |
| 6091h | — | Gear ratio | — | — | — | — | — | — | ALL | — | — | |
| | 00h | Number of entries | — | 2 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Motor revolutions | r (motor) | 1 to 4294967295 | 1 | U32 | rw | No | ALL | Yes | P, H | |
| | 02h | Shaft revolutions | r (shaft) | 1 to 4294967295 | 1 | U32 | rw | No | ALL | Yes | P, H | |
| 6092h | — | Feed constant | — | — | — | — | — | — | ALL | — | | |
| | 00h | Highest sub-index supported | — | 2 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Feed | Command unit | 1 to 4294967295 | 8388608 | U32 | rw | No | ALL | Yes | P, H | |
| | 02h | Shaft revolutions | r (shaft) | 1 to 4294967295 | 1 | U32 | rw | No | ALL | Yes | P, H | |
| 6098h | 00h | Homing method | — | -128 to 127 | 0 | I8 | rw | RxPDO | hm | Yes | B | — |
| 6099h | — | Homing speeds | — | — | — | — | — | — | hm | — | — | — |
| | 00h | Number of entries | — | 2 | — | U8 | ro | No | hm | No | X | |
| | 01h | Speed during search for switch | Command unit/s | 0 to 4294967295 | 873813 | U32 | rw | RxPDO | hm | Yes | A | |
| | 02h | Speed during search for zero | Command unit/s | 0 to 4294967295 | 87381 | U32 | rw | RxPDO | hm | Yes | A | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 609Ah | 00h | Homing acceleration | Command unit/s$^2$ | 0 to 4294967295 | 4194304000 | U32 | rw | RxPDO | hm | Yes | A | — |
| 60A3h | 00h | Profile jerk use | — | 1 to 2, 255 | 1 | U8 | rw | No | pp pv ip | Yes | A | — |
| 60A4h | — | Profile jerk | — | — | — | — | — | — | pp pv ip | — | — | |
| | 00h | Highest sub-index supported | — | 2 | — | U8 | ro | No | pp pv ip | No | X | |
| | 01h | Profile jerk1 | Command unit/s$^3$ | 0 to 4294967295 | 0 | U32 | rw | No | pp pv ip | Yes | A | |
| | 02h | Profile jerk2 | Command unit/s$^3$ | 0 to 4294967295 | 0 | U32 | rw | No | pp pv ip | Yes | A | |
| 60B0h | 00h | Position offset | Command unit | -2147483648 to 2147483647 | 0 | I32 | rw | RxPDO | csp | Yes | A | — |
| 60B1h | 00h | Velocity offset | Command unit/s | -2147483648 to 2147483647 | 0 | I32 | rw | RxPDO | pp pv hm ip csp csv | Yes | A | — |
| 60B2h | 00h | Torque offset | 0.1% | -32768 to 32767 | 0 | I16 | rw | RxPDO | ALL | Yes | A | — |
| 60B8h | 00h | Touch probe function | — | 0 to 65535 | 0 | U16 | rw | RxPDO | ALL | No | A | — |
| | | • bit 0: Touch Probe 1 execute, stop | | | | | | | | | | |
| | | • bit 1: Touch Probe 1 event mode selection | | | | | | | | | | |
| | | • bit 2: Touch Probe 1 trigger selection (external input, Z-phase) | | | | | | | | | | |
| | | • bit 4: Touch Probe 1 rising edge selection | | | | | | | | | | |
| | | • bit 5: Touch Probe 1 falling edge selection | | | | | | | | | | |
| | | • bit 8: Touch Probe 2 execute, stop | | | | | | | | | | |
| | | • bit 9: Touch Probe 2 event mode selection (single, continuous) | | | | | | | | | | |
| | | • bit 10: Touch Probe 2 trigger selection (external input, Z-phase) | | | | | | | | | | |
| | | • bit 12: Touch Probe 2 rising edge selection | | | | | | | | | | |
| | | • bit 13: Touch Probe 2 falling edge selection | | | | | | | | | | |
| | | • bit 15: External scale monitor value 0 clear enable, disable | | | | | | | | | | |
| 60B9h | 00h | Touch probe status | — | 0 to 65535 | — | U16 | ro | TxPDO | ALL | No | X | — |
| 60BAh | 00h | Touch probe 1 positive edge | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | — |
| 60BBh | 00h | Touch probe 1 negative edge | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 60BCh | 00h | Touch probe 2 positive edge | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 60BDh | 00h | Touch probe 2 negative edge | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | ALL | No | X | |
| 60C2h | — | Interpolation time period | — | — | — | — | — | — | ip csp csv cst | — | — | — |
| | 00h | Highest sub-index supported | — | 2 | — | U8 | ro | No | ip csp csv cst | No | X | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60C2h | 01h | Interpolation time period value | — | 0 to 255 | 1 | U8 | rw | No | ip csp csv cst | Yes | A | — |
| | 02h | Interpolation time index | — | -128 to 63 | -3 | I8 | rw | No | ip csp csv cst | Yes | A | |
| 60C5h | 00h | Max acceleration | Command unit/s$^2$ | 0 to 4294967295 | 4294967295 | U32 | rw | RxPDO | pp hm pv ip | Yes | A | — |
| 60C6h | 00h | Max deceleration | Command unit/s$^2$ | 0 to 4294967295 | 4294967295 | U32 | rw | RxPDO | pp hm pv ip | Yes | A | — |
| 60E0h | 00h | Positive torque limit value | 0.1% | 0 to 65535 | 5000 | U16 | rw | RxPDO | ALL | Yes | A | — |
| 60E1h | 00h | Negative torque limit value | 0.1% | 0 to 65535 | 5000 | U16 | rw | RxPDO | ALL | Yes | A | |
| 60E3h | — | Supported homing methods | — | — | — | — | — | — | ALL | — | — | — |
| | 00h | Number of entries | — | 32 | — | U8 | ro | No | ALL | No | X | |
| | 01h | 1st supported homing method | — | -128 to 127 | — | I8 | ro | No | ALL | No | X | |
| | ⋮ | | | | | | | | | | | |
| | 20h | 32nd supported homing method | — | -128 to 127 | — | I8 | ro | No | ALL | No | X | |
| 60F2h | 00h | Position option code | — | 0 to 65535 | 0 | U16 | rw | RxPDO | pp | Yes | A | — |
| | ● bits 1 to 0: relative option | | | | | | | | | | | — |
| | ● bits 3 to 2: change immediately option | | | | | | | | | | | |
| | ● bits 5 to 4: request-response option | | | | | | | | | | | |
| | ● bit 15: manufacturer-specific | | | | | | | | | | | |
| 60F4h | 00h | Following error actual value | Command unit | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm ip csp | No | X | — |
| 60FAh | 00h | Control effort | Command unit/s | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm ip csp | No | X | — |
| 60FCh | 00h | Position demand internal value | pulse | -2147483648 to 2147483647 | — | I32 | ro | TxPDO | pp hm ip csp | No | X | — |
| 60FDh | 00h | Digital inputs | — | 0 to 4294967295 | — | U32 | ro | TxPDO | ALL | No | X | — |
| 60FEh | — | Digital outputs | — | — | — | — | — | — | ALL | — | — | — |
| | ● bit 0: set brake | | | | | | | | | | | — |
| | ● bit 16: EX-OUT1 | | | | | | | | | | | |
| | ● bit 19: vel-loop torque limit | | | | | | | | | | | |
| | ● bit 20: vel-loop integral clear | | | | | | | | | | | |
| | ● bit 28: Timestamp reference time reset | | | | | | | | | | | |
| | 00h | Number of entries | — | 2 | — | U8 | ro | No | ALL | No | X | |
| | 01h | Physical outputs | — | 0 to 4294967295 | 0 | U32 | rw | RxPDO | ALL | Yes | A | |
| | 02h | Bit mask | — | 0 to 4294967295 | 0 | U32 | rw | RxPDO | ALL | Yes | A | |

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| Index | Sub-Index | Name | Units | Range | Initial value | Data type | Access | PDO | Op-mode | EEPROM | Attribute | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60FFh | 00h | Target velocity | Command unit/s | -2147483648 to 2147483647 | 0 | I32 | rw | RxPDO | pv csv | No | A | − |
| 6403h | 00h | Motor catalogue number | − | − | − | VS | ro | No | ALL | No | X | − |
| 6502h | 00h | Supported drive modes | − | 0 to 4294967295 | − | U32 | ro | TxPDO | ALL | No | X | − |

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