



OPERATING MANUAL

Stepping Motor *αSTEP*

AR Series/

Motorized actuator equipped with AR Series

AC power input *FLEX* Built-in controller type

Driver Edition



KCC-REM-OMC-058
KCC-REM-OMC-059

Introduction

Before use

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

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

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

Related operating manuals

For operating manuals not included with the product, contact your nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.

Operating manual name	Included or not included with product
AR Series/Motorized actuator equipped with AR Series OPERATING MANUAL Driver Edition (this document)	Included
AR Series/Motorized actuator equipped with AR Series USER MANUAL	Not included
APPENDIX UL Standards for AR Series	Included

Safety precautions

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

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

⚠ WARNING

General

- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock, or injury.
- Assign qualified personnel to the task of installing, wiring, operating/controlling, inspecting, and troubleshooting the product. Failure to do so may result in fire, electric shock, injury, or damage to equipment.
- Do not transport, install, connect or inspect the driver while the power is supplied. Always turn the power off before carrying out these operations. Failure to do so may result in electric shock.
- The terminals on the driver's front panel marked with ⚠ symbol indicate the presence of high voltage. Do not touch these terminals while the power is on. Doing so may result in fire or electric shock.

Thank you for purchasing an Oriental Motor product.

This Operating Manual describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

- When an alarm is generated in the driver (any of the driver's protective functions is triggered), the motor will stop and lose its holding torque. Accordingly, provide measures to hold the moving part in place in the event of an alarm. Failure to do so may result in injury or damage to equipment.
- When an alarm is generated in the driver (any of the driver's protective functions is triggered), remove the cause before clearing the alarm. Continuing the operation without removing the cause of the problem may cause malfunction of the motor and driver, leading to injury or damage to equipment.

Installation

- The driver is Class I equipment. When installing the driver, install it inside an enclosure so that it is out of the direct reach of users. Be sure to ground if users can touch it. Failure to do so may result in electric shock.
- Install the driver inside an enclosure. Failure to do so may result in electric shock or injury.

Connection

- Always keep the power supply voltage of the driver within the specified range. Failure to do so may result in fire or electric shock.
- Connect the cables securely according to the wiring diagram. Failure to do so may result in fire or electric shock.
- Do not forcibly bend, pull, or pinch the connection cable. Doing so may result in fire or electric shock.

Operation

- Turn off the driver power supply in the event of a power failure. Otherwise, the motor may suddenly start when the power is restored, causing injury or damage to equipment.
- Do not remove the motor excitation during operation. Doing so may cause the motor to stop and lose the holding force, resulting in injury or damage to equipment.

Maintenance and inspection

- Do not touch the connection terminal of the driver while the power is supplied. Turn off the power to check the CHARGE LED being turned off before starting connection or inspection. Residual voltage may cause electric shock.

Repair, disassembly, and modification

- Do not disassemble or modify the driver. Doing so may result in electric shock or injury. Refer all such internal inspections and repairs to the Oriental Motor sales office from which you purchased the product.

⚠ CAUTION

General

- Do not use the driver beyond its specifications. Doing so may result in electric shock, injury, or damage to equipment.
- Keep your fingers and objects out of the openings in the driver. Failure to do so may result in fire, electric shock, or injury.
- Do not touch the driver during operation or immediately after stopping. The surface is hot, and this may cause a skin burn(s).
- Do not use other batteries than our battery **BAT01B**. Doing so may result in injury or damage to equipment.

Installation

- Do not leave anything around the driver that would obstruct ventilation. Doing so may result in damage to equipment.

Connection

- The data edit connector (CN4) and RS-485 communication connectors (CN6/CN7) are not insulated. When grounding the positive terminal of the power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the driver and these equipment to short, damaging both.

Operation

- Use a motor and driver only in the specified combination. An incorrect combination may cause a fire.
- Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
- Before supplying power to the driver, turn all input signals to the driver to OFF. Otherwise, the motor may suddenly start when the power is turned on, leading to injury or damage to equipment.
- When moving the moving part manually, put the motor into a non-excitation state. Continuing the work while the motor is in an excitation state may result in injury.
- Use a 24 VDC power supply that has been given reinforced insulation between the primary side and secondary side. Failure to do so may cause electric shock.
- Immediately when a problem occurred, stop operation and turn off the driver power supply. Failure to do so may result in fire, electric shock, or injury.
- Use only an insulated slotted screwdriver to adjust the driver's switches. Failure to do so may result in electric shock.

Maintenance and inspection

- Do not touch the terminals while conducting the insulation resistance measurement or dielectric strength test. Doing so may cause electric shock.

Precautions for use

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

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

Check the [USER MANUAL](#) for the model name of cables.

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

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

• Motor excitation at power ON

The motor is excited when the 24 VDC power supply and main power supply are on. If the motor is required to be in a non-excitation state when turning on the power, assign the C-ON input to direct I/O or remote I/O. Refer to the [USER MANUAL](#) for details.

• Preventing electrical noise

Refer to the [USER MANUAL](#) for measures with regard to noise.

• Preventing leakage current

Stray capacitance exists between the driver's current-carrying line and other current-carrying lines, the earth and the motor, respectively. A high-frequency current may leak out through such capacitance, having a detrimental effect on the surrounding equipment. The actual leakage current depends on the driver's switching frequency, the length of wiring between the driver and motor, and so on. When providing a leakage current breaker, use the following products, for example, which have high-frequency signal protection:

Mitsubishi Electric Corporation: NV series

• Saving data to the non-volatile memory

Do not turn off the 24 VDC power supply while writing the data to the non-volatile memory, and also do not turn off for 5 seconds after the completion of writing the data. Doing so may abort writing the data and cause an alarm of EEPROM error to generate. The non-volatile memory can be rewritten approximately 100,000 times.

• When an alarm of overvoltage protection is generated

If vertical drive (gravitational operation) such as elevator applications is performed or if sudden start-stop operation of a large inertial load is repeated frequently, an alarm of overvoltage protection may be detected. If an alarm of overvoltage protection is detected, adjust the driving condition or use our regeneration resistor **RGB100**.

• Note on connecting a power supply whose positive terminal is grounded

The data edit connector (CN4) and RS-485 communication connectors (CN6/CN7) are not insulated. When grounding the positive terminal of the power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the driver and these equipment to short, damaging both. Use our data setter **OPX-2A** to set data, etc.

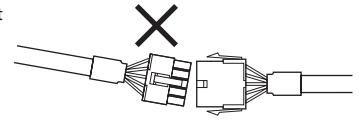
■ Notes when the connection cable is used

Note the following points when our cable is used.

• When inserting the connector

Hold the connector main body, and insert it in straight securely.

Inserting the connector in an inclined state may result in damage to terminals or a connection failure.



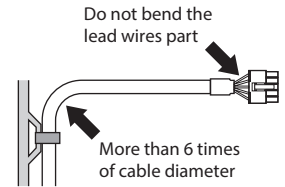
• When pulling out the connector

Pull out the connector in straight while releasing the lock part of the connector. Pulling out the connector with holding the cable may result in damage to the connector.

• Bending radius of cable

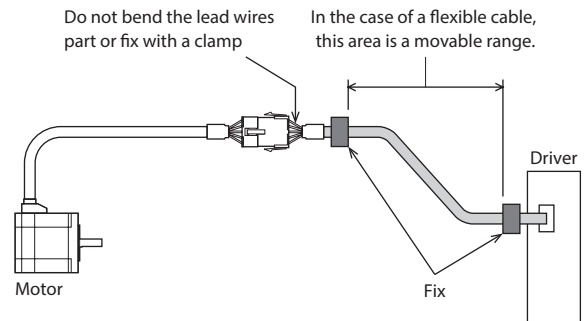
Use the cable in a state where the bending radius of the cable is more than six times of the cable diameter.

Do not bend the lead wires part or fix it with a clamp. Doing so may cause damage to the connector.



• How to fix the cable

Fix the cable near the connector so that stress is not applied to the connector part. Use a wide clamp or fix the connector at two places to prevent stress from being applied to the connector.



Preparation

■ Checking the product

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

- Driver..... 1 unit
- CN1 connector (6 pins)..... 1 pc.
- CN3 connector (5 pins)..... 1 pc.
- CN5 connector (5 pins)..... 1 pc.
- CN8 connector (9 pins)..... 1 pc.
- CN9 connector (7 pins)..... 1 pc.
- Connector wiring lever (for CN3)..... 1 pc.
- OPERATING MANUAL Driver Edition (this document)..... 1 copy
- APPENDIX UL Standards for
AR Series AC power input type..... 1 copy

Included connector model

There are two types of CN3 connectors made by WAGO Corporation and Molex Incorporated.

Either one of them is included with the product. Check the manufacturer name with the connector.

Type	Model number (Manufacturer)
CN1 connector	MC1,5/6-STF-3,5 (PHOENIX CONTACT GmbH & Co. KG)
CN3 connector	721-205 (WAGO Corporation)
	or 54928-0570 (Molex Incorporated)
CN5 connector	FK-MC0,5/5-ST-2,5 (PHOENIX CONTACT GmbH & Co. KG)
CN8 connector	FK-MC0,5/9-ST-2,5 (PHOENIX CONTACT GmbH & Co. KG)
CN9 connector	FK-MC0,5/7-ST-2,5 (PHOENIX CONTACT GmbH & Co. KG)

How to identify the product model

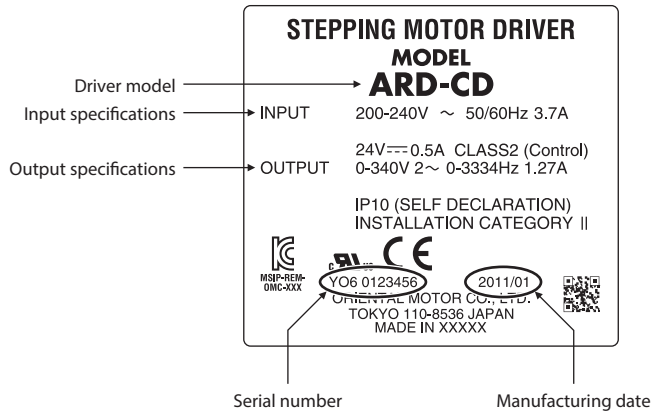
Verify the model number of the purchased product against the number shown on the nameplate.

ARD – C D
1 2 3

1	Series name	ARD: AR Series driver
2	Power supply input	A: Single-phase 100-120 V C: Single-phase 200-240 V
3	Type	D: Built-in controller type

Information about nameplate

The figure shows an example.



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

Products for possible combinations

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

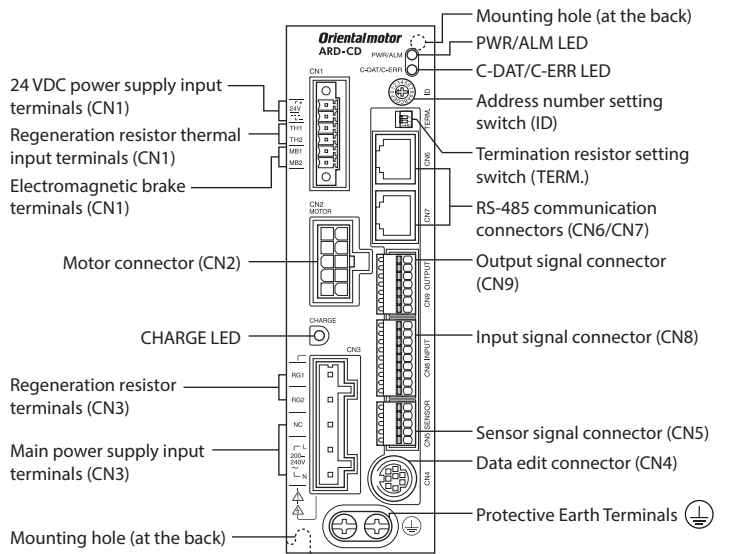
Driver model	Type	Applicable Series	Model
ARD-AD ARD-CD	Stepping motor	AR Series	ARM46
		EAS Series *	ARM66
		EAC Series *	ARM69
		EZS Series *	ARM98
	Motorized actuator	EZSH Series *	ARM911
DGII Series		DGM85 DGM130 DGM200	

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

Names and functions of parts

The figure shows the **ARD-CD**.

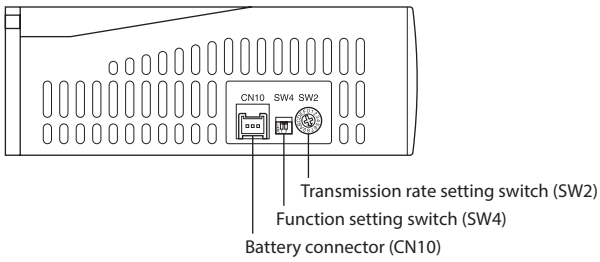
Driver front face



Name	Description
PWR/ALM LED	<ul style="list-style-type: none"> PWR (Green): This LED is lit while the 24 VDC power is input. ALM (Red) : This LED will blink if an alarm generates (a protective function is triggered). It is possible to check the generated alarm by counting the number of times the LED blinks.
C-DAT/C-ERR LED	<ul style="list-style-type: none"> C-DAT (Green): This LED blinks or is lit when the driver is communicating with the master controller properly via RS-485 communication. C-ERR (Red) : This LED will be lit if a RS-485 communication error occurs with the master controller.
Address number setting switch (ID)	This switch is used when controlling the system via RS-485 communication. Sets the address number (slave address) of RS-485 communication using this switch and SW4-No.1 of the function setting switch. (Factory setting: 0)
Termination resistor setting switch (TERM.)	This switch is used when controlling the system via RS-485 communication. Sets the termination resistor (120 Ω) of RS-485 communication. (Factory setting: OFF)
RS-485 communication connectors (CN6/CN7)	Connects the RS-485 communication cable.
Output signal connector (CN9)	Connects the output signals.
Input signal connector (CN8)	Connects the input signals.
Sensor signal connector (CN5)	Connects the sensor signals.
Data edit connector (CN4)	Connects a PC in which the support software MEXE02 has been installed, or our data setter OPX-2A .
Protective Earth Terminals	Ground using a wire of AWG16 to 14 (1.25 to 2.0 mm ²).
24 VDC power supply input terminals (CN1-24V)	Connects a power supply for control circuit of the driver. +: 24 VDC power supply input -: Power supply GND
Regeneration resistor thermal input terminals (CN1-TH1/TH2)	Connects our regeneration resistor RGB100 . If no regeneration resistor is connected, short the TH1 and TH2 terminals.
Electromagnetic brake terminals (CN1-MB1/MB2)	Connects the cable for electromagnetic brake. MB1: Electromagnetic brake – (Black) MB2: Electromagnetic brake + (White)
Motor connector (CN2)	Connects the motor.
CHARGE LED (Red)	This LED is lit while the main power is input. After the main power has been turned off, the LED will turn off once the residual voltage in the driver drops to a safe level.

Name	Description
Regeneration resistor terminals (CN3-RG1/RG2)	Connects our regeneration resistor RGB100 .
Main power supply input terminals (CN3)	<ul style="list-style-type: none"> Single-phase 100-120 V L, N : Connects a single-phase 100-120 VAC power supply. Single-phase 200-240 V L, N : Connects a single-phase 200-240 VAC power supply. NC: Not used.
Mounting holes (2 places at the back)	These mounting holes are used to secure the driver with screws.

● Driver bottom face



Name	Description
Transmission rate setting switch (SW2)	This switch is used when controlling the system via RS-485 communication. Sets the transmission rate of RS-485 communication. (Factory setting: 7)
Function setting switch (SW4)	This switch is used when controlling the system via RS-485 communication. No.1: Sets the address number (slave address) using this switch and the address number setting switch (ID). (Factory setting: OFF) No.2: Sets the protocol of RS-485 communication. (Factory setting: OFF)
Battery connector (CN10)	Connects our battery BAT01B .

Installation

■ Location for installation

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

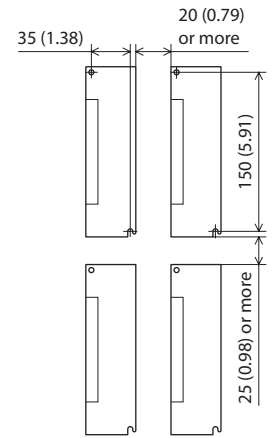
- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature 0 to +55 °C (+32 to +131 °F) (non-freezing)
- Operating ambient humidity 85 % or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- 1,000 m (3,300 ft.) or lower above sea level

■ Installation method

The driver is designed so that heat is dissipated via air convection and conduction through the enclosure. Install the driver on a flat metal plate [material: aluminium, 200×200×2 mm (7.87×7.87×0.08 in.) equivalent] having excellent heat conductivity.

When two or more drivers are to be installed side by side, provide 20 mm (0.79 in.) and 25 mm (0.98 in.) clearances in the horizontal and vertical directions, respectively.

When installing the driver inside an enclosure, use two screws (M4; not included) to secure the driver through the mounting holes.



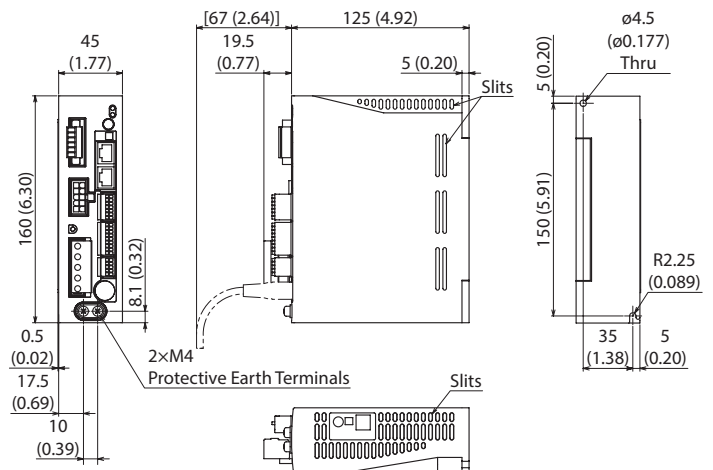
Unit: mm (in.)



- Install the driver inside an enclosure whose pollution degree is 2 or better environment, or whose degree of protection is IP54 minimum.
- Do not install any equipment that generates a large amount of heat or noise near the driver.
- Do not install the driver underneath the controller or other equipment vulnerable to heat.
- If the ambient temperature of the driver exceeds 55 °C (131 °F), improve the ventilation condition.
- Be sure to install the driver vertically (vertical position).

Dimension [unit: mm (in.)]

Mass: 0.75 kg (1.65 lb.)



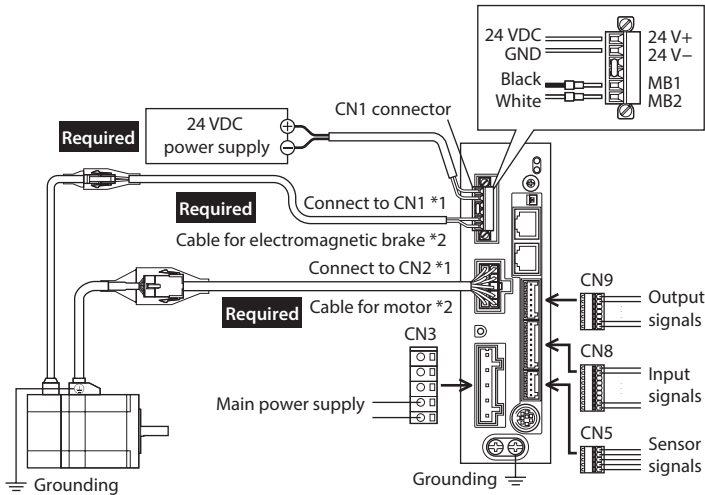
Connection

⚠ WARNING

- For protection against electric shock, do not turn on the power supply until the wiring is completed.
- A high voltage is applied to the motor connector (CN2) and the main power supply input terminal (CN3). Do not touch these terminals while the power is on. Doing so may result in fire or electric shock.

■ Connection example

The figure shows models for the electromagnetic brake motor and single-phase 200 to 240 VAC input.



- *1 Keep 30 m (98.4 ft.) or less for the wiring distance between the motor and driver.
- *2 These cables are provided as our products. Purchase them separately.

Note

- Connect the connectors securely. Insecure connections may cause malfunction or damage to the motor or driver.
- Do not wire the power supply cable of the driver in the same cable duct with other power lines or motor cables. Doing so may cause malfunction due to noise.
- When cycling the main power supply or connecting/disconnecting the connector, turn off the power and wait for the CHARGE LED to turn off before doing so. The residual voltage may cause electric shock.
- The lead wires of the "cable for electromagnetic brake" have polarities, so connect them in the correct polarities. If the lead wires are connected with their polarities reversed, the electromagnetic brake will not operate properly.

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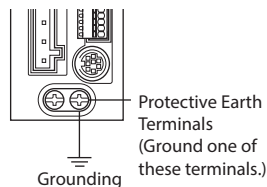
- When disconnecting the connector, pull out while pressing the latches on the connector.
- When installing the motor on a moving part, use a flexible cable having excellent flex resistance. Check the [USER MANUAL](#) for the model name of cables.

■ Grounding the driver

Be sure to ground the Protective Earth Terminal (screw size: M4) of the driver. You can ground either of the two Protective Earth Terminals.
Grounding wire: AWG16 to 14 (1.25 to 2.0 mm²)
Tightening torque: 1.2 N·m (10.6 lb-in)

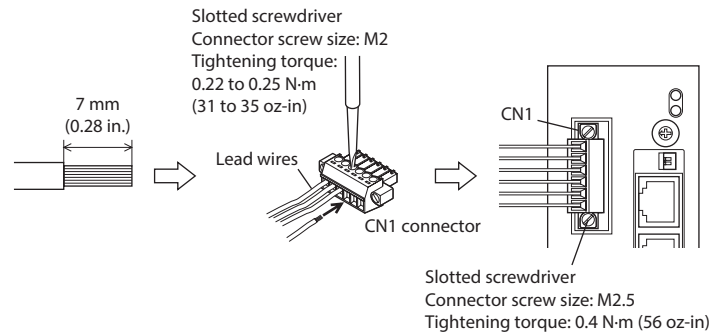
The terminal that is not grounded is used as a service terminal. Use the service terminal according to your specific need, such as connecting it to the motor in order to ground the motor.

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



■ Connecting the 24 VDC power supply and regeneration resistor (CN1)

Applicable lead wire: AWG28 to 16 (0.08 to 1.25 mm²)
Stripping length of wire insulation: 7 mm (0.28 in.)



● Connecting the 24 VDC power supply

Connect a 24 VDC power supply of the current capacity shown in the following table. When motorized actuators are used, check while referring to the model name of the equipped motor. In the case of the **DGII** Series, check the current capacity of a 24 VDC power supply with the **DGII** Series [OPERATING MANUAL Actuator Edition](#). The 24 VDC power supply is for the control circuit. Be sure to connect it.

Motor model	Input power supply voltage	Power supply current capacity	
		Without electromagnetic brake	With electromagnetic brake
ARM46	24 VDC±5 % *	0.25 A or more	0.33 A or more
ARM66			0.5 A or more
ARM69			
ARM98			
ARM911			-

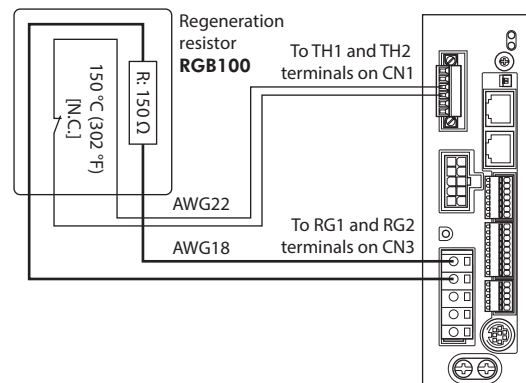
* If the distance between the motor and driver is extended to 20 to 30 m (65.6 to 98.4 ft.), use a power supply of 24 VDC±4 %.

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When turning on the 24 VDC power supply again, turn off the 24VDC power supply and wait for at least 1 second before doing so.

● Connecting the regeneration resistor

If vertical drive (gravitational operation) such as elevator applications is performed or if sudden start-stop operation of a large inertial load is repeated frequently, connect our regeneration resistor **RGB100**.

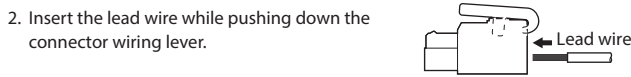


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- Before connecting the regeneration resistor, be sure to remove the jumper wire from the CN1 connector.
- If the allowable power consumption of the regeneration resistor exceeds the allowable level, the thermostat will be triggered and an alarm of regeneration resistor overheat is generated. If an alarm of regeneration resistor overheat is generated, turn off the main power supply and check the content of the error.

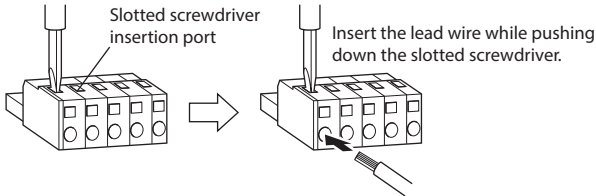
■ Connecting the main power supply (CN3)

- Applicable lead wire: AWG16 to 14 (1.25 to 2.0 mm²)
 - Stripping length of wire insulation: 8 to 9 mm (0.31 to 0.35 in.)
1. Insert the connector wiring lever.



You can also connect the power supply cable using a slotted screwdriver.

Insert the lead wire while pushing the insertion port using a slotted screwdriver with a tip of 3.0 to 3.5 mm (0.12 to 0.14 in.) in width.



● Current capacity of main power supply

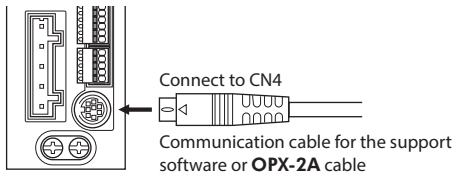
The current capacity of the main power supply varies depending on the motor combined.

When motorized actuators are used, check while referring to the model name of the equipped motor.

In the case of the **DGII** Series, check the current capacity of a main power supply with the **DGII** Series OPERATING MANUAL Actuator Edition.

Motor model	Single-phase 100-120 V -15 to +6 % 50/60 Hz	Single-phase 200-240 V -15 to +6 % 50/60 Hz
ARM46	2.4 A or more	1.5 A or more
ARM66	3.6 A or more	2.3 A or more
ARM69	4.9 A or more	3.0 A or more
ARM98	4.6 A or more	2.9 A or more
ARM911	5.9 A or more	3.7 A or more

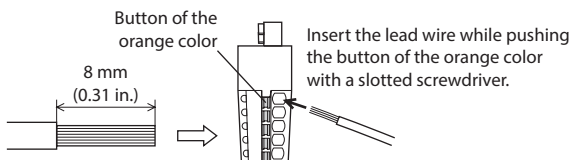
■ Connecting the data setter (CN4)



CAUTION The data edit connector (CN4) and RS-485 communication connectors (CN6/CN7) are not insulated. When grounding the positive terminal of the power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the driver and these equipment to short, damaging both.

■ Connecting the I/O signals

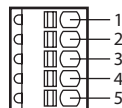
Applicable lead wire: AWG26 to 20 (0.14 to 0.5 mm²)
Stripping length of wire insulation: 8 mm (0.31 in.)



● Connecting the sensor (CN5)

Pin assignment

Pin No.	Signal name	Description
1	+LS	Limit sensor input +
2	-LS	Limit sensor input -
3	HOMES	Mechanical home sensor input
4	SLIT	Slit sensor input
5	IN-COM2	Sensor signals common

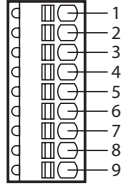


● Connecting the control input (CN8)

Pin assignment

Pin No.	Signal name	Description *
1	IN0	Control input 0 (HOME)
2	IN1	Control input 1 (START)
3	IN2	Control input 2 (M0)
4	IN3	Control input 3 (M1)
5	IN4	Control input 4 (M2)
6	IN5	Control input 5 (FREE)
7	IN6	Control input 6 (STOP)
8	IN7	Control input 7 (ALM-RST)
9	IN-COM1	Input signals common

* (): Initial value

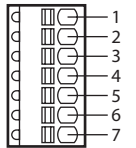


● Connecting the control output (CN9)

Pin assignment

Pin No.	Signal name	Description *
1	OUT0	Control output 0 (HOME-P)
2	OUT1	Control output 1 (END)
3	OUT2	Control output 2 (AREA1)
4	OUT3	Control output 3 (READY)
5	OUT4	Control output 4 (WNG)
6	OUT5	Control output 5 (ALM)
7	OUT-COM	Output signals common

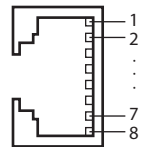
* (): Initial value



■ Connecting the RS-485 communication cable (CN6, CN7)

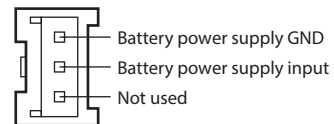
Pin assignment

Pin No.	Signal name	Description
1	N.C.	Not used
2	GND	GND
3	TR+	RS-485 communication signal (+)
4	N.C.	Not used
5	N.C.	Not used
6	TR-	RS-485 communication signal (-)
7	N.C.	Not used
8	N.C.	Not used



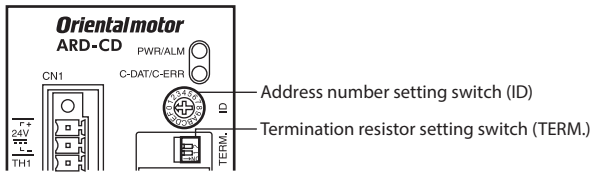
■ Connecting the battery (CN10)

Connect our battery **BAT01B** when using in the absolute-position backup system. When the battery is connected to the battery connector (CN10) of the driver and the 24 VDC power is turned on, the battery will start charging. It takes approximately 32 hours to fully charge the battery [at an ambient temperature of 20 °C (68 °F)].

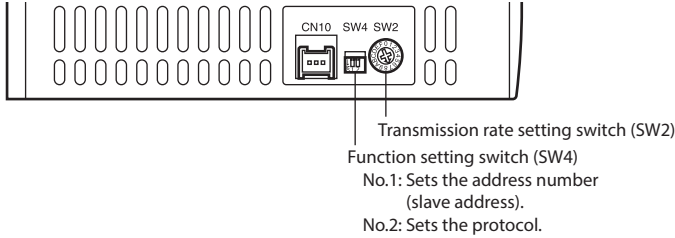


Setting

● Driver front face



● Driver bottom face



Note When setting any switch, turn off the main power supply and the 24 VDC power supply of the driver and wait for the CHARGE LED to turn off before doing so. The residual voltage may cause electric shock.

memo The set switches are enabled after the 24 VDC power supply is turned on again.

■ Address number (slave address)

Using the address number setting switch (ID) and SW4-No.1 of the function setting switch, set the address number (slave address). Make sure each address number (slave address) you set for each driver is unique.

Factory setting ID: 0, SW4-No.1: OFF

ID switch	Address number (slave address)	
	SW4-No.1: OFF	SW4-No.1: ON
0	0*	16
1	1	17
2	2	18
3	3	19
4	4	20
5	5	21
6	6	22
7	7	23
8	8	24
9	9	25
A	10	26
B	11	27
C	12	28
D	13	29
E	14	30
F	15	31

* In the case of Modbus protocol, the address number (slave address) 0 is reserved for broadcasting, so do not use this address.

■ Protocol

Using the SW4-No.2 of the function setting switch, set the protocol of RS-485 communication.

Factory setting OFF

SW4-No.2	Protocol
ON	Modbus RTU mode
OFF	Connecting with network converter

■ Transmission rate

Using the transmission rate setting switch (SW2), set the transmission rate. The transmission rate to be set should be the same as the transmission rate of the master controller.

Factory setting 7

SW2	Transmission rate	SW2	Transmission rate
0	9,600 bps	4	115,200 bps
1	19,200 bps	5, 6	Not used
2	38,400 bps	7	Network converter
3	57,600 bps	8 to F	Not used

memo Do not set SW2 to positions 5, 6, and 8 to F.

■ Termination resistor

Set a termination resistor for the driver located farthest away (positioned at the end) from the host controller.

Turn the termination resistor setting switch (TERM.-Nos.1 and 2) ON to set the termination resistor for RS-485 communication (120 Ω).

Factory setting Both No.1 and No.2 are OFF.

TERM.-No.1, No.2	Termination resistor (120 Ω)
Both are OFF	Disabled
Both are ON	Enabled

memo If only one of No.1 or No.2 is turned ON, a communication error may occur.

Alarm (protective function)

When an alarm generates, the ALM output will turn OFF and the PWR/ALM LED will blink in red. Before resetting an alarm, always remove the cause of the alarm and ensure safety. For details of alarm, refer to [USER MANUAL](#).

Inspection and maintenance

■ Inspection

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

Inspection item

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

Note The driver uses semiconductor elements. Handle the driver with care since static electricity may damage semiconductor elements.

■ Warranty

Check on the Oriental Motor Website or General Catalog for the product warranty.

■ Disposal

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

Specifications

Check on the Oriental Motor Website for the product specifications.

General specifications

Degree of protection		IP10
Operation environment	Ambient temperature	0 to +55 °C (+32 to +131 °F) (non-freezing) *
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 1,000 m (3,300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water, or oil
Storage environment	Ambient temperature	-25 to +70 °C (-13 to +158 °F) (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 3,000 m (10,000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water, or oil
Shipping environment	Ambient temperature	-25 to +70 °C (-13 to +158 °F) (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 3,000 m (10,000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water, or oil
Insulation resistance	100 MΩ or more when 500 VDC megger is applied between the following places: <ul style="list-style-type: none"> Protective Earth Terminals - Power supply terminals Signal I/O terminals - Power supply terminals 	
Dielectric strength	Sufficient to withstand the following for 1 minute. Leak current 13 mA or less. <ul style="list-style-type: none"> Protective Earth Terminals - Power supply terminals 1.8 kVAC 50/60 Hz Signal I/O terminals - Power supply terminals 1.9 kVAC 50/60 Hz 	

* When installing a driver to a heat sink of a capacity at least equivalent to an aluminum plate [200x200 mm (7.87x7.87 in.), thickness 2 mm (0.08 in.)].

Regulations and standards

UL Standards

Check the APPENDIX UL Standards for **AR Series AC power input type** for recognition information about UL Standards.

EU Directives

CE Marking

This product is affixed the CE Marking under the Low Voltage Directive and EMC Directive.

Low Voltage Directive

Applicable Standards	EN 61800-5-1
Installation conditions	To be incorporated in an equipment. Overvoltage category: II Pollution degree: 2 Protection against electric shock: Class I

- This product cannot be used in IT power distribution systems.
- Install the product within the enclosure in order to avoid contact with hands.
- Be sure to perform protective grounding if a product can be touched with hands. Make sure to ground the Protective Earth Terminals of the motor and driver.
- To protect against electric shock using an earth leakage breaker (RCD), connect a type B earth leakage breaker to the primary side of the driver.
- When using a circuit breaker (MCCB), use a unit conforming to the EN or IEC standard.
- Isolate the motor cable, power-supply cable and other drive cables from the signal cables (CN1, CN4 to CN9) by means of double insulation.
- The temperature of the driver's heat sink may exceed 90 °C (194 °F) depending on the driving conditions. Accordingly, take heed of the following items:
 - Do not touch the driver.
 - Do not use the driver near flammable objects.
 - Always conduct a trial operation to check the driver temperature.

EMC Directive

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

Applicable Standards

EMI	EN 55011 group 1 class A EN 61000-6-4 EN 61800-3
EMS	EN 61000-6-2 EN 61800-3

CAUTION

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

Combinations of motors and drivers in compliance with EMC Directive

Check "Products for possible combinations" on p.3 for the combinations of motors and drivers in compliance with EMC Directive.

Republic of Korea, Radio Waves Act

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

RoHS Directive

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

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- Please contact your nearest Oriental Motor office for further information.

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