



## OPERATING MANUAL

Stepping Motor *αSTEP*

**AR Series/**

**Motorized actuator equipped with AR Series**

**AC power input Pulse input type Driver Edition**



KCC-REM-OMC-025  
KCC-REM-OMC-026  
KCC-REM-OMC-027

## Introduction

### ■ Before use

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

Use the product correctly after thoroughly reading the "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, download from Oriental Motor Website Download Page or contact your nearest Oriental Motor sales office.

- AR Series/Motorized actuator equipped with AR Series OPERATING MANUAL Driver Edition (this document)
- AR Series/Motorized actuator equipped with AR Series USER MANUAL
- APPENDIX UL Standards for AR Series

## 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.

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

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.

## ⚠ 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, or injury.
- 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.
- When an alarm is generated in the driver (any of the driver's protective functions is triggered), the motor stops and loses its holding torque. Accordingly, provide measures to hold the moving part in a specific position 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 (protective function). Continuing the operation without removing the cause of the problem may cause malfunction of the motor and driver, leading to injury or damage to equipment.

### 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 terminals on the driver while the power is supplied or for at least 10 minutes after turning off the power. Turn off the power to check the CHARGE LED being turned off before starting connection or inspection.

## 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).

## 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 I/O signal connector (CN5) are not electrically insulated. When grounding the positive terminal of the power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the equipment and driver 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 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 result in 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 driver.

Check the [USER MANUAL](#) for the cable models.

### • 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

Simply turning on the power will not excite the motor. To excite the motor, always turn the C-ON input ON. It is possible to set the motor to be excited automatically after the power has been turned on, by changing the applicable driver parameter using the support software **MEXE02** or our data setter **OPX-2A**.

### • 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 main power supply or 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 the 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

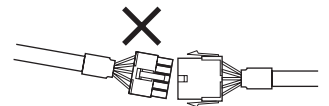
If vertical drive (gravitational operation) such as elevator applications is performed or if sudden start-stop operation of a large inertial load is repeated frequently, an alarm of overvoltage protection may be detected. If an overvoltage protection alarm is detected, adjust the driving condition or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

## ■ 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.

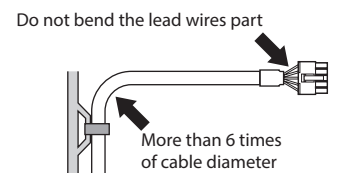


### • When pulling out the connector

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

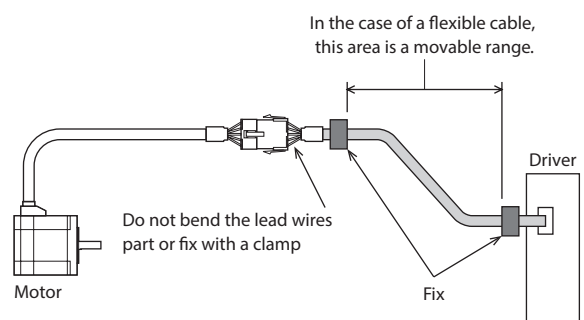
Use the cable in a state where the bending radius of the cable is more than six times of the cable diameter. Do not bend the lead wires part or fix it with a clamp. Doing so may cause damage to the connector.



### • 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 (36 pins).....1 pc.
- Connector wiring lever (for CN3) ....1 pc.
- Seal (for CN5).....1 pc.\*
- OPERATING MANUAL Driver Edition 1 copy (this document)

\* To distinguish from connectors of other series, put the seal on the CN5 connector to use.

### Included connector model

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

There are two types of CN5 connectors made by 3M Company and Molex Incorporated.

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

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	Case: 10336-52A0-008 (3M Company)
	Connector: 10136-3000PE (3M Company)
	or Case: 54331-1361 (Molex Incorporated)
	Connector: 54306-3619 (Molex Incorporated)

### How to identify the product model

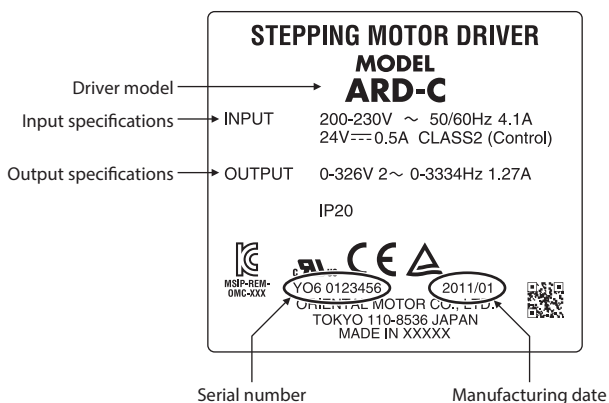
Verify the model number of the purchased product against the number shown on the nameplate.

**ARD - C**  
1      2

1	Series name	<b>ARD: AR</b> Series driver
2	Power supply input	<b>A:</b> Single-phase 100-115 V <b>C:</b> Single-phase 200-230 V <b>S:</b> Three-phase 200-230 V

### Information about nameplate

The figure shows an example.



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

### Products for possible combinations

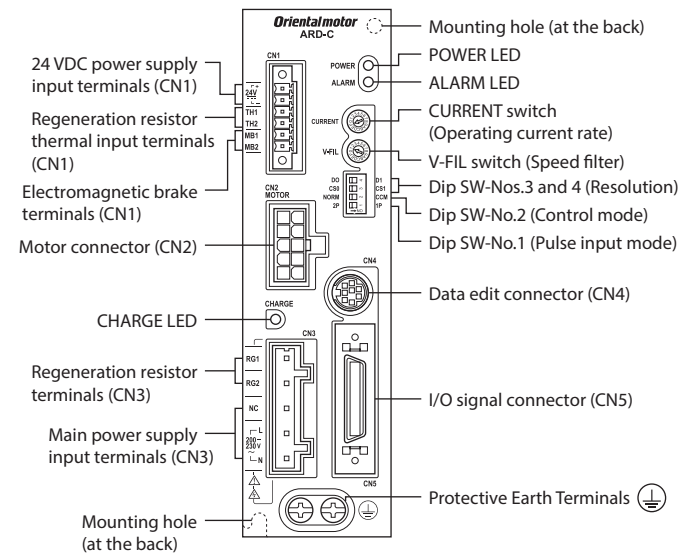
Products with which the driver can be combined are listed below. Check the model name with the nameplate.

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

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

### Names and functions of parts

The figure shows the ARD-C.



Name	Description
POWER LED (green)	This LED is lit while the main power or 24 VDC power is input.
ALARM LED (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.
CURRENT switch (Operating current rate)	This switch adjusts the operating current. It is used to limit the torque and temperature rise. A desired current can be set as a percentage (%) of the rated output current. Factory setting: F
V-FIL switch (Speed filter)	This switch adjusts the motor response. Use this switch if you want to suppress motor vibration or cause the motor to start/stop smoothly. "0" and "F" correspond to the minimum and maximum speed filter settings, respectively. Factory setting: 1
Dip SW-Nos.3 and 4 (Resolution)	These two switches are used to set the resolution per revolution of the motor output shaft. Factory setting: No.3 and No.4 are both left side (OFF) [1,000 P/R]
Dip SW-No.2 (Control mode)	This switch toggles the driver between the normal mode and current control mode. Left side (OFF): Normal mode (Keep the switch in this position in normal conditions of use.) Right side (ON): Current control mode (Set the switch to this position if you want to suppress noise or vibration.) Factory setting: Left side (OFF) [Normal mode]

Name	Description
Dip SW-No.1 (Pulse input mode)	This switch is used to toggle between the 1-pulse input mode and 2-pulse input mode according to the pulse output mode of the controller. Left side (OFF): 2-pulse input mode, active low Right side (ON): 1-pulse input mode, active low The factory setting of the pulse-input mode depends on the destination country.
Data edit connector (CN4)	Connects a PC in which the <b>MEXE02</b> has been installed, or <b>OPX-2A</b> .
I/O signal connector (CN5)	Connects the I/O signals of the controller.
Protective Earth Terminals	Ground using a wire of AWG16 to 14 (1.25 to 2.0 mm <sup>2</sup> ).
24 VDC power supply input terminals (CN1) [24V]	Connects the 24 VDC power supply. Once a 24 VDC power supply is connected, you can check the contents of alarms that have generated even when the main power is cut off. If a motor with an electromagnetic brake is used, be sure to connect a 24 VDC power supply as a power supply for the electromagnetic brake.
Regeneration resistor thermal input terminals (CN1) [TH1, TH2]	Connects our regeneration resistor <b>RGB100</b> . If no regeneration resistor is connected, connect the CN1 connector to short the TH1 terminal and TH2 terminal.
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.
Regeneration resistor terminals (CN3) [RG1, RG2]	Connects our regeneration resistor <b>RGB100</b> .
Main power supply input terminals (CN3)	<ul style="list-style-type: none"> <li>Single-phase 100-115 V, single-phase 200-230 V L, N: Connects a single-phase 100-115 VAC or 200-230 VAC power supply.</li> <li>Three-phase 200-230 V L1, L2, L3: Connects a three-phase 200-230 VAC power supply.</li> <li>NC: Not used.</li> </ul>
Mounting holes (2 places at the back)	These mounting holes are used to secure the driver with screws.

## Installation

### Location for installation

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

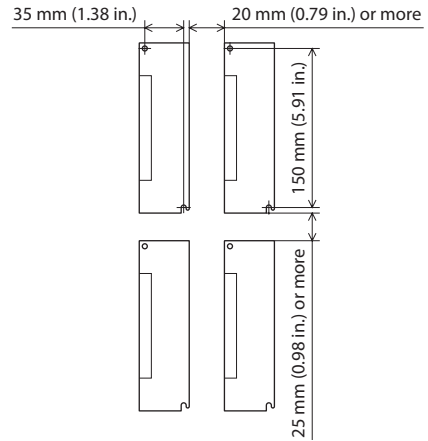
- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature 0 to +50 °C (+32 to +122 °F) (non-freezing)
- Operating ambient humidity 85 % or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area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

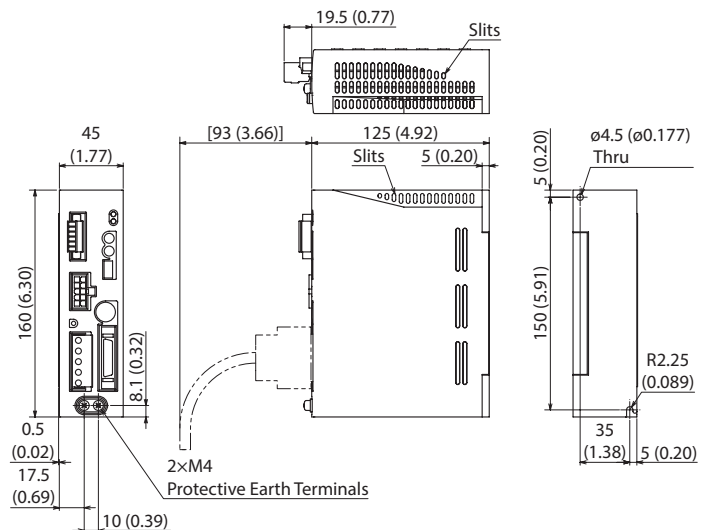
When installing the driver inside an enclosure, use two screws (M4, not included) to secure the driver through the mounting holes.



- 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 50 °C (122 °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.)

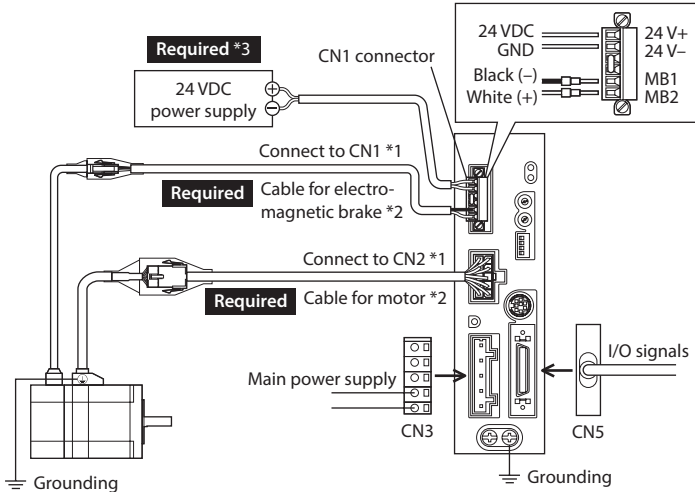


## Connection

- ⚠ 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 terminals (CN3). Do not touch them while the power is supplied. 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 230 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.

\*3 If a motor with an electromagnetic brake is used, be sure to connect as a power supply for the electromagnetic brake.

- Note**
- Connect the connector securely. Insecure connections may cause malfunction or damage to the motor or driver.
  - When connecting or 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.

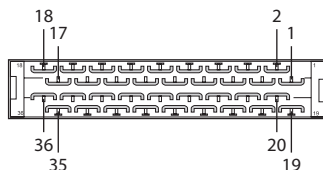
- memo**
- When disconnecting the connector, pull out while pressing the latches on the connector.
  - When installing the motor on a moving part, use a flexible cable having excellent flex resistance. Check the [USER MANUAL](#) for the cable models.

### ■ Connecting the I/O signals

Solder the I/O signal cable (AWG28 to 24: 0.08 to 0.2 mm<sup>2</sup>) to the CN5 connector (36 pins) while checking the pin numbers in "Connector function table" provided next.

Use a shielded cable for I/O signals.

Connector pin assignment  
(viewed from soldering side)



### ● Connector function table

Pin No	Operating mode		Name	
	Positioning operation	Push-motion operation *	Positioning operation	Push-motion operation *
1	–	–	–	–
2	GND	–	Ground connection	
3	ASG+	–	A-phase pulse output (line driver)	
4	ASG–	–		
5	BSG+	–	B-phase pulse output (line driver)	
6	BSG–	–		
7	TIM1+	–	Timing output (line driver)	
8	TIM1–	–		
9	ALM+	–	Alarm output	
10	ALM–	–		
11	WNG+	–	Warning output	
12	WNG–	–		
13	END+	–	Positioning complete output	
14	END–	–		
15	READY+/AL0+ *	–	Operation ready complete output/ Alarm code output 0 *	
16	READY–/AL0– *	–		
17	TLC+/AL1+ *	–	Torque limit output/ Alarm code output 1 *	
18	TLC–/AL1– *	–		
19	TIM2+/AL2+ *	–	Timing signals output (open collector)/ Alarm code output 2 *	
20	TIM2–/AL2– *	–		
21	GND	–	Ground connection	
22	IN-COM	–	Input signals common	
23	C-ON	–	Current on input	
24	CLR/ALM-RST	–	Deviation counter clear input/Alarm reset input	
25	CCM	–	Current control mode ON input	
26	CS	T-MODE *	Resolution selection input	Push-motion operation ON *
27	–	M0 *	–	Push-current setting selection input *
28	RETURN	M1 *	Return to electrical home operation	
29	P-RESET	M2 *	Position reset input	
30	FREE	–	Excitation OFF, electromagnetic brake release	
31	CW+/PLS+	–	CW pulse input/Pulse input (+5 V or line driver)	
32	CW–/PLS–	–		
33	CW+24 V/PLS+24 V	–	CW pulse input/Pulse input (+24 V)	
34	CCW+24 V/DIR+24 V	–	CCW pulse input/Rotation direction input (+24 V)	
35	CCW+/DIR+	–	CCW pulse input/Rotation direction input (+5 V or line driver)	
36	CCW–/DIR–	–		

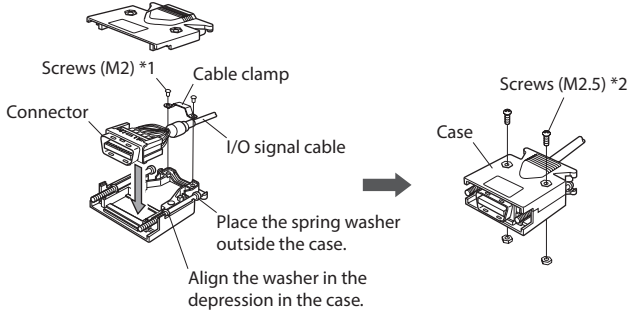
\* The signal will become effective if the applicable setting has been changed using the **MEXE02** or **OPX-2A**.

- Note**
- The factory setting of the current on input is normally open. Be sure to turn the current on input ON when operating the motor. If the current on input is not used, set the input logic to "normally closed" using the **MEXE02** or **OPX-2A**.



## ● Assembling the connector

The tightening torque of a screw varies depending on the manufacturer of the connector. Check the manufacturer and tightening torque of the connector before tightening the screw.



\*1 Tightening torques of this screw are shown in the table.

Manufacturer of connector	Tightening torque [N·m (oz-in)]
3M Company	0.15 to 0.25 (21 to 35)
Molex Incorporated	0.3 to 0.35 (42 to 49)

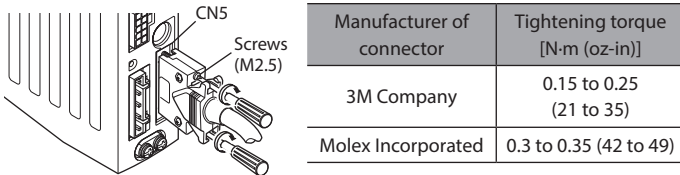
\*2 Tightening torques of this screw are shown in the table.

Manufacturer of connector	Tightening torque [N·m (oz-in)]
3M Company	0.16 to 0.2 (22 to 28)
Molex Incorporated	0.5 to 0.55 (71 to 78)

## ● Connecting the connector

Insert the CN5 connector into the I/O signal connector (CN5) on the driver, and tighten the screws.

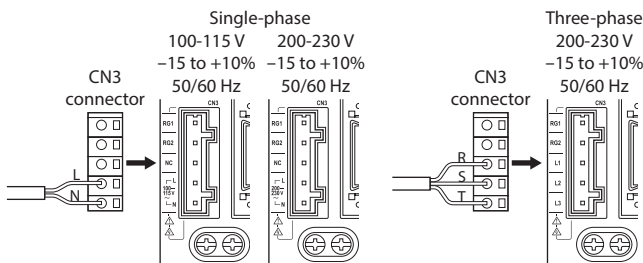
The tightening torque of a screw varies depending on the manufacturer of the connector. Check the manufacturer and tightening torque of the connector before tightening the screw.



Be certain the I/O signal cable is as short as possible. The maximum input frequency will decrease as the cable length increases.

## ■ Connecting the main power supply

Use the CN3 connector (5 pins) to connect the power supply cable (AWG16 to 14: 1.25 to 2.0 mm<sup>2</sup>) to the main power supply input terminals (CN3) on the driver.

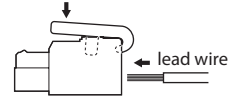


- Do not wire the power supply cable of the driver in the same cable duct with other power lines or motor cables. Doing so may cause malfunction due to noise.
- When cycling the main power supply or connecting/disconnecting the connector, turn off the power and wait for the CHARGE LED to turn off before doing so. The residual voltage may cause electric shock.

## ● Connecting method of the power supply cable

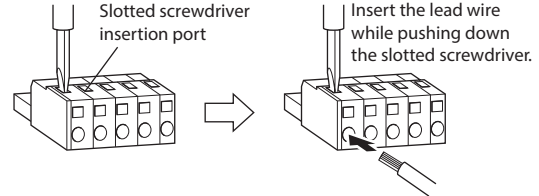
- Applicable lead wire: AWG16 to 14 (1.25 to 2.0 mm<sup>2</sup>)
- Stripping length of wire insulation: 8 to 9 mm (0.31 to 0.35 in.)

1. Insert the connector wiring lever.
2. Insert the lead wire while pushing down 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.



## ● Power supply current capacity

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 100-115 V -15 to +10% 50/60 Hz	Single-phase 200-230 V -15 to +10% 50/60 Hz	Three-phase 200-230 V -15 to +10% 50/60 Hz
<b>ARM46</b>	2.9 A or more	1.9 A or more	1.0 A or more
<b>ARM66</b>	4.4 A or more	2.7 A or more	1.4 A or more
<b>ARM69</b>	6.1 A or more	3.8 A or more	2.0 A or more
<b>ARM98</b>	5.5 A or more	3.4 A or more	1.8 A or more
<b>ARM911</b>	6.5 A or more	4.1 A or more	2.2 A or more

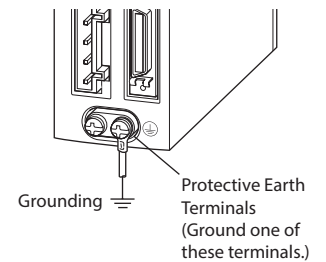
## ■ Grounding the driver

Be sure to ground the Protective Earth Terminal (screw size: M4) of the driver.

- Grounding wire: AWG16 to 14 (1.25 to 2.0 mm<sup>2</sup>)
- Tightening torque: 1.2 N·m (170 oz-in)

You can ground either of the two Protective Earth Terminals. 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.

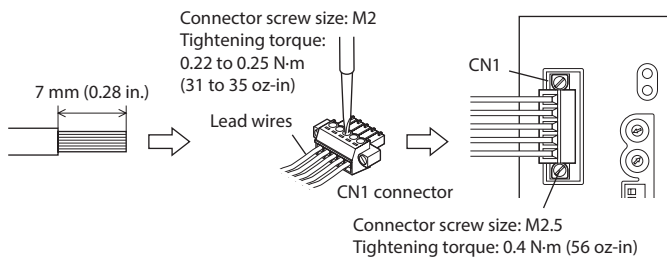


## ■ Connecting the 24 VDC power supply, regeneration resistor, and electromagnetic brake

Use the CN1 connector (6 pins) to connect the 24 VDC power supply, regeneration resistor thermal input, and electromagnetic brake. Connect the lead wires (AWG28 to 16: 0.08 to 1.25 mm<sup>2</sup>) to the connector while checking the table.

Display	Description
24V+	24 VDC power supply input
24V-	(Be sure to connect these pins when an electromagnetic brake is used.)
TH1	Regeneration resistor thermal input
TH2	(If these pins are not used, short them using a jumper wire.)
MB1	Electromagnetic brake – (Connect the black lead wire of the electromagnetic brake.)
MB2	Electromagnetic brake + (Connect the white lead wire of the electromagnetic brake.)

### ● Connecting method



### ● 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*.

Motor model	Input power supply voltage	Power supply current capacity	
		Without electromagnetic brake	With electromagnetic brake
<b>ARM46</b>	24 VDC±5 % *	0.5 A or more	0.58 A or more
<b>ARM66</b>			0.75 A or more
<b>ARM69</b>			
<b>ARM98</b> <b>ARM911</b>			

\* 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 %.

Once a 24 VDC power supply is connected, you can check the contents of alarms that have generated even when the main power is cut off.

If a motor with electromagnetic brake is used, be sure to connect a 24 VDC power supply as a power supply for the electromagnetic brake.

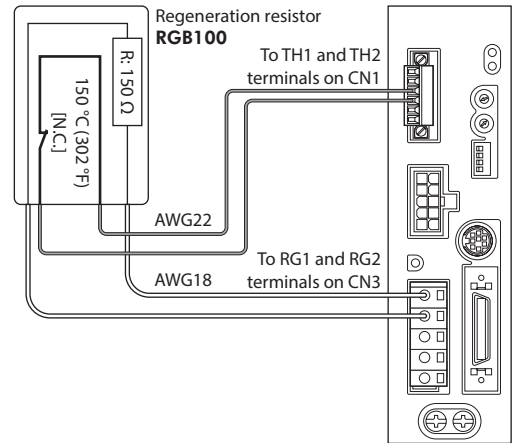
Since the 24 VDC power supply is not used for operating the motor, connect it as necessary.



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

### ● Connecting the regeneration resistor

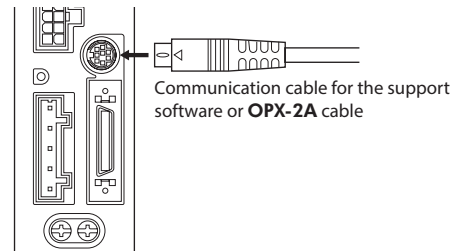
If vertical drive (gravitational operation) such as elevator applications is performed or if sudden start-stop operation of a large inertial load is repeated frequently, connect our regeneration resistor **RGB100**.



- 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 this alarm generates, turn off the main power supply and check the content of the error.

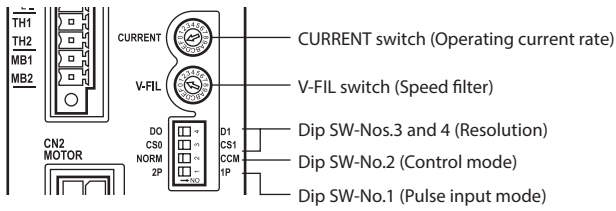
### ■ Connecting the data setter

Connect the communication cable for the support software or **OPX-2A** cable to the data edit connector (CN4) on the driver.



The data edit connector (CN4) and I/O signal connector (CN5) 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 equipments to short, damaging both.

## Setting



**Note** Before operating any switch, turn off the driver power supply and wait for the CHARGE LED to turn off. The residual voltage may cause electric shock.

## Resolution

Dip SW-No.3	Dip SW-No.4	OFF	ON
	OFF		1,000 P/R (0.36°/pulse) *
ON		10,000 P/R (0.036°/pulse)	5,000 P/R (0.072°/pulse)

\* Factory setting



- The new setting of the Dip SW will be enabled after the power is cycled. If a 24 VDC power supply is used, also cycle the 24 VDC power supply.
- When the resolution is changed with the CS input, set the Dip SW-No.3 to the left side (OFF). If the Dip SW-No.3 is set to the right side (ON), the resolution will not change even when the CS input is turned ON.

## Pulse input mode

Dip SW-No.1 is set to the right side (ON): 1-pulse input mode

Dip SW-No.1 is set to the left side (OFF): 2-pulse input mode

The factory setting of the pulse input mode depends on the destination country.



The new setting of the Dip SW will be enabled after the power is cycled. If a 24 VDC power supply is used, also cycle the 24 VDC power supply.

## Operating current rate

Dial setting	Operating current rate (%)	Dial setting	Operating current rate (%)
0	6.3	8	56.3
1	12.5	9	62.5
2	18.8	A	68.8
3	25.0	B	75.0
4	31.3	C	81.3
5	37.5	D	87.5
6	43.8	E	93.8
7	50.0	F	100 (factory setting)



If the operating current rate is too low, starting of the motor and its position hold function may be affected. Do not lower the operating current rate more than necessary.

## Speed filter

Dial setting	Speed filter time constant (ms)	Dial setting	Speed filter time constant (ms)
0	0	8	30
1	1 (factory setting)	9	50
2	2	A	70
3	3	B	100
4	5	C	120
5	7	D	150
6	10	E	170
7	20	F	200

## Alarm (Protective function)

When an alarm generates, the ALM output will turn OFF and the ALARM LED will blink.

Before resetting an alarm, always remove the cause of the alarm and ensure safety.

For details of alarm, refer to the [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

- Check if any of the screws having installed the driver comes loose.
- Check if the connection part between the motor and driver comes loose.
- Check if the connecting parts of connectors for the driver are loose.
- Check if the openings in the driver blocked.
- Check if any strange smells or appearances within the driver.



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

Operation environment	Degree of protection	IP20
	Ambient temperature	0 to +50 °C (+32 to +122 °F) * (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 1,000 m (3,300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water, or oil
Storage environment	Ambient temperature	-20 to +60 °C (-4 to +140 °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	-20 to +60 °C (-4 to +140 °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"> <li>Protective Earth Terminals - Power supply terminals</li> <li>Signal I/O terminals - Power supply terminals</li> </ul>	
Dielectric strength	Sufficient to withstand the following for 1 minute. <ul style="list-style-type: none"> <li>Protective Earth Terminals - Power supply terminals 1.5 kVAC 50/60 Hz</li> <li>Signal I/O terminals - Power supply terminals 1.8 kVAC 50/60 Hz</li> </ul>	

\* When installing a driver to a heat sink of a capacity at least equivalent to an aluminum plate [200×200 mm (7.87×7.87 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

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.
- 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.
- The driver cannot be connected to a power supply of overvoltage category III. Install an insulation transformer on the power supply side of the driver. Also ground the secondary side of the isolation transformer.
- 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) and earth leakage breaker (RCD), 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, CN5) 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 use the driver near flammable objects.
  - Always conduct a trial operation to check the driver temperature.
  - Do not touch the driver.
- The driver is not provided with the electronic motor overload protection as specified in EN 61800-5-1.
- The driver is not provided with the motor overtemperature protection.
- For ground fault protection, this product conforms to IEC 60364-4-41:2005/AMD1:2017, Clause 411 by connecting an earth leakage breaker of 30 mA to the main power supply of the driver and setting the fault loop impedance to a value shown in the table.

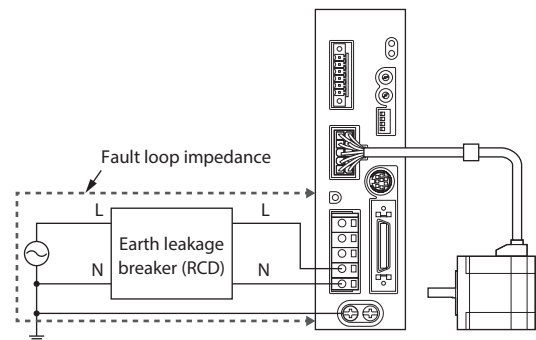
Driver model	Fault loop impedance
<b>ARD-A</b>	500 Ω
<b>ARD-C, ARD-S</b>	1,000 Ω

### Wiring example of ground fault protection

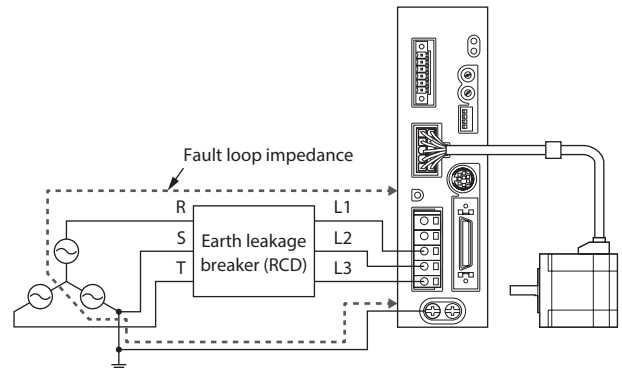


The motor does not have protective functions for overload and overheat.

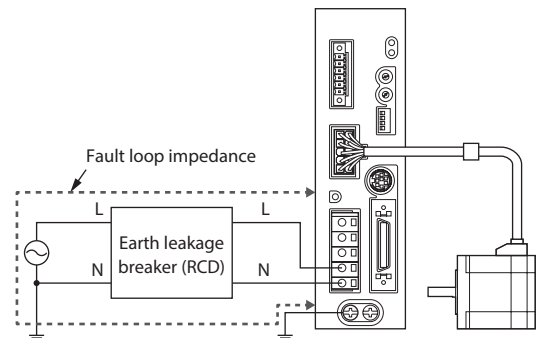
- TN power distribution systems (**ARD-A, ARD-C**)



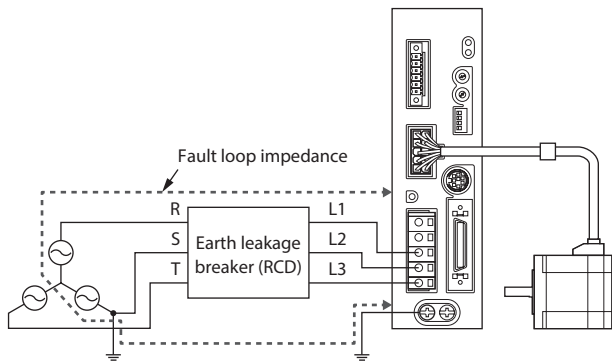
- TN power distribution systems (**ARD-S**)



- TT power distribution systems (**ARD-A, ARD-C**)



• TT power distribution systems (**ARD-S**)



• **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.

**! 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).



- Unauthorized reproduction or copying of all or part of this manual is prohibited.
- Oriental Motor shall not be liable whatsoever for any problems relating to industrial property rights arising from use of any information, circuit, equipment or device provided or referenced in this manual.
- Characteristics, specifications and dimensions are subject to change without notice.
- While we make every effort to offer accurate information in the manual, we welcome your input. Should you find unclear descriptions, errors or omissions, please contact your nearest Oriental Motor sales office.
- **Orientalmotor** and **αSTEP** are registered trademarks or trademarks of Oriental Motor Co., Ltd., in Japan and other countries.

© Copyright ORIENTAL MOTOR CO., LTD. 2010

Published in February 2022

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

ORIENTAL MOTOR U.S.A. CORP  
 Technical Support Tel:800-468-3982  
 8:30am EST to 5:00pm PST (M-F)  
[www.orientalmotor.com](http://www.orientalmotor.com)

ORIENTAL MOTOR (EUROPA) GmbH  
 Schiessstraße 44, 40549 Düsseldorf, Germany  
 Technical Support Tel:00 800/22 55 66 22  
[www.orientalmotor.de](http://www.orientalmotor.de)

ORIENTAL MOTOR (UK) LTD.  
 Unit 5 Faraday Office Park, Rankine Road,  
 Basingstoke, Hampshire RG24 8QB UK  
 Tel:+44-1256347090  
[www.oriental-motor.co.uk](http://www.oriental-motor.co.uk)

ORIENTAL MOTOR (FRANCE) SARL  
 Tel:+33-1 47 86 97 50  
[www.orientalmotor.fr](http://www.orientalmotor.fr)

ORIENTAL MOTOR ITALIA s.r.l.  
 Tel:+39-02-93906347  
[www.orientalmotor.it](http://www.orientalmotor.it)

ORIENTAL MOTOR CO., LTD.  
 4-8-1 Higashiueno, Taito-ku, Tokyo 110-8536  
 Japan  
 Tel:+81-3-6744-0361  
[www.orientalmotor.co.jp](http://www.orientalmotor.co.jp)

ORIENTAL MOTOR ASIA PACIFIC PTE. LTD.  
 Singapore  
 Tel:1800-842-0280  
[www.orientalmotor.com.sg](http://www.orientalmotor.com.sg)

ORIENTAL MOTOR (MALAYSIA) SDN. BHD.  
 Tel:1800-806-161  
[www.orientalmotor.com.my](http://www.orientalmotor.com.my)

ORIENTAL MOTOR (THAILAND) CO., LTD.  
 Tel:1800-888-881  
[www.orientalmotor.co.th](http://www.orientalmotor.co.th)

ORIENTAL MOTOR (INDIA) PVT. LTD.  
 Tel:1800-120-1995 (For English)  
 1800-121-4149 (For Hindi)  
[www.orientalmotor.co.in](http://www.orientalmotor.co.in)

TAIWAN ORIENTAL MOTOR CO., LTD.  
 Tel:0800-060708  
[www.orientalmotor.com.tw](http://www.orientalmotor.com.tw)

SHANGHAI ORIENTAL MOTOR CO., LTD.  
 Tel:400-820-6516  
[www.orientalmotor.com.cn](http://www.orientalmotor.com.cn)

INA ORIENTAL MOTOR CO., LTD.  
 Korea  
 Tel:080-777-2042  
[www.inaom.co.kr](http://www.inaom.co.kr)