Oriental motor

HM-9466-2

AC Motors

KⅡS Series

Induction Motors, Electromagnetic Brake Motors

OPERATING MANUAL

Thank you for purchasing an Oriental Motor product.

This operating manual describes product handling procedures and safety precautions.

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

Table of contents

1 Introduction

■ Before using the product

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

2 Safety precautions

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

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

Description of graphic symbols

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

⚠ WARNING	
	• Do not use the product in explosive or corrosive environments, in the presence of flammable gases or near combustible materials. Doing so may result in fire, electric shock, or injury. • Do not transport, install, connect or inspect the product while the power is supplied. Always turn off the power before carrying out these operations. This may result in electric shock or damage to equipment. • Do not use the electromagnetic brake of the electromagnetic brake motor as a safety brake. Provide safety measures separately. This may cause injury or damage to equipment. • Do not forcibly bend, pull, or pinch the cable or lead wires. Doing so may result in fire, electrical shock, or damage to equipment. • Do not disassemble or modify the motor. Doing so may result in electric shock, injury, or damage to equipment. Refer all such internal inspections and repairs to the sales office from which you purchased the product.
	• Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/troubleshooting of the product. Handling by unqualified and uneducated personnel may result in fire, electric shock, injury, or damage to equipment. • Be sure to ground the motor as it is Class Ⅰ equipment. Failure to do so may result in electric shock. • Always keep the power supply voltage within the specified range. Failure to do so may result in fire or electric shock. • Connect the product securely according to the connection diagram. Failure to do so may result in fire or electric shock. • Turn off the power in the event of a power failure. Otherwise, the motor may start suddenly when the power is restored, causing injury or damage to equipment.

⚠ CAUTION	
	• Do not use the motor beyond the specifications. Doing so may result in fire, electric shock, injury, or damage to equipment. • Do not lift the product by holding the output shaft, the lead wire, or the cable. Doing so may result in injury. • Keep the area around the motor free of combustible materials. Failure to do so may result in fire or a skin burn(s). • Do not leave anything around the motor that would obstruct ventilation. Doing so may result in damage to equipment. • Do not touch the motor output shaft (shaft end or pinion section) with bare hands. Doing so may result in injury. • When assembling the motor and the gearhead, be careful not to get your fingers or any other part of your body caught between the motor and the gearhead. Injury may result. • When installing the motor in equipment, be careful not to get your fingers or any other part of your body caught between the product and the equipment. Injury may result. • Do not touch the motor during operation or immediately after stopping. The surface of the motor is hot and it may cause a skin burn(s). • Do not touch the rotating part (output shaft) during operation. Doing so may result in injury.
	• Provide a cover over the rotating part (output shaft). Failure to do so may result in injury. • The motor does not have a built-in overheat protection device. Provide a protection device externally. • When an abnormality is generated, turn off the power immediately. Failure to do so may result in fire, electric shock, or injury. • The motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions. If the operator is allowed to approach the operating motor, attach a warning label on a conspicuous position as shown in the figure. Failure to do so may result in a skin burn(s).  Warning label

3 Preparation

3.1 Checking the product

Verify that the items listed below are included.

Report any missing or damaged items to the branch or sales office from which you purchased the product.

■ Motor

- ☐ Motor ..... 1 unit
- ☐ Instructions and Precautions for Safe Use ..... 1 copy

■ Parallel shaft GV gearhead (sold separately)

- ☐ Parallel shaft gearhead ..... 1 unit
- ☐ Mounting screw ..... 1 set
  Hexagon socket head cap screw, flat washer, spring washer: each 4 pieces
- ☐ Parallel key ..... 1 piece
  Included or fixed to the output shaft
- ☐ Motor assembly screw ..... 1 set
  Hexagon socket head cap screw: 2 pieces

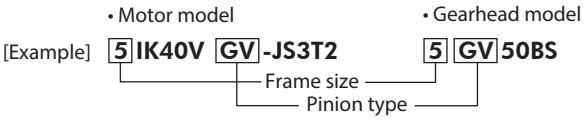
3.2 Checking the model name

Check the motor model and the gearhead model against the model name shown on each nameplate.

Tell us the model name, product serial number, and manufacturing date when you contact us.

■ Combination of motors and gearheads

Combine a motor and a gearhead having the same frame size and pinion type as shown below.



■ Induction Motors

The box (■) in the model name indicates a code representing the power supply voltage.

JS: Three-phase 200 VAC 50/60 Hz

ES: Three-phase 220/230/240 VAC 50/60 Hz or three-phase 220/230 VAC 50/60 Hz

● Pinion shaft type

Terminal box type

Output power	Motor model	Applicable gearhead*		
		Gearhead model	Gear ratio (☐)	Decimal gearheads
30 W	**4IK30VGV-■3T2**	**4GV☐BS**	**5** to **360**	**4GV10X**
40 W	**5IK40VGV-■3T2**	**5GV☐BS**	**5** to **300**	**5GV10X**
60 W	**5IK60VGVH-■3T2**	**5GVH☐BS**	**5** to **300**	–
		5GVH☐B		
100 W	**5IK100VGVR-■3T2**	**5GVR☐BS**	**5** to **180**	–
		5GVR☐B		

The gear ratio when assembling a decimal gearhead is ten times the gear ratio of the gearhead.

* Material of the gearhead output shaft: Stainless steel is used when a code "**S**" appears at the end of the model name. Carbon steel is used when a code "**B**" appears at the end of the model name.

Lead wire type

Output power	Motor model	Applicable gearhead*	
		Gearhead model	Gear ratio (□)
60 W	**5IK60VGVH-■**	**5GVH□B**	**5** to **300**
100 W	**5IK100VGVR-■**	**5GVR□B**	**5** to **180**

* Material of gearhead output shaft: Carbon steel

● Round shaft type

Output power	Motor model	
	Terminal box type	Lead wire type
30 W	**4IK30VAS-■3T2**	–
40 W	**5IK40VAS-■3T2**	–
60 W	**5IK60VAS-■3T2**	**5IK60VA-■**
100 W	**5IK100VAS-■3T2**	**5IK100VA-■**

■ Electromagnetic brake motors

The box (■) in the model name indicates a code representing the power supply voltage.

JS: Three-phase 200 VAC 50/60 Hz

ES: Three-phase 220/230 VAC 50/60 Hz

● Pinion shaft type

Output power	Motor model		Applicable gearhead*	
	Terminal box type	Cable type	Gearhead model	Gear ratio (□)
60 W	**5IK60VGVH-■MT2**	**5IK60VGVH-■M**	**5GVH□B**	**5** to **300**
100 W	**5IK100VGVR-■MT2**	**5IK100VGVR-■M**	**5GVR□B**	**5** to **180**

* Material of gearhead output shaft: Carbon steel

● Round shaft type

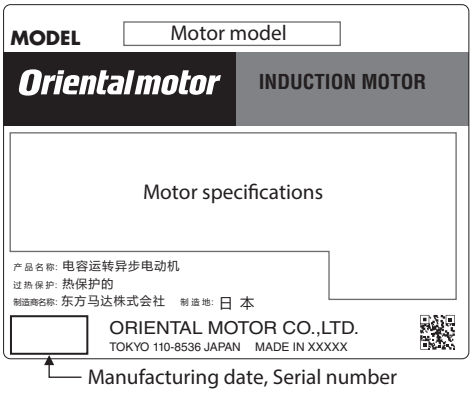
Output power	Motor model	
	Terminal box type	Cable type
60 W	**5IK60VA-■MT2**	**5IK60VA-■M**
100 W	**5IK100VA-■MT2**	**5IK100VA-■M**

3.3 Information about nameplate

The figure shows an example.

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

■ Motor



■ Gearhead

4 Installation

This chapter describes where and how to install the product and how to install a load.

4.1 Installation location

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

[Common conditions]

- Operating ambient temperature: –10 to +40 °C [+14 to 104 °F] (non-freezing)
- Operating ambient humidity: 85 % or less (non-condensing)
- Area free of explosive atmosphere, toxic gas (such as sulfuric gas), or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area 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
- Altitude: Up to 1000 m (3300 ft.) above sea level

[Terminal box type]

- Indoors
- Area not subject to oil (oil droplets) or chemicals
  This product can be used in an environment where it is splashed with water (except for the mounting surface of the round shaft type).
  However, do not use the product in water or in areas with high water pressure.

[Lead wire type, cable type]

- Inside an enclosure installed indoors (provide a ventilation hole)
- Area not subject to splashing water (rain, water droplets), oil (oil droplets), or other liquids

Note On rare occasions, grease may ooze out from the gearhead.
If there is concern about potential environmental contamination from grease leakage, provide an oil pan or similar oil receiving device to prevent secondary damage. Grease leakage may lead to problems in the user's equipment or products.

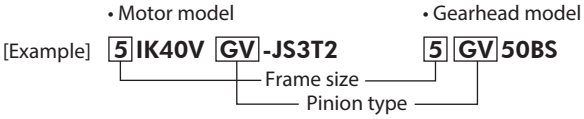
4.2 Installation method

Note Do not install the motor to the mounting hole diagonally or assemble the motor forcibly. Doing so may cause damage to the flange pilot section, thereby resulting in damage to the motor.

■ Pinion shaft type

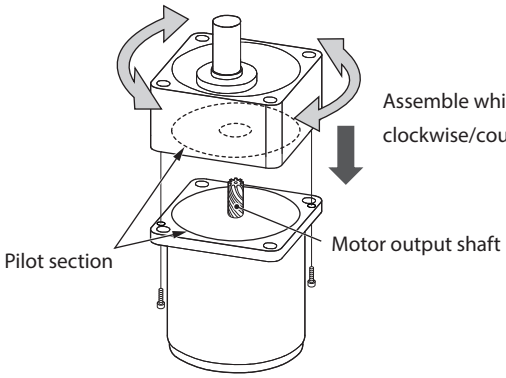
● Assembling a motor and a gearhead

Check the model names for the motor and gearhead.
Only a motor and a gearhead that have the same frame size and pinion type can be combined.



Assemble the gearhead with the motor in a condition where the motor output shaft is facing up. Wipe off grease if it is stuck to the pilot section of the gearhead.

1. Keep the pilot sections of the motor and gearhead parallel and assemble the gearhead with the motor while slowly rotating it clockwise/counterclockwise.
2. Check that there is no gap between the motor and gearhead and tighten them using the motor assembly screws (2 pieces). When using a decimal gearhead, install it between the motor and gearhead.



Motor assembly screws*

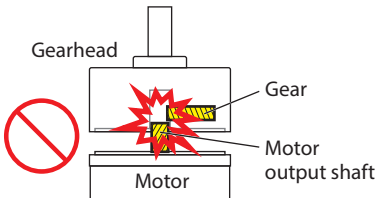
Gearhead model	Nominal designation of thread	Tightening torque [N·m (lb-in)]
4GV	M2.6	0.4 (3.5)
5GV **5GVH** **5GVR**	M3	0.6 (5.3)

* Included with gearheads (sold separately)

Note An O-ring is installed on the motor and decimal gearhead, respectively. Assemble the motor and gearhead carefully to avoid pinching the O-ring. Pinching the O-ring may cause grease to leak from the gearhead.

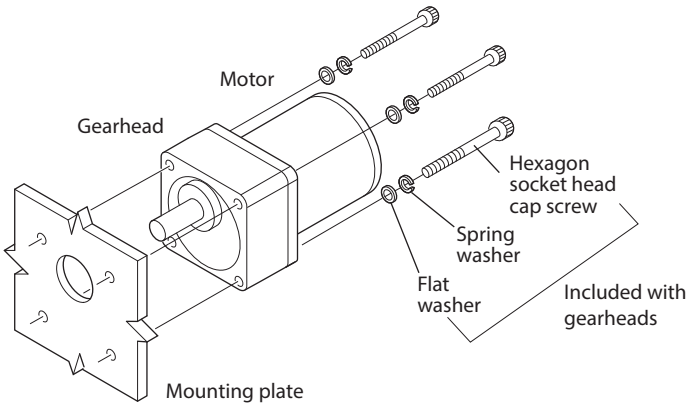
Precaution when assembling

Do not forcibly assemble a motor and a gearhead, and do not hit the motor output shaft with the gearhead or the gear.
Also, do not allow any metal objects or foreign substances to enter the gearhead. The motor output shaft or the gear may be damaged, resulting in abnormal noise or shortened service life.



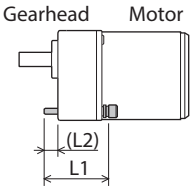
● Installing the motor to a mounting plate

Use the mounting screws included with a gearhead to secure the motor and gearhead to the mounting plate.
Install so that there is no gap between the product and the mounting plate.
When using a decimal gearhead, use the screws included with the decimal gearhead.



Parallel shaft gearheads

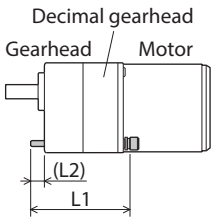
Gearhead model	Gear ratio (☐)	Hexagon socket head cap screw* (Material: Stainless steel)		L2 [mm (in.)]	Tightening torque [N·m (lb-in)]
		Nominal designation	L1 [mm (in.)]		
4GV☐	**5** to **25**	M6	60 (2.36)	9 (0.35)	5.0 (44)
	30 to **120**		65 (2.56)	9 (0.35)	
	150 to **360**		70 (2.76)	9 (0.35)	
5GV☐ **5GVH☐**	**5** to **18**	M8	70 (2.76)	14 (0.55)	12.0 (106)
	25 to **100**		85 (3.35)	16 (0.63)	
	120 to **300**		90 (3.54)	15 (0.59)	
5GVR☐	**5** to **15**		70 (2.76)	14 (0.55)	
	18 to **36**		85 (3.35)	16 (0.63)	
	50 to **180**		95 (3.74)	14 (0.55)	



* Included with gearheads (sold separately)

Decimal gearheads

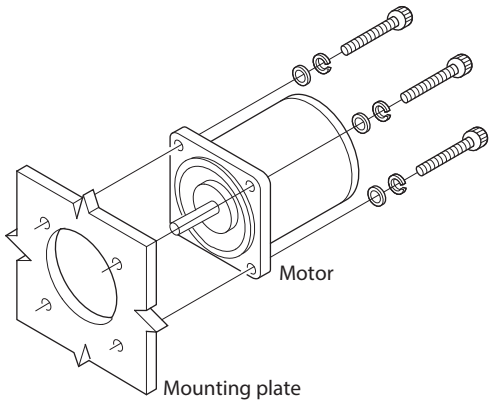
Gearhead model	Combined gearhead		Hexagon socket head cap screw* (Material: Stainless steel)		L2 [mm (in.)]	Tightening torque [N·m (lb-in)]
	Model name	Gear ratio (☐)	Nominal designation	L1 [mm (in.)]		
4GV10X	**4GV☐**	**50** to **120**	M6	110 (4.33)	15 (0.59)	5.0 (44)
		150 to **360**			10 (0.39)	
5GV10X	**5GV☐**	**36** to **100**	M8	130 (5.12)	18 (0.71)	12.0 (106)
		120 to **300**			12 (0.47)	



* Included with gearheads (sold separately)

■ Round shaft type

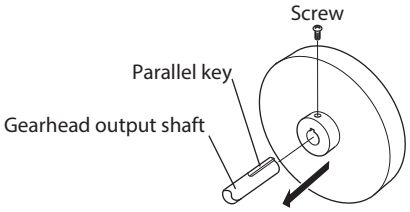
Secure the product using hexagon socket head cap screws (not included) through the four mounting holes.
Install so that there is no gap between the product and the mounting plate.



Motor model	Hexagon socket head cap screw		Tightening torque [N·m (lb-in)]
	Nominal designation	Material	
4IK	M5	Stainless steel	3.0 (26)
5IK	M6	Stainless steel	5.0 (44)
		Iron	6.4 (56)

4.3 Installing a load

The gearhead output shaft is provided with a key slot for installing the transmission parts.
Be sure to fit the output shaft and the transmission parts by a clearance fit when installing.
In addition, always fix the parallel key to the output shaft with a screw to prevent the transmission parts from rattling or spinning.

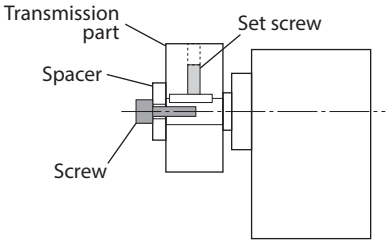


Note Do not apply excessive force onto the gearhead output shaft using a hammer or other tools.
Doing so may cause damage to the output shaft or bearings.

■ When using the output shaft end screw hole of a gearhead

Use a screw hole provided at the end of the output shaft as an auxiliary means to prevent the transmission parts from disengaging.

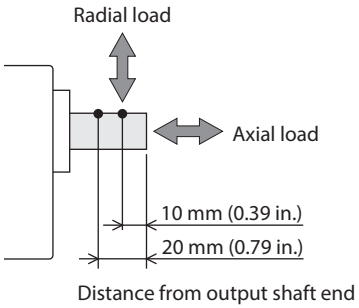
Gearhead model	Output shaft end screw hole
4GV	M5, Effective depth 10 mm (0.39 in)
5GV **5GVH** **5GVR**	M6, Effective depth 12 mm (0.47 in)



4.4 Permissible radial load and permissible axial load

Make sure that the radial load and axial load applied to the output shaft of the motor and gearhead do not exceed the permissible values shown in the table below.

Note Failure due to fatigue may occur when the motor or gearhead bearings and output shaft are repeatedly subjected to the radial or axial load that exceeds the permissible limit.



■ Parallel shaft gearheads

Gearhead model		Permissible radial load [N (lb.)]		Permissible axial load [N (lb.)]
		Distance from output shaft end of the gearhead		
	Gear ratio (□)	10 mm (0.39 in.)	20 mm (0.79 in.)	
4GV□	**5** to **25**	300 (67)	350 (78)	100 (22)
	30 to **360**	450 (101)	550 (123)	
5GV□ **5GVH□**	**3** to **9**	400 (90)	500 (112)	150 (33)
	12.5 to **18**	450 (101)	600 (135)	
	25 to **300**	500 (112)	700 (157)	
5GVR□	**3** to **9**	400 (90)	500 (112)	150 (33)
	12.5 to **18**	450 (101)	600 (135)	
	25 to **180**	500 (112)	700 (157)	

■ Round shaft type

Motor model	Permissible radial load [N (lb.)]		Permissible axial load [N (lb.)]	
	Distance from motor output shaft end		Induction motors	Electromagnetic brake motors
	10 mm (0.39 in.)	20 mm (0.79 in.)		
4IK30	90 (20)	140 (31)	15 (3.3)	–
5IK40	140 (31)	200 (45)	20 (4.5)	
5IK60	240 (54)	270 (60)		14 (3.1)
5IK100				17 (3.8)

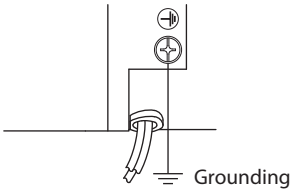
5 Connection

Insulate the connection part of the motor lead wires and the power supply.

5.1 Connecting the Protective Earth Terminal

Use the Protective Earth Terminal ⏚ of the motor to ground as close to the motor as possible.

Note Be sure to use the screw for protective earth attached on the product.



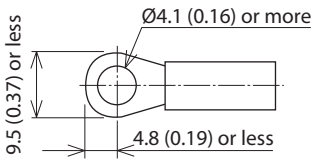
■ Ground terminal

Use the following crimp terminal for grounding.

- Applicable crimp terminal: Ring crimp terminal with insulation cover
- Terminal screw size: M4
- Tightening torque: 1.0 to 1.5 N·m (8.8 to 13.2 lb-in)
- Applicable lead wire: AWG 18 (0.75 mm^2) or thicker

● Lead wire type, cable type*

[Unit: mm (in.)]



* For the terminal box type, use the same crimp terminal used to connect the cable to the terminal block.

5.2 Connection diagram

⚠ CAUTION

The motor does not have a built-in overheat protection device.
Use an electromagnetic switch to prevent the motor from burning when an overload is applied or when the output shaft is locked.
(Refer to the following for details.)

The rotation direction of the gearhead output shaft varies depending on the gear ratio of the gearhead.
Check the gearhead model name and gear ratio before connecting. (The connection diagrams show when the motor is connected directly to a power supply.)

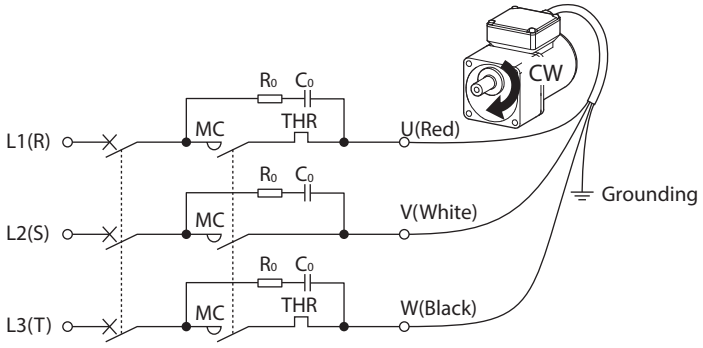
The output shaft rotates in the following direction if connected as shown in the figures below.
Gear ratio ▭ and round shaft type: CW (clockwise direction)
Gear ratio ▭: CCW (counterclockwise direction)

Gearhead model	Gear ratio															
4GV	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**
	150	**180**	**250**	**300**	**360**											
5GV	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**
	150	**180**	**250**	**300**												
5GVH	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**
	150	**180**	**250**	**300**												
5GVR	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**
	150	**180**														

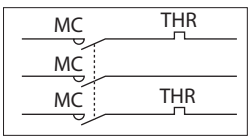
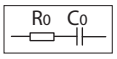
When a decimal gearhead is connected to these gearheads, the rotation speed will be one-tenth. The rotation direction is the same.

■ Induction Motors

Changing the connection for any two wires of R, S, or T will rotate in the opposite direction.

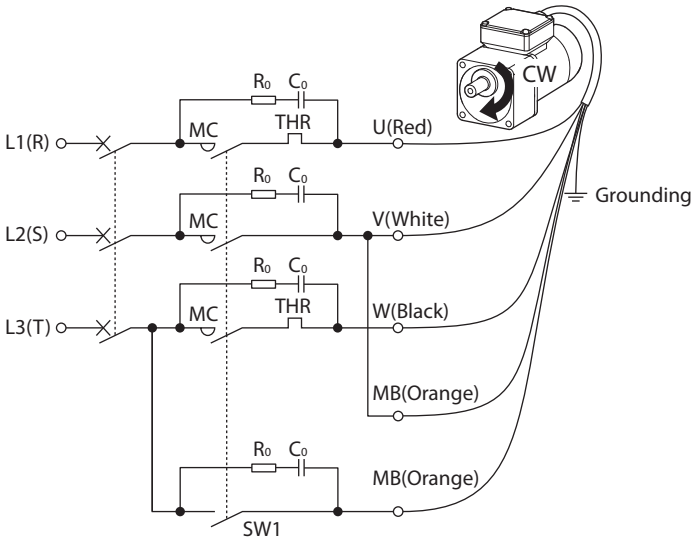


The codes U, V, and W in the connection diagram indicate the terminal codes inside the terminal box of the terminal box type.
The color in parentheses ( ) indicates the color of the lead wire of the lead wire type.

Electromagnetic switch	Measures for surge voltage
MC: Electromagnetic contactor THR: Thermal relay 	Connect the CR circuit for surge suppression to protect contacts as shown in the figure.  R_0 = 5 to 200 Ω C_0 = 0.1 to 0.2 μF, 250 VAC The CR circuit for surge suppression is available as an accessory (sold separately). Model: **EPCR1201-2**

■ Electromagnetic brake motors

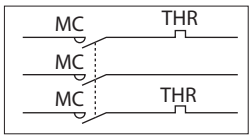
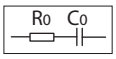
Changing the connection for any two wires of R, S, or T will rotate in the opposite direction.



Contact capacity of SW1: 250 VAC, inductive load 5 A or more (interlocking)

The codes U, V, and W in the connection diagram indicate the terminal codes inside the terminal box of the terminal box type.

The color in parentheses ( ) indicates the color of the lead wire of the cable type.

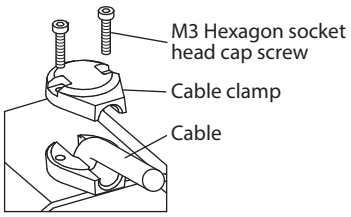
Electromagnetic switch	Measures for surge voltage
MC: Electromagnetic contactor THR: Thermal relay 	Connect the CR circuit for surge suppression to protect contacts as shown in the figure.  R_0 = 5 to 200 Ω C_0 = 0.1 to 0.2 μF, 250 VAC The CR circuit for surge suppression is available as an accessory (sold separately). Model: **EPCR1201-2**

● How to change the direction of the cable outlet position (electromagnetic brake motor only)

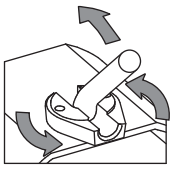
The cable outlet position is set toward the direction of the motor output shaft at the time of shipment.

The direction of the cable outlet position can be changed by 180 degrees. Change the direction according to the following steps.

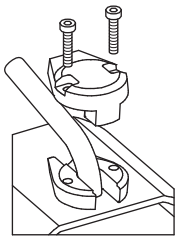
1. Loosen the screws of the cable clamp and remove the top of the cable clamp.



2. Change the direction of the cable by 180 degrees and rotate the cable clamp by 180 degrees.



3. Install the top of the cable clamp and secure it with screws.
   Tightening torque of screw: 0.5 to 0.7 N·m (4.4 to 6.1 lb-in)



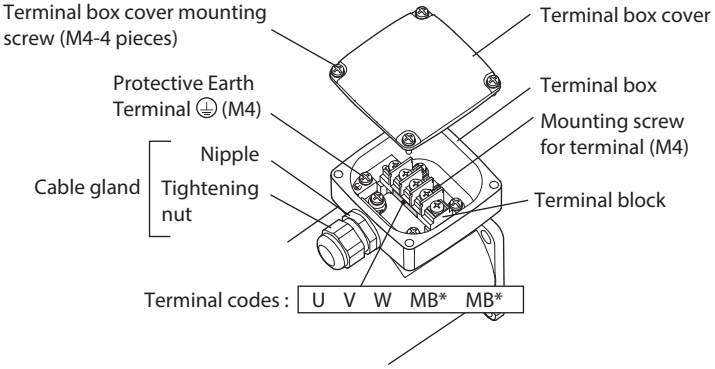
5.3 Connecting to the terminal block

Remove the terminal box cover to connect a cable. Cables for connection are available as accessories (sold separately).

- If the O-ring placed on the mating surface of the terminal box cover is detached, install it firmly in the groove of the terminal box cover.
- After connecting the cable, tighten the screws securely to the tightening torque shown in the table below.

Note

- To maintain the sealing performance of the terminal box, observe the applicable cable diameter and the tightening torque for screws.
- Secure the cable exposed to the outside of the motor so that it is not subjected to stress.
- Check to see if the mounting screw is loose on a regular basis.



Tightening torque [Unit: N·m (lb-in)]

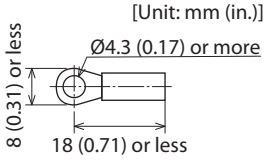
Terminal box cover mounting screw	1.0 to 1.5 (8.8 to 13.2)
Mounting screw for terminal	1.0 to 1.2 (8.8 to 10.6)
Tightening nut	2.0 to 2.5 (17.7 to 22)
Nipple	2.0 to 2.5 (17.7 to 22)

* When an electromagnetic brake motor is used

- Use the following cable and crimp terminal when connecting the cable on the terminal block.

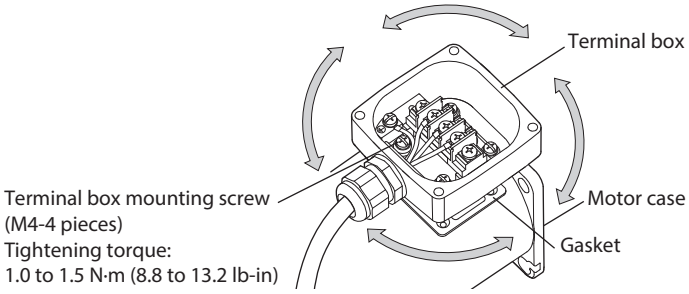
Applicable crimp terminal: Ring crimp terminal with insulation cover
Applicable cable diameter: Ø7 to Ø13 mm (0.28 to 0.51 in.)*
Applicable lead wire: AWG 18 (0.75 mm^2) or thicker
* Round shaft type: Ø8 to Ø13 mm (0.31 to 0.51 in.)

[Unit: mm (in.)]



■ Changing the cable outlet position

The cable outlet position can be changed to the left or right 90-degree direction or the 180-degree direction. When changing the cable outlet position, loosen the terminal box cover mounting screws and rotate the terminal box to change the mounting direction.



Note

- Be sure to use the gasket attached.
- Assemble so that no foreign objects can get between between the terminal box and the motor case.

6 Operation

The motor rotates when the power supply is turned on.

To prevent the risk of electric shock, do not turn on the power supply until the wiring has been completed.

Note

- Make sure that the motor case temperature does not exceed 90 °C (194 °F) when operating the motor. Operating the motor above the motor case temperature of 90 °C (194 °F) may cause significant deterioration of the motor windings and ball bearings, resulting in shortened motor life. Measure to check the motor case temperature using a thermometer, thermo tape, or thermocouple.
- Do not perform any operation that instantaneously switches the motor rotation direction. Doing so may damage the motor or gearhead.
- When the motor is used in a low temperature environment, the output torque may become small.

■ Operation/stop of electromagnetic brake motor

SW1 is used for "Operation-Stop" of the motor.

Turning SW1 ON releases the electromagnetic brake to rotate the motor.

Turning SW1 OFF actuates the electromagnetic brake to stop the motor.

A load may fall if the product is used in a vertical drive. Operate it after thoroughly checking the load condition.

memo

- The electromagnetic brake is a friction type. Friction noise may occur when the electromagnetic brake is actuated, but this is not a problem.
- If the electromagnetic brake is released in advance, the motor can be started faster. Release the electromagnetic brake at least 10 ms before starting the motor.
- If a current is applied between the two electromagnetic brake lead wires (orange) when the motor is stopped, the electromagnetic brake is released and the motor shaft can be rotated easily by hand.

7 Burning protection at overload/locked condition

7.1 When connecting to a power supply

- Always connect an electromagnetic switch. Connect the electromagnetic switch according to the operating manual of the electromagnetic switch.
- For the settling current of the thermal relay, set the motor rated current.
  The motor rated current is shown on the nameplate.
- For an electromagnetic switch, use any of the following products or equivalent.

[Fuji Electric FA Components & Systems Co., Ltd.]

Motor output power	Part number
30 W, 40 W	SC11AAN-☐10TD
60 W	SC11AAN-☐10TF
100 W	SC11AAN-☐10TH

The box (☐) in the part number indicates a code representing the coil voltage code.
Use the product having the coil voltage code which satisfies the motor rated voltage.

Rated voltage		Coil voltage code
50 Hz	60 Hz	
200 VAC	200 to 220 VAC	2
200 to 220 VAC	220 to 240 VAC	M
220 to 240 VAC	240 to 260 VAC	P

[Mitsubishi Electric Corporation]

Motor output power	Part number
30 W, 40 W	MSO-T10 0.24A 200V AC200V
60 W	MSO-T10 0.35A 200V AC200V
100 W	MSO-T10 0.5A 200V AC200V

7.2 When connecting to an inverter

Be sure to set the electronic thermal relay according to the operating manual of the inverter.
If the electronic thermal relay is not set, burnout may occur.

■ When using the motor with an inverter

When the motor is used with connecting an inverter, perform the following settings to the inverter.
When driving the motor, use it at the setting frequency 120 Hz or lower.

● Setting for motor

Electronic thermal relay function	Set the rated current shown on the motor nameplate based on the base frequency and the voltage applied to the motor.
Setting the applicable motor	Constant-torque motor or inverter motor
Motor capacity	Motor rated output power If it does not exist in the setting value of the inverter, set the closest value.
Number of motor poles	4 poles

● Note on using the motor with an inverter

- Use the input voltage to the inverter at or below 240 VAC. If the motor is operated above the voltage, the insulation of the motor windings may deteriorate, resulting in damage to the motor.
- Connect the lead wires of the electromagnetic brake to the primary side of the inverter (commercial power supply). Do not connect to the secondary side (output side) of the inverter.
- If the motor is stopped operating with the electromagnetic brake, keep the motor shaft speed at 1800 r/min or less.

8 Inspection and maintenance

8.1 Inspection

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

■ Inspection items

- Check to see if any of the mounting screws of the motor and gearhead are loose.
- Check to see if the bearing part (ball bearings) of the motor makes an unusual noise.
- Check to see if the bearing part (ball bearings) or the gear meshing part of the gearhead makes an unusual noise.
- Check to see if the output shaft of the motor and gearhead and a load shaft are out of alignment.

8.2 Warranty

Check on the Oriental Motor Website for the product warranty.

8.3 Disposal

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

9 Troubleshooting and remedial actions

When the motor cannot be operated properly, refer to the contents described in this section and take an appropriate remedial action.

If the problem persists, contact your nearest Oriental Motor sales office.

Phenomenon	Check point
The motor does not rotate. The motor sometimes rotates and sometimes does not.	• Check the power supply voltage. • Connect the power supply properly. • If terminal blocks or crimp terminals are used, check if poor connection is occurred. • Check the voltage applied to the electromagnetic brake lead wires (MB, orange). • Keep a load at or below the permissible value.
The motor rotates in the direction opposite to the specified direction.	• The connection varies depending on the gear ratio of the gearhead. • The rotation direction is viewed from the output shaft side. Check the direction from which the product is being viewed.
The motor temperature is abnormally high. [The motor case temperature exceeds 90 °C (194 °F).]	• Check the power supply voltage. • Reconsider the ventilation condition.
Noise is generated.	• Assemble the motor and gearhead properly. • Assemble a gearhead with the same type of pinion as the motor pinion shaft.

10 Specifications

10.1 Specifications

Check on the Oriental Motor Website for the product specifications.

10.2 General specifications

Operating environment	Ambient temperature	−10 to +40 °C (+14 to +104 °F) (non-freezing)
	Ambient humidity	85 % or less (non-condensing)
	Altitude	Up to 1000 m (3300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. No water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environments.
Storage environment Shipping environment	Ambient temperature	−25 to +70 °C (−13 to +158 °F) (non-freezing)
	Ambient humidity	85 % or less (non-condensing)
	Altitude	Up to 3000 m (10000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. No water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environments.
Degree of protection		Terminal box type: IP66 (except for mounting surface of round shaft type) Lead wire type: IP20 Cable type: IP40

10.3 Time rating

Continuous operation can be performed (continuous rating).

11 Regulations and standards

Check on the Oriental Motor Website for details about standards.

■ UL Standards, CSA Standards

This product is recognized by UL under UL and CSA Standards.

■ China Compulsory Certification System (CCC System)

This product is affixed with the CCC Mark under the China Compulsory Certification System.
It is also certified by CQC.

■ CE Marking

This product is affixed with the CE Marking under the following directive.

● Low Voltage Directive

Installation conditions

- Terminal box type
  Overvoltage category: Ⅱ, pollution degree: 3, protection against electric shock: Class Ⅰ equipment
- Lead wire type, cable type
  Overvoltage category: Ⅱ, pollution degree: 2, protection against electric shock: Class Ⅰ equipment

If the overvoltage category Ⅲ is required according to the equipment, supply a rated voltage to the motor via the insulation transformer.

● RoHS Directive

This product does not contain the substances exceeding the restriction values.

■ Motor temperature rise tests

The temperature rise tests stipulated in the standards are conducted in a state where a motor is mounted on a heat radiation plate instead of attaching a gearhead.
The size, thickness and material of the heat radiation plates are as follows.

Motor model	Size [mm (in.)]	Thickness [mm (in.)]	Material
4IK30	135 × 135 (5.31 × 5.31)	5 (0.20)	Aluminum alloy
5IK40	165 × 165 (6.50 × 6.50)		
5IK60 **5IK100**	200×200 (7.87×7.87)		

■ Electrical Appliance and Material Safety Act

(PS E) mark is shown on the motor nameplate for the round shaft type (with terminal box) of three-phase 200/220/230/240 VAC.

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

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