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.

### 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 safe use of the product.

#### Introduction

Before using the motor

Only qualified personnel 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.

#### Regulatons and standards

### UL Standards, CSA Standards, CCC System

This product is recognized by UL under the UL and CSA Standards, and also certified by CCC under the China Compulsory Certification (CCC) system. The motor model name represents the model that conforms to the standards. The three-phase 380/400/415 V motors have obtained only the certification under the CCC system.

<table>
<thead>
<tr>
<th>Applicable standards</th>
<th>Certification Body / File No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1004-1, UL 1004-2, UL 1004-3</td>
<td>UL / UL File No.E64197, E64199</td>
</tr>
<tr>
<td>CSA C22.2 No.100, CSA C22.2 No.77</td>
<td>CQC</td>
</tr>
</tbody>
</table>

- **Thermal Class:** 130 (B) 1 W type and 3 W type motors: 105 (A) of the UL / CSA standards and 120 (E) of the CCC / EN standards

- **Standards for accessories**
  - **Capacitor:** UL File No.E88367 (CYWT2), VDE License Nos.112847 (capacitors with a rated voltage of 250 VAC, excluding CH10FAUL, CH12FAUL, CH15FAUL and CH18FAUL), 114747 (capacitors with a rated voltage of 450 VAC, excluding CH035FAUL and CH045FAUL)
  - **Capacitor cap:** UL File No.E56078 (YDTU2)

- **CE Marking**

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

- **Low Voltage Directive**
- **Applications standards**
  - EN 60034-1, EN 60034-5, EN 60664-1, EN 60950-1

- **Installation conditions (For EN standard)**
  - **Overvoltage category**: II, Pollution degree 2, Class I equipment
  - When the motor to which the capacitor is mounted requires overvoltage category III and pollution degree 3 specifications, install the motor in a cabinet that comply with IP54 and connect to power supply via an isolation transformer.

- **Motor temperature rise tests**

Temperature rise tests required by the standards are conducted for the pinion shaft type motors in a state of attaching a gearhead. For the 90 W reversible motors, the tests are conducted in a state of attaching a gearhead and heat radiation plate (heat radiation plate size: 200×200 mm (7.87×7.87 in.), thickness: 5 mm (0.20 in.), material: aluminum alloy). The tests for the round shaft type motors are conducted in a state of attaching a heat radiation plate. The size, thickness, and material of the heat radiation plates are as follows.

<table>
<thead>
<tr>
<th>First number in motor name</th>
<th>Size [mm (in.)]</th>
<th>Thickness [mm (in.)]</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>80x80 (3.15x3.15)</td>
<td>5 (0.20)</td>
<td>Aluminum alloy</td>
</tr>
<tr>
<td>2</td>
<td>115x115 (4.53x4.53)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>125x125 (4.92x4.92)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>135x135 (5.31x5.31)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 (40 W)</td>
<td>165x165 (6.50x6.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 (60 W, 90 W Induction motors, 150 W)</td>
<td>200x200 (7.87x7.87)</td>
<td>10 (0.39)</td>
<td></td>
</tr>
</tbody>
</table>

#### RoHS Directive

The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).
The list above shows pinion shaft motors. For the round shaft motor, “Check the model number against the number indicated on the product.” Checking the model name

• Operating manual
• Capacitor cap
• Capacitor

Motor..........................................1 unit to the branch or sales office from which you purchased the product. Verify that the items listed below are included. Report any missing or damaged items in the model and motor model are replaced by “①”, “②”, “③”. Refer to p.3 for the connection diagram.

**Induction motors**

Single-phase type (Connection diagram: ①)

<table>
<thead>
<tr>
<th>Output power</th>
<th>Model</th>
<th>Motor model</th>
<th>Capacitor model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 W</td>
<td>0IK1GN-AW2J</td>
<td>0IK1GN-AW2</td>
<td>CH15FAUL</td>
</tr>
<tr>
<td></td>
<td>0IK1GN-AW3U</td>
<td>0IK1GN-AW3</td>
<td>CH10FAUL</td>
</tr>
<tr>
<td></td>
<td>0IK1GN-CW2J</td>
<td>0IK1GN-CW2</td>
<td>CH033BFAUL</td>
</tr>
<tr>
<td>3 W</td>
<td>0IK3GN-BW2J</td>
<td>0IK3GN-BW2</td>
<td>CH18FAUL</td>
</tr>
<tr>
<td></td>
<td>0IK3GN-BW3U</td>
<td>0IK3GN-BW3</td>
<td>CH15FAUL</td>
</tr>
<tr>
<td></td>
<td>0IK3GN-DW2J</td>
<td>0IK3GN-DW2</td>
<td>CH045BFAUL</td>
</tr>
<tr>
<td>6 W</td>
<td>2IK6GN-AW2J</td>
<td>2IK6GN-AW2</td>
<td>CH35FAUL</td>
</tr>
<tr>
<td></td>
<td>2IK6GN-AW2U</td>
<td>2IK6GN-AW2</td>
<td>CH25FAUL</td>
</tr>
<tr>
<td></td>
<td>2IK6GN-CW2E</td>
<td>2IK6GN-CW2</td>
<td>CH068FAUL</td>
</tr>
<tr>
<td></td>
<td>3IK1GN-AW2J</td>
<td>3IK1GN-AW2</td>
<td>CH155FAUL</td>
</tr>
<tr>
<td></td>
<td>3IK1GN-AW2U</td>
<td>3IK1GN-AW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td></td>
<td>3IK1GN-CW2J</td>
<td>3IK1GN-CW2</td>
<td>CH155FAUL</td>
</tr>
<tr>
<td></td>
<td>3IK1GN-CW2E</td>
<td>3IK1GN-CW2</td>
<td>CH108FAUL</td>
</tr>
<tr>
<td>15 W</td>
<td>4IK2GN-AW2J</td>
<td>4IK2GN-AW2</td>
<td>CH80CFAU1</td>
</tr>
<tr>
<td></td>
<td>4IK2GN-AW2U</td>
<td>4IK2GN-AW2</td>
<td>CH65CFAU1</td>
</tr>
<tr>
<td></td>
<td>4IK2GN-CW2E</td>
<td>4IK2GN-CW2</td>
<td>CH158FAUL</td>
</tr>
<tr>
<td>25 W</td>
<td>5IK4GN-AW2J</td>
<td>5IK4GN-AW2</td>
<td>CH110CFAU2</td>
</tr>
<tr>
<td></td>
<td>5IK4GN-AW2U</td>
<td>5IK4GN-AW2</td>
<td>CH90CFAU1</td>
</tr>
<tr>
<td></td>
<td>5IK4GN-CW2E</td>
<td>5IK4GN-CW2</td>
<td>CH238FAUL</td>
</tr>
<tr>
<td>40 W</td>
<td>5IK6GN-AW2J</td>
<td>5IK6GN-AW2</td>
<td>CH180CFAU2</td>
</tr>
<tr>
<td></td>
<td>5IK6GN-AW2U</td>
<td>5IK6GN-AW2</td>
<td>CH180CFAU2</td>
</tr>
<tr>
<td></td>
<td>5IK6GN-CW2E</td>
<td>5IK6GN-CW2</td>
<td>CH408FAUL</td>
</tr>
<tr>
<td>60 W</td>
<td>5IK9GN-AW2J</td>
<td>5IK9GN-AW2</td>
<td>CH280CFAU2</td>
</tr>
<tr>
<td></td>
<td>5IK9GN-AW2U</td>
<td>5IK9GN-AW2</td>
<td>CH280CFAU2</td>
</tr>
<tr>
<td></td>
<td>5IK9GN-CW2E</td>
<td>5IK9GN-CW2</td>
<td>CH608FAUL</td>
</tr>
</tbody>
</table>

Single-phase, 2-pole, high-speed type (Connection diagram: ②)

Models listed in the table below are the round shaft type motors.

<table>
<thead>
<tr>
<th>Output power</th>
<th>Model</th>
<th>Motor model</th>
<th>Capacitor model</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 W</td>
<td>4IK40A-BW2J</td>
<td>4IK40A-BW2</td>
<td>CH90CFAU1</td>
</tr>
<tr>
<td></td>
<td>4IK40A-BW2U</td>
<td>4IK40A-BW2</td>
<td>CH75CFAU1</td>
</tr>
<tr>
<td></td>
<td>4IK40A-DW2J</td>
<td>4IK40A-DW2</td>
<td>CH238FAUL</td>
</tr>
<tr>
<td></td>
<td>4IK40A-DW3E</td>
<td>4IK40A-DW3</td>
<td>CH188FAUL</td>
</tr>
<tr>
<td>60 W</td>
<td>4IK60A-BW2J</td>
<td>4IK60A-BW2</td>
<td>CH140CFAU2</td>
</tr>
<tr>
<td></td>
<td>4IK60A-BW2U</td>
<td>4IK60A-BW2</td>
<td>CH100CFAU2</td>
</tr>
<tr>
<td></td>
<td>4IK60A-DW2J</td>
<td>4IK60A-DW2</td>
<td>CH308FAUL</td>
</tr>
<tr>
<td></td>
<td>4IK60A-DW3E</td>
<td>4IK60A-DW3</td>
<td>CH258FAUL</td>
</tr>
</tbody>
</table>

Three-phase type (Connection diagram: ③)

Models listed in the table below are the round shaft type motors.

<table>
<thead>
<tr>
<th>Output power</th>
<th>Model</th>
<th>Motor model</th>
<th>Capacitor model</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 W</td>
<td>2IK6GN-SW2</td>
<td>2IK6GN-SW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td>15 W</td>
<td>3IK15GN-SW2</td>
<td>3IK15GN-SW2</td>
<td>CH35FAUL</td>
</tr>
<tr>
<td>25 W</td>
<td>4IK25GN-SW2</td>
<td>4IK25GN-SW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td></td>
<td>4IK25GN-UW2</td>
<td>4IK25GN-UW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td>40 W</td>
<td>5IK40GN-SW2</td>
<td>5IK40GN-SW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td></td>
<td>5IK40GN-UW2</td>
<td>5IK40GN-UW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td>60 W</td>
<td>5IK60GN-SW2</td>
<td>5IK60GN-SW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td></td>
<td>5IK60GN-UW2</td>
<td>5IK60GN-UW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td>90 W</td>
<td>5IK90GN-SW2</td>
<td>5IK90GN-SW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td></td>
<td>5IK90GN-UW2</td>
<td>5IK90GN-UW2</td>
<td>CH45FAUL</td>
</tr>
</tbody>
</table>

Three-phase, 2-pole, high-speed type (Connection diagram: ③)

Models listed in the table below are the round shaft type motors.

<table>
<thead>
<tr>
<th>Output power</th>
<th>Model</th>
<th>Motor model</th>
<th>Capacitor model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 W</td>
<td>0RK1GN-AW2J</td>
<td>0RK1GN-AW2</td>
<td>CH18FAUL</td>
</tr>
<tr>
<td></td>
<td>0RK1GN-AW3U</td>
<td>0RK1GN-AW3</td>
<td>CH12FAUL</td>
</tr>
<tr>
<td></td>
<td>0RK1GN-CW2J</td>
<td>0RK1GN-CW2</td>
<td>CH045BFAUL</td>
</tr>
<tr>
<td>6 W</td>
<td>2RK6GN-AW2J</td>
<td>2RK6GN-AW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td></td>
<td>2RK6GN-AW2U</td>
<td>2RK6GN-AW2</td>
<td>CH45FAUL</td>
</tr>
<tr>
<td></td>
<td>2RK6GN-CW2E</td>
<td>2RK6GN-CW2</td>
<td>CH108FAUL</td>
</tr>
<tr>
<td>15 W</td>
<td>3RK15GN-AW2J</td>
<td>3RK15GN-AW2</td>
<td>CH75FAUL</td>
</tr>
<tr>
<td></td>
<td>3RK15GN-AW2U</td>
<td>3RK15GN-AW2</td>
<td>CH60FAUL</td>
</tr>
<tr>
<td></td>
<td>3RK15GN-CW2E</td>
<td>3RK15GN-CW2</td>
<td>CH158FAUL</td>
</tr>
<tr>
<td>25 W</td>
<td>4RK25GN-AW2J</td>
<td>4RK25GN-AW2</td>
<td>CH100CFAU2</td>
</tr>
<tr>
<td></td>
<td>4RK25GN-AW2U</td>
<td>4RK25GN-AW2</td>
<td>CH80CFAU2</td>
</tr>
<tr>
<td></td>
<td>4RK25GN-CW2E</td>
<td>4RK25GN-CW2</td>
<td>CH258FAUL</td>
</tr>
<tr>
<td>40 W</td>
<td>5RK40GN-AW2J</td>
<td>5RK40GN-AW2</td>
<td>CH160CFAU2</td>
</tr>
<tr>
<td></td>
<td>5RK40GN-AW2U</td>
<td>5RK40GN-AW2</td>
<td>CH120CFAU2</td>
</tr>
<tr>
<td></td>
<td>5RK40GN-CW2E</td>
<td>5RK40GN-CW2</td>
<td>CH358FAUL</td>
</tr>
</tbody>
</table>

Reversible motors

Single-phase type (Connection diagram: ④)

<table>
<thead>
<tr>
<th>Output power</th>
<th>Model</th>
<th>Motor model</th>
<th>Capacitor model</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 W</td>
<td>4IK40A-BW2J</td>
<td>4IK40A-BW2</td>
<td>CH90CFAU1</td>
</tr>
<tr>
<td></td>
<td>4IK40A-BW2U</td>
<td>4IK40A-BW2</td>
<td>CH75CFAU1</td>
</tr>
<tr>
<td></td>
<td>4IK40A-DW2J</td>
<td>4IK40A-DW2</td>
<td>CH238FAUL</td>
</tr>
<tr>
<td></td>
<td>4IK40A-DW3E</td>
<td>4IK40A-DW3</td>
<td>CH188FAUL</td>
</tr>
<tr>
<td>60 W</td>
<td>4IK60A-BW2J</td>
<td>4IK60A-BW2</td>
<td>CH140CFAU2</td>
</tr>
<tr>
<td></td>
<td>4IK60A-BW2U</td>
<td>4IK60A-BW2</td>
<td>CH100CFAU2</td>
</tr>
<tr>
<td></td>
<td>4IK60A-DW2J</td>
<td>4IK60A-DW2</td>
<td>CH308FAUL</td>
</tr>
<tr>
<td></td>
<td>4IK60A-DW3E</td>
<td>4IK60A-DW3</td>
<td>CH258FAUL</td>
</tr>
<tr>
<td>90 W</td>
<td>4IK90A-BW2J</td>
<td>4IK90A-BW2</td>
<td>CH280CFAU2</td>
</tr>
<tr>
<td></td>
<td>4IK90A-BW2U</td>
<td>4IK90A-BW2</td>
<td>CH250CFAU2</td>
</tr>
<tr>
<td></td>
<td>4IK90A-DW2J</td>
<td>4IK90A-DW2</td>
<td>CH708FAUL</td>
</tr>
<tr>
<td></td>
<td>4IK90A-DW3E</td>
<td>4IK90A-DW3</td>
<td>CH608FAUL</td>
</tr>
</tbody>
</table>

Installation

**Location for installation**

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

• Inside an enclosure that is installed indoors (provide vent holes)
• Operating ambient temperature −10 to +40 °C (+14 to +104 °F) (non-freezing)
• 100 V/200 V (Excluding the 1 W and 3 W types) −10 to +50 °C (+14 to +122 °F) (non-freezing)
• Operating ambient humidity 85%, maximum (non-condensing)
- Area that is free from an explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area free of excessive dust, iron particles or the like
- Area not subject to splashing water (storms, 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
- 1000 m (3300 ft.) or less above sea level

## How to install the motor

### Round shaft type

Drill holes on the mounting plate and fix the motor on the plate using screws (not supplied). Do not leave a gap between the motor and mounting plate.

<table>
<thead>
<tr>
<th>First number of motor model</th>
<th>Nominal diameter of screw</th>
<th>Tightening torque [N·m (lb-in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>M3</td>
<td>1.0 (8.8)</td>
</tr>
<tr>
<td>2</td>
<td>M4</td>
<td>2.0 (17.7)</td>
</tr>
<tr>
<td>4</td>
<td>M5</td>
<td>2.5 (22)</td>
</tr>
<tr>
<td>5</td>
<td>M6</td>
<td>3.0 (26)</td>
</tr>
</tbody>
</table>

**Note**

Do not insert the motor into the mounting hole at an angle or force it in, as this may scratch the flange pilot section and damage the motor.

### Pinion shaft type

**Assembling**

Keep the pilot sections of the motor and gearhead in parallel, and assemble the gearhead with the motor while slowly rotating it clockwise/ counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the side panel or gears of the gearhead strongly. Assemble the gearhead to the motor in a condition where the motor output shaft is in an upward direction.

**Installing**

Drill holes on the mounting plate and fix the motor and gearhead on the plate using screws supplied with the gearhead. Do not leave a gap between the motor and mounting plate. Refer to the Oriental Motor Website for the screw specifications.

**Note**

- Use the gearhead with pinion shaft which is identical with one of motor.
- Do not forcibly assemble the motor and gearhead. Also, prevent metal objects or foreign substances from entering in the gearhead. The pinion of the motor output shaft or gear may be damaged, resulting in noise or shorter service life.

### 1 W type and 3 W type motors

Remove only the black cap before installation. If the white tube is removed, grease in the gearhead may penetrate into the inside of the motor, resulting in damage to the motor.

### Motor with cooling fan

When installing a motor with cooling fan onto a device, leave 10 mm (0.39 in.) or more behind the fan cover or open a ventilation hole so that the cooling inlet on the back of the motor cover is not blocked.

### Mounting the capacitor (only for single-phase motors)

Before mounting the capacitor, check that the capacitor’s capacitance matches that stated on the motor’s name plate. Mount the capacitor securely by using M4 screws (not provided).

**Note**

- Do not let the screw fastening torque exceed 1 N·m (8.8 lb-in) to prevent damage to the mounting foot.
- Mount capacitor at least 10 cm (3.94 in.) away from the motor. If it is located closer, the life of the capacitor will be shortened.

## Connection

Insulate all the wire connections, such as the connection between the motor and the capacitor connection. Ground the motor using a Protective Earth Terminal.

### Rotating direction of the gearhead output shaft

The rotating direction of the gearhead output shaft may be opposite that of the motor shaft, depending on the gear ratio. Refer to Website for details.

### Connection diagram

Check the motor model name used before connecting. The direction of motor rotation is as viewed from the side of the motor’s output shaft. The motor rotates in a clockwise (CW) and counterclockwise (CCW) direction. Colors shown in the connection diagram indicate the colors of lead wires.

### Induction motors

#### Single-phase type (Connection diagram: ①)

**Clockwise**

- White
- Red
- Grounding

**Counterclockwise**

- White
- Red
- Grounding

#### Single-phase, 2-pole, high-speed type (Connection diagram: ②)

**Clockwise**

- White
- Red
- Blue
- Gray

**Counterclockwise**

- White
- Red
- Blue
- Gray

#### Three-phase type (Connection diagram: ③)

The motor rotates in the clockwise direction (CW) if connected as the connection diagram below. To change the direction of rotation, change any two connections between R, S and T.

**Clockwise**

- Red
- Black
- White
- Grounding

**Counterclockwise**

- Red
- Black
- White
- Grounding

#### Reversible motors

**Single-phase type (Connection diagram: ④)**

The motor rotates in the clockwise direction if the switch SW is connected to the CW side, and it rotates in the counterclockwise direction if connected to the CCW side.

**Clockwise**

- Red
- Black
- White
- Grounding

**Counterclockwise**

- Red
- Black
- White
- Grounding
For protection of contact (switch)

If the switch is used for starting/stoping the motor or switching the rotation direction, connect the CR circuit for surge suppression in order to protect the contacts.

\[
\begin{align*}
R_o &= 5 \text{ to } 200 \, \Omega \\
C_o &= 0.1 \text{ to } 0.2 \, \mu F \text{ at } 25 \, \text{VAC}
\end{align*}
\]

It is provided as an accessory (sold separately). Model: EPCR1Z01-2

**Lead wire for Power Supply**

For power supply, use a thicker lead wire than the motor lead wire.

Motors of 1 W and 3 W: AWG24 (0.2 mm²)

Motors of 6W or larger: AWG20 (0.5 mm²)

**Capacitor connection (only for single-phase motors)**

When crimp terminals are used, use the FASTON terminals 187 Series (TE Connectivity).

Use the supplied capacitor cap to insulate the capacitor terminal connection.

The capacitor has four terminals that are internally connected as shown in the figure.

![Capacitor internal wiring diagram](image)

**Connecting Protective Earth Terminal**

Ground the motor using the motor’s Protective Earth Terminal.

Applicable crimp terminal: Insulated round crimp terminal

Terminal screw size: M4

[Unit: mm (in.)]

- Ø4.0 (0.16) or more
- 4.8 (0.19) or less

**Not**

For lead wire connection, use one lead wire for each individual terminal.

**Operation**

The motor rotates when the power supply is turned on. For protection against electric shock, do not turn on the power supply until the wiring is complete.

- Make sure that the motor case temperature does not exceed 90°C (194°F) when operating the motor. Operation exceeding case temperature 90°C (194°F) may significantly deteriorate the coils and ball bearings of the motor and shorten the motor’s life span.

- Motor case temperature can be measured by fixing a thermometer on the motor surface. It can also be measured using thermo tape or a thermocouple.

- To change rotation direction of the single-phase induction motor, wait until the motor completely stops. Otherwise its direction may not change or may take much time to change.

- Do not perform an operation switching the motor rotation direction instantaneously with three-phase motors. Doing so may cause damage to the motor and gearhead.

- Single-phase motors use a capacitor and keep it connected even after rotation of the motor has started.

- The three-phase 380/400/415 V motors cannot be combined with an inverter. If combined with an inverter, these motors may be damaged due to deteriorated insulation of the motor coil.

**Time rating**

- Induction motors
  Induction motors have a continuous rating.

- Reversible motors
  Reversible motors have a 30 minutes rating. “30 min” is indicated on the nameplate.

**Locked rotor burnout protection**

This motor is equipped with one of the two features listed below to prevent the motor from burning out as a result of abnormal heating which may be caused by misapplication.

**Thermal protection**

“TP” is stamped on the motor nameplate. The motor has an “auto reset” type thermal protector built into its motor coil. When the motor reaches a predetermined temperature, the internal thermal protector is activated and the motor is stopped. Always turn off the power before performing inspections.

**Thermal protector activation range:**

- Power is turned off at 130±5°C (266±9°F)
- Power is turned back on at 82±15°C (180±27°F)
- 90±15°C (194±27°F) for 3IK15GN-SW2, 3IK15A-SW2 and 83±15°C (181±27°F) for three-phase 380/400/415 V motors.

**Impedance protection**

“ZP” is stamped on the motor nameplate. The motor has higher coil impedance.

When the motor goes into locked rotor condition due to a malfunction, coil impedance rises, suppressing input power to the motor and protecting the motor coil from burnout.

**Troubleshooting**

When the motor cannot be operated correctly, refer to the contents provided in this section and take appropriate action. If the problem persists, contact your nearest office.

<table>
<thead>
<tr>
<th>Phenomena</th>
<th>Check items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor does not rotate or rotates slowly.</td>
<td>• Check the power supply voltage. • Connect the power supply and the motor correctly. • With a single-phase motor, connect the supplied capacitor correctly. If terminal blocks or crimp terminals are used, check them for poor connection. • Keep the load at or below the allowable value.</td>
</tr>
<tr>
<td>Motor sometimes rotates and stops.</td>
<td>• Connect the power supply and the motor correctly. • With a single-phase motor, connect the supplied capacitor correctly. If terminal blocks or crimp terminals are used, check them for poor connection.</td>
</tr>
<tr>
<td>Motor case temperature exceeds 90°C (194°F)</td>
<td>• Connect correctly by referring to “Connection diagram.” • With a single-phase motor, connect the supplied capacitor correctly. • The rotating direction of the motor output shaft may be different from that of the gearhead output shaft depending on the gear ratio of the gearhead. Refer to Website for details. • The rotating direction is indicated as viewed from the motor output shaft. Check the reference direction.</td>
</tr>
<tr>
<td>Motor temperature abnormally high (Motor case temperature exceeds 90°C (194°F))</td>
<td>• Check the power supply voltage. • With a single-phase motor, connect the supplied capacitor correctly. • Review the ventilation condition.</td>
</tr>
<tr>
<td>Noisy operation</td>
<td>• Assemble the motor and gearhead correctly. • Assemble a gearhead of the same pinion type as the motor.</td>
</tr>
</tbody>
</table>

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