

## OPERATING MANUAL

### World K Series Lead Wire Type Induction Motors and Reversible Motors



## Before using the motor

### ■ Introduction

Only qualified personnel should work with the product. Use the product correctly after thoroughly reading the section "Safety precautions". Should you require the inspection or repair of internal parts, contact the Oriental Motor office where you purchased the product. The product described in this manual has been designed and manufactured for use in general industrial machinery, and must not be used for any other purpose. Oriental Motor Co., Ltd. is not responsible for any damage caused through failure to observe this warning.

### ■ Standard and CE marking

Motors are recognized by UL and certified by VDE or DEMKO.  
\* Voluntary display of the CE mark conforming to the Low Voltage Directives.

#### Standards

UL 1004-1, UL 1004-3

CSA C22.2 No.100, CSA C22.2 No.77, EN 60950-1 or EN 62368-1

#### Standards File No.

UL File No. E64197, VDE, DEMKO

#### Applications for standard

EN 60034-1, EN 60034-5, EN 60664-1, EN 60950-1 or EN 62368-1

Temperature rise tests required by the standards are conducted in a state of attaching a heat radiation plate.

The size, thickness and material of the heat radiation plates are as follows.

[Size] 200 × 200 mm (7.87 × 7.87 in.)

[Thickness] 5 mm (0.20 in.)

[Material] Aluminium alloy

#### Installation conditions

Overvoltage category II, Pollution degree 2, Class I equipment (For EN standards)

When the machinery to which the motor 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.

#### Standards for accessories

Capacitor : UL File No. E83671 (CYWT2),

VDE Licence No.112847 (for only capacitor rated voltage 250VAC types, capacitor model ending in **FAUL2**),

VDE License No. 114747 (for capacitor rated voltage 450 VAC types)

Capacitor cap : UL File No. E56078 (YDTU2)

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.

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

### **WARNING**

- 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 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 the product, perform connections or inspections when the power is on. Always turn the power off before carrying out these operations. Failure to do so may result in electric shock.
- Turn off the power in the event the overheat protection device (thermal protector) is triggered. Failure to do so may result in injury or damage to equipment, since the motor will start abruptly when the overheat protection device (thermal protector) is automatically reset.
- The motor is Class I equipment. Install the motor so as to avoid contact with hands, or ground it to prevent the risk of electric shock. If the motor has a protective ground terminal, be sure to connect the terminal to the ground. *Dieser Motor ist in Geräten mit Schutzklasse I zu verwenden. Der Motor ist so einzusetzen, dass er nicht berührt werden kann, bzw. er ist zu erden, um Stromschläge zu verhindern. Wenn der Motor über eine Schutzterdungsklemme verfügt, ist die Erdung über diese vorzunehmen.*
- Install the motor in an enclosure in order to prevent electric shock or injury.
- Keep the input-power voltage within the specification to avoid fire and electric shock.
- Connect the cables securely according to the wiring diagram in order to prevent fire and electric shock.
- Do not forcibly bend, pull or pinch the lead wires. Doing so may result in fire and electric shock.
- Be sure to insulate the connection terminal of the capacitor. Failure to do so may result in electric shock.
- Turn off the power in the event of a power failure, or the motor will suddenly start when the power is restored and may cause injury or damage to equipment.
- Do not touch the connection terminal of the capacitor immediately after the power is turned off (for a period of 30 seconds). The residual voltage may cause electric shock.
- Do not disassemble or modify the motor. This may cause electric shock or injury.

## CAUTION

- Do not use the motor beyond its specifications, or electric shock, injury or damage to equipment may result.
- Do not touch the motor during operation or immediately after stopping. The surface is hot and may cause a burn.
- Do not hold the motor output shaft. This may cause injury.
- Keep the area around the motor free of combustible materials in order to prevent fire or a burn.
- To prevent the risk of damage to equipment, leave nothing around the motor that would obstruct ventilation.
- To prevent bodily injury, do not touch the rotating parts (output shaft, cooling fan) of the motor during operation.
- When an abnormality is noted, turn off the power immediately, or fire, electric shock or injury may occur.
- The motor's surface temperature may exceed 70 °C, even under normal operating conditions. If a motor is accessible during operation, post the warning label shown in the figure in a conspicuous position to prevent the risk of burns.
- Dispose of the product correctly in accordance with laws and regulations, or instructions of local governments.



Warning label

## Preparation

### Checking the product

Upon opening the package, 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 ..... 1 unit
- Capacitor ..... 1 piece (only for single-phase motor)
- Capacitor cap ..... 1 piece (only for single-phase motor)
- Operating manual (this manual) ..... 1 copy

### Checking the model name

Check the model number against the number indicated on the product.

#### Induction motors

Model	Motor model	Capacitor model
<b>5IK60GU-AWJ</b>	5IK60GU-AW	CH200CFAUL2
<b>5IK60GU-AWU</b>		CH180CFAUL
<b>5IK60GU-CWJ</b>	5IK60GU-CW	CH50BFAUL
<b>5IK60GU-CWE</b>		CH40BFAUL
<b>5IK90GU-AWJ</b>	5IK90GU-AW	CH280CFAUL2
<b>5IK90GU-AWU</b>		CH200CFAUL2
<b>5IK90GU-CWJ</b>	5IK90GU-CW	CH70BFAUL
<b>5IK90GU-CWE</b>		CH60BFAUL
<b>5IK60GU-SW</b>	5IK60GU-SW	-
<b>5IK90GU-SW</b>	5IK90GU-SW	-

#### Reversible motors

Model	Motor model	Capacitor model
<b>5RK60GU-AWJ</b>	5RK60GU-AW	CH250CFAUL2
<b>5RK60GU-AWU</b>		CH200CFAUL2
<b>5RK60GU-CWJ</b>	5RK60GU-CW	CH60BFAUL
<b>5RK60GU-CWE</b>		CH50BFAUL
<b>5RK90GU-AWJ</b>	5RK90GU-AW	CH350CFAUL
<b>5RK90GU-AWU</b>		CH300CFAUL2
<b>5RK90GU-CWJ</b>	5RK90GU-CW	CH80BFAUL
<b>5RK90GU-CWE</b>		CH70BFAUL

The list above shows pinion shaft motors.

## Installation

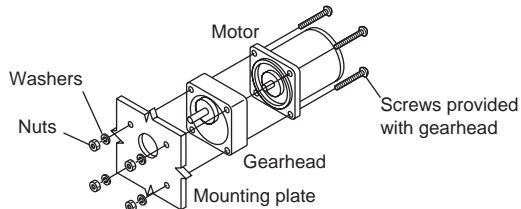
### Location for installation

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)
  - 10 to +50 °C (+14 to +122 °F) for 100/200 V (non-freezing)
- Operating ambient humidity 85%, maximum (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 (rains, 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 or less above sea level

### How to install the motor

Drill holes on the mounting plate and fix the motor and gearhead on the plate using screws supplied with the gearhead. Be careful there is no gap between the motor flange and the gearhead.



#### Note

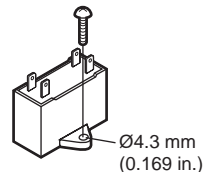
Use the gearhead with pinion shaft which is identical with one of motor.

### 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 provided 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 and operation

Insulate all the wire connections, such as the connection between the motor and the capacitor connection. Use the supplied capacitor cap to insulate the capacitor terminal connection.

### Note

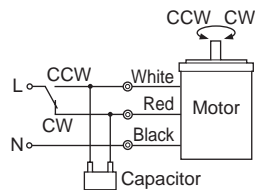
- Make sure that the motor case temperature does not exceed 90 °C (194 °F) during operation of the motor. Operation exceeding case temperature 90 °C (194 °F) may significantly deteriorate the coils and ball bearings of the motor and shorten the motor's life span. Motor case temperature can be measured by fixing a thermometer on the motor surface. It can also be measured using thermo tape or a thermocouple. Insulation class of this motor is B.
- 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.
- Single-phase motors use a capacitor and keep it connected even after rotation of the motor has started.

## Single-phase motors

A capacitor is required for motor startup and operation. Capacitor cap is available to insulate capacitor connection.

### Wiring diagram

Connect the motor according to the figure. The direction of motor rotation is as viewed from motor output shaft side. "CW" indicates clockwise and "CCW" counterclockwise.

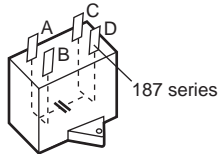


### Switching directions

To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.

### Capacitor connection

The capacitor internal wiring as follows: Capacitor terminals are internally electrically connection in twos; A-B and C-D for easy connection. For easy to install terminals use 187 series FASTON terminals (TE Connectivity).

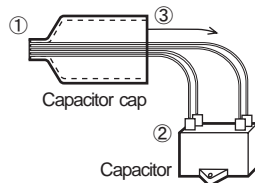


### Note

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

### Capacitor cap

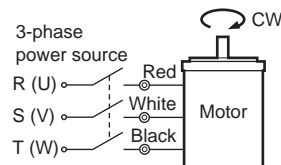
- Pass the lead wires through the capacitor cap as shown in the figure.
- Connect the lead wires to the terminals or use terminal ends.
- Cover the capacitor with the capacitor cover.



## Three-phase motors

### Wiring diagram

Connect the motor according to the figure. The direction of motor rotation is as viewed from motor output shaft side. "CW" indicates clockwise and "CCW" counterclockwise.



### Switching directions

When connected according to the connection diagram, the motor will operate in the clockwise direction as viewed from the motor's output shaft. To change the direction of rotation, change any two connections between U, V and W.

## 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 to prevent burning the motor as a result of abnormal heating.

### 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 the power off before performing inspections.

Thermal protector activation range:

Power is turned off at 130±5 °C (266±9 °F)

Power is turned back on at 85±20°C (185±36 °F)

## 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.

Phenomena	Check items
Motor does not rotate or rotates slowly.	<ul style="list-style-type: none"> <li>Is supplied voltage appropriate?</li> <li>Is the power source securely connected?</li> <li>For a single-phase motor is the capacitor properly connected?</li> <li>Is there a faulty contact on terminal blocks or crimped terminals if the cable is extended?</li> <li>Is the load on the motor too much?</li> </ul>
Motor sometimes rotates and stops.	<ul style="list-style-type: none"> <li>Is the power source securely connected?</li> <li>For a single-phase motor is the capacitor properly connected?</li> <li>Is there a faulty contact on terminal blocks or crimped terminals if the cable is extended?</li> </ul>
Motor rotates in reverse direction.	<ul style="list-style-type: none"> <li>If the motor connected differently than the "wiring diagram" shown in this manual. Check wiring by referring to the "wiring diagram".</li> <li>For a single-phase motor is the capacitor properly connected?</li> <li>In some gearheads, rotation direction of the gearhead output shaft may differ from rotation direction of the motor. See the operating manual for the gearhead.</li> <li>Is your understanding of rotation direction different than the manual description? In this manual rotation direction of the motor is defined as viewed at the motor from shaft side.</li> </ul>
Motor temperature abnormally high [Motor case temperature exceeds 90 °C (194 °F)]	<ul style="list-style-type: none"> <li>Is appropriate voltage applied to the motor?</li> <li>For a single-phase motor is the capacitor properly connected?</li> <li>Does ambient temperature exceed the specified range?</li> </ul>
Noisy operation	<ul style="list-style-type: none"> <li>Are the motor and gearhead appropriately coupled? See the operating manual for the gearhead.</li> <li>Is the coupled gearhead the same pinion type as the motor shaft?</li> </ul>

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