

OPERATING MANUAL

World K Series Terminal Box Type Induction Motors and Reversible Motors



Introduction

■ Before using the motor

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 as an internal component for general industrial equipment, 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 CQC. Recognized name and certified name are motor model name. Voluntary display of the CE mark conforming to the Low Voltage Directives.

Standards

UL 1004, UL 2111, CSA C22.2 No.100, CSA C22.2 No.77, GB 12350

Standards File No.

UL File No.E64197, CQC

Applications for standard

EN 60034-1, EN 60034-5, IEC 60664-1, EN 60950-1

A Running Heating Test and a Locked-Rotor Test has been conducted with a aluminum radiation plate of size indicated below.

For the motor with a gearhead, tests has been conducted with a gearhead instead of the radiation plate. For the 90 W reversible motor with a gearhead, tests have been conducted with a gearhead and a radiation plate [a radiation plate size: 200×200 mm (7.87×7.87 in.), thickness: 5 mm (0.20 in.), material: aluminum].

First number in motor name	Size [mm (in.)]	Thickness [mm (in.)]	Material
4	135×135 (5.31×5.31)	5 (0.20)	Aluminium
5 (40 W)	165×165 (6.50×6.50)		
5 (60 W, 90 W Induction motors, 150 W)	200×200 (7.87×7.87)		
5 (90 W Reversible motors)	200×200 (7.87×7.87)	10 (0.40)	

Installation conditions

Overvoltage category II, Pollution degree 2 (induction motor: pollution degree 3, except for the motor mounting surface), Class I equipment (For EN/IEC 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 License Nos.112847 (capacitors with a rated voltage of 250 VAC), 114747 (capacitors with a rated voltage of 450 VAC)

Capacitor cap: UL File No.E56078 (YDTU2)

■ Electrical appliance and material safety law

The three-phase round shaft motor type bears a mark.

■ Hazardous substances

RoHS (Directive 2002/95/EC 27Jan.2003) compliant

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.

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.
- To prevent the risk of electric shock, use the motor for class I equipment only.
Motore zur Verwendung in Geräten der Schutzklasse I.
- Install the motor in an enclosure in order to prevent electric shock or injury.
- Install the motor so as to avoid contact with hands, or ground it to prevent the risk of electric shock.
Die Gehäuse der Motore sind mit einer Schraube und Zahnscheibe sicher mit dem geerdeten Gehäuse des Gerätes zu verbinden.
- 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.
- To dispose of the motor, disassemble it into parts and components as much as possible and dispose of individual parts/components as industrial waste.



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 motors)
- Capacitor cap..... 1 piece (only for single-phase motors)
- Operating 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
4IK25GN-AW2TJ	4IK25GN-AW2T	CH80CFAUL2
4IK25GN-AW2TU	4IK25GN-AW2T	CH65CFAUL2
4IK25GN-CW2TJ	4IK25GN-CW2T	CH20BFAUL
4IK25GN-CW2TE	4IK25GN-CW2T	CH15BFAUL
5IK40GN-AW2TJ	5IK40GN-AW2T	CH110CFAUL2
5IK40GN-AW2TU	5IK40GN-AW2T	CH90CFAUL2
5IK40GN-CW2TJ	5IK40GN-CW2T	CH30BFAUL
5IK40GN-CW2TE	5IK40GN-CW2T	CH23BFAUL
5IK60GE-AW2TJ	5IK60GE-AW2T	CH200CFAUL2
5IK60GE-AW2TU	5IK60GE-AW2T	CH180CFAUL2
5IK60GE-CW2TJ	5IK60GE-CW2T	CH50BFAUL
5IK60GE-CW2TE	5IK60GE-CW2T	CH40BFAUL
5IK90GE-AW2TJ	5IK90GE-AW2T	CH280CFAUL2
5IK90GE-AW2TU	5IK90GE-AW2T	CH200CFAUL2
5IK90GE-CW2TJ	5IK90GE-CW2T	CH70BFAUL
5IK90GE-CW2TE	5IK90GE-CW2T	CH60BFAUL
4IK25GN-SW2T	4IK25GN-SW2T	—
5IK40GN-SW2T	5IK40GN-SW2T	—
5IK60GE-SW2T	5IK60GE-SW2T	—
5IK90GE-SW2T	5IK90GE-SW2T	—
5IK150A-TW2T	5IK150A-TW2T	—

● Reversible motors

Model	Motor model	Capacitor model
4RK25GN-AW2TJ	4RK25GN-AW2T	CH100CFAUL2
4RK25GN-AW2TU	4RK25GN-AW2T	CH80CFAUL2
4RK25GN-CW2TJ	4RK25GN-CW2T	CH30BFAUL
4RK25GN-CW2TE	4RK25GN-CW2T	CH25BFAUL
5RK40GN-AW2TJ	5RK40GN-AW2T	CH160CFAUL2
5RK40GN-AW2TU	5RK40GN-AW2T	CH120CFAUL2
5RK40GN-CW2TJ	5RK40GN-CW2T	CH40BFAUL
5RK40GN-CW2TE	5RK40GN-CW2T	CH35BFAUL
5RK60GE-AW2TJ	5RK60GE-AW2T	CH250CFAUL2
5RK60GE-AW2TU	5RK60GE-AW2T	CH200CFAUL2
5RK60GE-CW2TJ	5RK60GE-CW2T	CH60BFAUL
5RK60GE-CW2TE	5RK60GE-CW2T	CH50BFAUL

Model	Motor model	Capacitor model
5RK90GE-AW2TJ	5RK90GE-AW2T	CH350CFAUL2
5RK90GE-AW2TU	5RK90GE-AW2T	CH300CFAUL2
5RK90GE-CW2TJ	5RK90GE-CW2T	CH80BFAUL
5RK90GE-CW3TE	5RK90GE-CW3T	CH70BFAUL

The list above shows pinion shaft motors.

For the round shaft motor, “GN” and “GE” in the model and motor model are replaced by “A.” (5IK150A-TW2T is only available in the round shaft specification.)

Installation

■ Location for installation

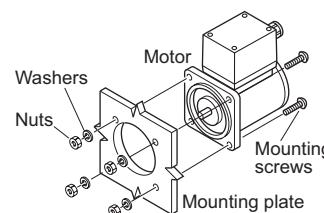
The motor is designed and manufactured for installation in equipment. Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- 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
- 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 amount 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 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, nuts, and washers (not supplied). Be careful there is no gap between the motor installation surface and the bracket.



First number of motor model	Nominal diameter of screw	Tightening torque [N·m (lb·in)]
4	M5	2.5 (22)
5	M6	3.0 (26)

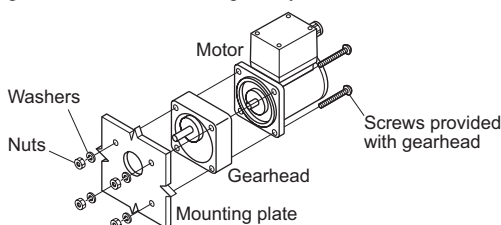
Note

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

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.

For details of installation, see the operating manual provided with the gearhead, which is sold separately.



Note

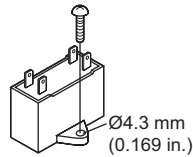
Use the gearhead with pinion shaft which is identical with one of motor.

● 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.

Ground the motor using a protective earth terminal.

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.

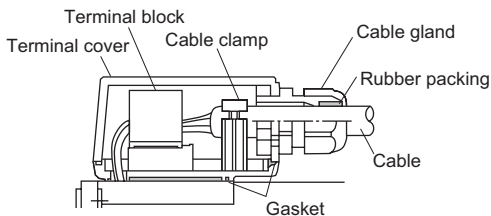
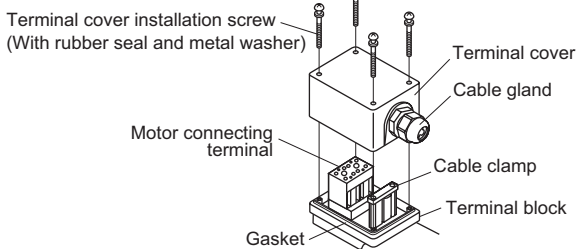
Note

- Insulation class of this motor is B. 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.
- 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.

■ Rotating direction of the gearhead output shaft

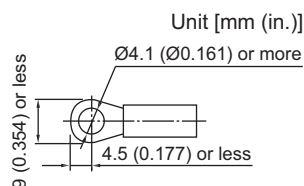
The rotating direction of the gearhead output shaft may be opposite that of the motor shaft, depending on the gear ratio. For the rotating direction of the output shaft of a specific gearhead used, refer to the operating manual for the gearhead.

■ Connection method to a terminal box



- To ensure safety, ground the motor using the \oplus inside the terminal box. On the three-phase round shaft motor type, refer to the following specifications.

Applicable crimp terminal:
 Insulated round crimp terminal
 Terminal screw size: M4
 Tightening torque:
 1.0 to 1.3 N·m (8.8 to 11.5 lb-in)
 Applicable minimum lead wire
 size: AWG18 (0.75 mm²) or more



- Use a cable of the following specifications:
 Applicable cable diameter: Ø6 to 12 mm
 Applicable lead wire: AWG24 to 12 (0.2 to 3.5 mm²)
 Stripping length: 8 mm (0.31 in.)
- When sealing the terminal cover, ensure that no scraps or particles get caught between the contact surfaces.
- The terminal cover screws are specifically designed for mounting the terminal cover. They are provided with a rubber seal and metal washer that keep the terminal box splashproof. In order to maintain a tight seal around the terminal box, use only the provided screws. Also, this terminal box is constructed to hold a gasket. If this gasket comes out of the box, please reseal it correctly on the box. Also refer to the tightening torque table to determine the appropriate tightening torque to use when fastening the terminal cover and cable gland.

Terminal cover	0.5 to 0.7 N·m (71 to 99 oz-in.)
Cable gland	2.5 to 3.8 N·m (350 to 530 oz-in.)
Cable clamp	0.2 to 0.3 N·m (28 to 42 oz-in.)
Terminal block	0.5 to 0.8 N·m (71 to 113 oz-in.)

Note

- To make shielding function fully effective, use a cable of an appropriate diameter.
- Securely affix the cable exposed outside the motor so that it does not receive stress.

■ Single-phase motors

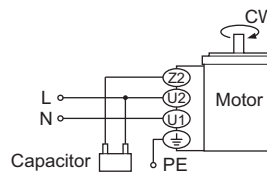
● Wiring diagram

Connect the motor according to the figure.

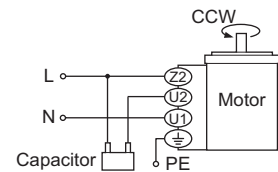
Induction motors

The connection method will vary, depending on the direction

<Clockwise>

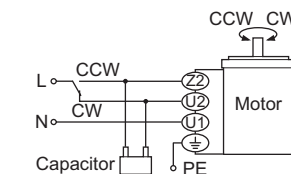


<Counterclockwise>

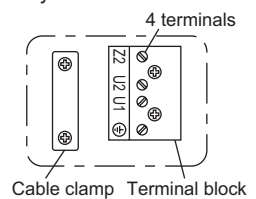


Reversible motors

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



<Layout of terminals>

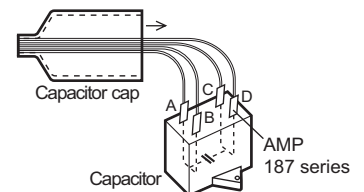


● Capacitor connection (only for single-phase motors)

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 AMP FASTON terminals (Tyco Electronics AMP).

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



Note

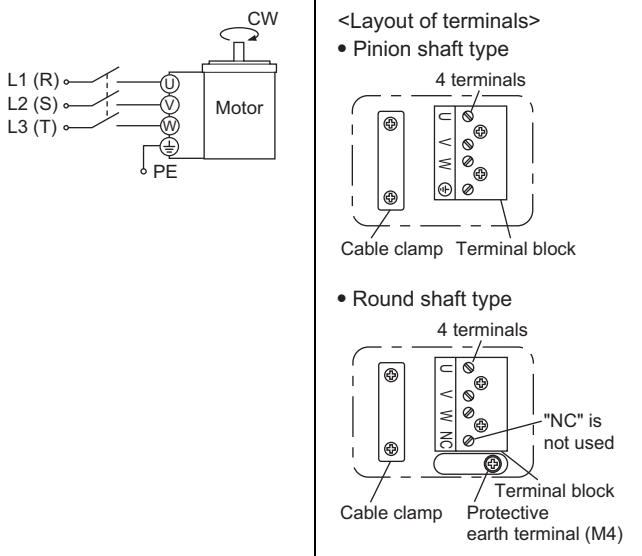
For lead wire connection, use one lead wire for each individual terminal.

■ Three-phase motors

Connect the motor according to the figure.

When connected according to the connection diagram, the motor will operate in the clockwise direction (CW) 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 with the feature 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 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 82±15 °C (180±27 °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"> 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.
Motor sometimes rotates and stops.	<ul style="list-style-type: none"> 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.
The motor rotates in the direction opposite to the specified direction.	<ul style="list-style-type: none"> Connect correctly by referring to "Wiring 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. See the operating manual for the gearhead. The rotating direction is indicated as viewed from the motor output shaft. Check the reference direction.
Motor temperature abnormally high [Motor case temperature exceeds 90 °C (194 °F)]	<ul style="list-style-type: none"> Check the power supply voltage. With a single-phase motor, connect the supplied capacitor correctly. Review the ventilation condition.
Noisy operation	<ul style="list-style-type: none"> Assemble the motor and gearhead correctly by referring to the operating manual for the gearhead. Assemble a gearhead of the same pinion type as the motor.

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