



New 5-Phase Stepping Motor and Driver Package

RK II Series



Instructions and Precautions for Safe Use Motor

Thank you for purchasing an Oriental Motor product.
Please read it thoroughly to ensure safe operation.
Always keep the manual where it is readily available.

Introduction

■ Before use

Only qualified personnel should work with the product.
Use the product correctly after thoroughly reading the section "Safety precautions".

The product described in this manual has been designed and manufactured for use 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.

■ Operating manuals for the RK II Series

Operating manuals for the **RK II** Series are listed below.

- **RK II Series**
Instructions and Precautions for Safe Use Motor
(this document)
- **RK II Series OPERATING MANUAL** Driver
- **RK II Series USER MANUAL**

■ Hazardous substances

The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).

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.

Description of signs

	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.

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, locations subjected to splashing water, or near combustibles. This may cause fire, electric shock or injury.
	Do not transport, install the product, perform connections or inspections when the power is on. This may cause electric shock.

Warning

	Do not use the brake mechanism of an electromagnetic brake motor as a deceleration/safety brake. This may cause injury or damage to the equipment.
	Do not forcibly bend, pull or pinch the cable. This may cause fire or electric shock.
	Do not disassemble or modify the product. This may cause injury or damage to equipment.
	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, injury or damage to equipment.
	If this product is used in an vertical application, be sure to provide a measure for the position retention of moving parts. Failure to do so may result in injury or damage to equipment.
	When the driver generates an alarm (any of the driver's protective functions is triggered), take measures to hold the moving part in place since the motor stops and loses its holding torque. Failure to do so may result in injury or damage to equipment.
	Install the product in an enclosure. Failure to do so may result in electric shock or injury.
	The motor and driver are designed with Class I equipment basic insulation. When installing the motor and driver, do not touch the product or be sure to ground them. Failure to do so may result in electric shock.

Caution

	Do not use the product beyond its specifications. This may cause electric shock, injury or damage to equipment.
	Keep your fingers and objects out of the openings in the product. Failure to do so may result in fire, electric shock or injury.
	Do not touch the product during operation or immediately after stopping. This may cause a skin burn(s).
	Do not hold the motor output shaft or motor cable. This may cause injury.
	Keep the area around the product free of combustible materials. Failure to do so may result in fire or a skin burn(s).
	Leave nothing around the product that would obstruct ventilation. Failure to do so may result in damage to equipment.
	Do not touch the rotating parts (output shaft etc.) during operation. This may cause injury.
	Do not touch the terminals while performing the insulation resistance test or dielectric strength test. This may cause electric shock.

 Caution	
	Provide a cover over the rotating parts (output shaft etc.). Failure to do so may result in injury.
	Use a motor and driver only in the specified combination. Failure to do so may result in fire.
	Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
	To dispose of the motor, disassemble it into parts and components as much as possible and dispose of individual parts/components as industrial waste.
	The motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions. If the operator is allowed to approach the running motor, attach a warning label as shown below in a conspicuous position. Failure to do so may result in skin burn(s). <div style="text-align: right;">  Warning label </div>

Precautions for use

This section covers limitations and requirements the user should consider when using the product.

- Always use the cable (supplied or accessory) to connect the motor and driver.

Be sure to use the cable (supplied or accessory) to connect the motor and driver. If a cable other than the supplied cable or accessory cable (sold separately) is used, the driver may generate a large amount of heat. In the following condition, an appropriate accessory cable must be purchased separately.

- If a flexible cable is to be used.
- If a cable of 3 m (9.8 ft.) or longer is to be used.
- If a motor and driver package without a cable was purchased.
- Conduct the insulation resistance measurement or dielectric strength test separately on the motor and the driver.

Conducting the insulation resistance measurement or dielectric strength test with the motor and driver connected may result in damage to the product.

- Do not apply strong impact on the motor output shaft.

If you are using a motor with encoder, an optical encoder is housed in the motor. To prevent damage to the encoder, handle the motor with care and avoid strong impact to the motor output shaft when transporting the motor or installing the load.

- Do not apply an radial load and axial load in excess of the specified permissible limit

Operating the motor under an excessive radial load or axial load may damage the motor bearings (ball bearings). Be sure to operate the motor within the specified permissible limit of radial load and axial load.

- **Motor case temperature**
- The driver has an overheat protection function, but the motor has no such feature. The motor surface temperature may exceed 100 °C (212 °F) under certain conditions (ambient temperature, operating speed, duty cycle, etc.). To prevent the motor bearings (ball bearings) from reaching its usable life quickly, use the motor in conditions where the surface temperature will not exceed 100 °C (212 °F).
- Use the geared type motor in a condition where the gear case temperature does not exceed 70 °C (158 °F), in order to prevent deterioration of grease and parts in the gear case.
- In the case of a motor with an encoder, use it in a condition where the motor surface temperature will not exceed 85 °C (185 °F) in order to protect the encoder.

- **Holding torque at standstill**

The motor holding torque is reduced by the current cutback function of the driver at motor standstill. When operating the motor, take account of the motor torque drop at the time of stopping.

- **Do not use the electromagnetic brake to reduce speed or as a safety brake.**

Do not use the electromagnetic brake as a means to decelerate and stop the motor. The brake hub of the electromagnetic brake will wear significantly and the braking force will drop if used to stop the motor. The electromagnetic brake is a power-off activated type. This means that although it helps maintain the position of the load in the event of power outage, etc., this brake cannot securely hold the load in place. Accordingly, do not use the electromagnetic brake as a safety brake. To use the electromagnetic brake to hold the load in place, do so after the motor has stopped.

- **Grease of geared type motor**

On rare occasions, a small amount of grease may ooze out from the geared type motor. If there is concern over possible environmental damage resulting from the leakage of grease, check for grease stains during regular inspections. Alternatively, install an oil pan or other device to prevent leakage from causing further damage. Oil leakage may lead to problems in the customer's equipment or products.

- **Rotation direction of the gear output shaft**

The relationship between the rotation direction of the motor shaft and that of the gear output shaft changes as follows, depending on the gear type and gear ratio.

Type of gear	Gear ratio	Rotation direction (relative to the motor rotation direction)
TS geared	3.6, 7.2, 10	Same direction
	20, 30	Opposite direction
PS geared	All gear ratios	Same direction
Harmonic geared	All gear ratios	Opposite direction

- **Maximum torque of geared type motor**

Always operate the geared type motor under a load not exceeding the maximum torque. If the load exceeds the maximum torque, the gear will be damaged.

General specifications

Degree of protection		IP20
Operation environment	Ambient temperature	-10 to +50 °C (+14 to +122 °F) (non-freezing) Standard type with encoder: 0 to +50 °C (+32 to +122 °F) (non-freezing) Harmonic geared type: 0 to +40 °C (+32 to +104 °F) (non-freezing)
	Humidity	85% or less (non-condensing)
	Altitude	Up to 1000 m (3300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil
Storage environment	Ambient temperature	-20 to +60 °C (-4 to +140 °F) (non-freezing)
	Humidity	85% or less (non-condensing)
	Altitude	Up to 3000 m (10000 ft.) above sea level
Shipping environment	Surrounding atmosphere	No corrosive gas, dust, water or oil

Insulation resistance	100 MΩ or more when 500 VDC megger is applied between the following places: • Case - Motor windings • Case - Electromagnetic brake windings
Dielectric strength	Sufficient to withstand the following for 1 minute: • Case - Motor windings 1.5 kVAC 50/60 Hz • Case - Electromagnetic brake windings 1.5 kVAC 50/60 Hz

CE Marking

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

Low Voltage Directive

- The product is a type with machinery incorporated, so it should be installed within an enclosure.
- This product cannot be used with cables normally used for IT equipment.
- Install the product within the enclosure in order to avoid contact with hands.
- Be sure to maintain a protective ground in case hands should make contact with the product. Be sure to connect the Protective Earth lead of the cable for motor to the Protective Earth Terminal on the driver, and ground the driver's Protective Earth Terminal.
- To protect against electric shock using an earth leakage breaker (RCD), connect a type B earth leakage breaker to the primary side of the driver.
- When using a circuit breaker (MCCB), use a unit conforming to the EN or IEC standard.
- Isolate the motor cable, power-supply cable and other drive cables from the signal cables by means of double insulation.
- The temperature of the driver's heat sink may exceed 90 °C (194 °F) depending on the driving conditions. Accordingly, take heed of the following items:
 - Do not touch the driver.
 - Do not use the driver near flammable objects.
 - Always conduct a trial operation to check the driver temperature.

Applicable Standards

EN 60034-1, EN 60034-5, EN 60664-1

Installation conditions (EN Standard)

- Motor is to be used as a component within other equipment.
- Overvoltage category: II
- Pollution degree: 2
- Degree of protection: IP20
- Protection against electric shock: Class I

Preparation

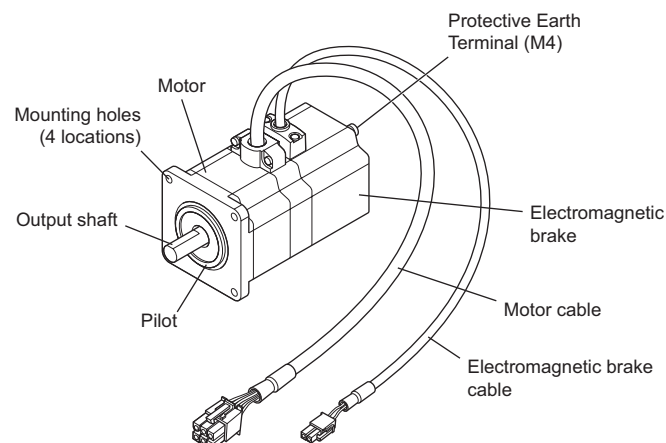
Checking the product

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.

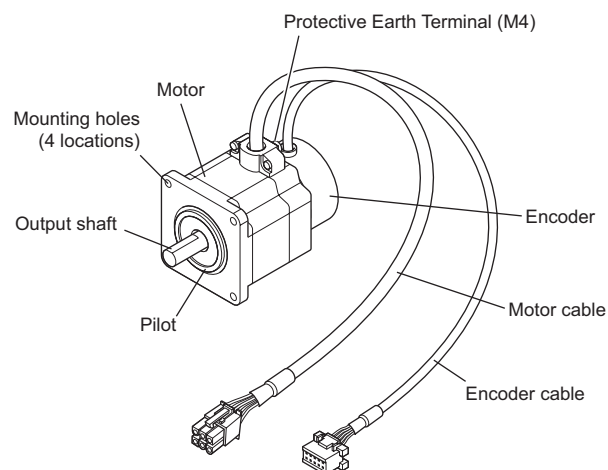
- Motor..... 1 unit
- Parallel key..... 1 unit
(Supplied with geared types; except for the PKE543-TS)
- Motor mounting sucre (M4)..... 4 pcs.
(Supplied with PKE564-TS)
- Motor mounting sucre (M8)..... 4 pcs.
(Supplied with PKE596-TS)
- Instructions and Precautions for Safe Use Motor 1 copy
(this document)

Names and functions of parts

- Standard type with electromagnetic brake
(Example: PKE566MC)



- Standard type with encoder (Example: PKE566RC2)



Installation

Location for installation

The motor has been designed and manufactured to be installed within another device. Install them in a well-ventilated location that provides easy access for inspection.

The location must also satisfy the following conditions:

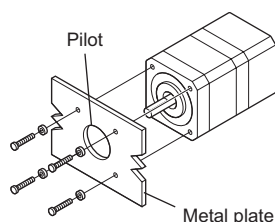
- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature
 - Motor: -10 to +50 °C (+14 to +122 °F) (non-freezing)
 - Motor with encoder: 0 to +50 °C (+32 to +122 °F) (non-freezing)
 - Harmonic geared type: 0 to +40 °C (+32 to +104 °F) (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- 1000 m (3300 ft.) or lower above sea level

■ Installation method

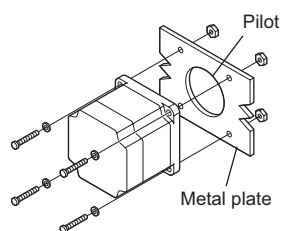
The motor can be installed in any direction. To allow for heat dissipation and prevent vibration, install the motor on a metal surface of sufficient strength.

For PKE564-TS and PKE596-TS, Install the motor using the supplied screws.

• Installation method A



• Installation method B



Nominal size, tightening torque and installation method

• Standard type

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
PKE54	M3	1 (142)	4.5 (0.177)	A
PKE56	M4	2 (280)	-	B
PKE59	M6	3 (420)		

• TS geared type

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
PKE54	M4	2 (280)	8 (0.315)	A
PKE56			-	B
PKE59	M8	4 (560)		

• PS geared type

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
PKE54	M4	2 (280)	8 (0.315)	A
PKE56	M5	2.5 (350)	10 (0.394)	
PKE59	M8	4 (560)	15 (0.591)	

• Harmonic geared type

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
PKE54	M4	2 (280)	8 (0.315)	A
PKE56	M5	2.5 (350)	10 (0.394)	
PKE59	M8	4 (560)	-	B

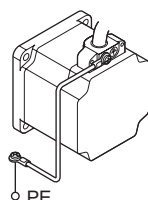
■ Grounding the motor

Be sure to ground the Protective Earth Terminal of the motor.

Grounding wire: AWG18 (0.75 mm²) or more

Tightening torque: 1.2 N·m (170 oz-in)

When grounding, use a round terminal and secure it with a mounting screw with a washer. Ground wires and crimp terminals are not supplied.



Inspection

It is recommended that periodic inspections be conducted for the items listed below after each operation of the motor.

If an abnormal condition is noted, discontinue any use and contact your nearest Oriental Motor sales office.

• During inspection

- Are any of motor mounting screws loose?
- Check for any unusual noises in the motor's bearings (ball bearings) or other moving parts.
- Are there any scratches, signs of stress or loose driver connection in the motor cable?
- Are the motor's output shaft and load shaft out of alignment?

Orientalmotor is a registered trademark or trademark of Oriental Motor Co., Ltd., in Japan and other countries.

© Copyright ORIENTAL MOTOR CO., LTD. 2013

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

ORIENTAL MOTOR U.S.A. CORP.
Technical Support Tel:(800)468-3982
8:30 A.M. to 5:00 P.M., P.S.T. (M-F)
7:30 A.M. to 5:00 P.M., C.S.T. (M-F)
www.orientalmotor.com

ORIENTAL MOTOR DO BRASIL LTDA.
Tel:+55-11-3266-6018
www.orientalmotor.com.br

ORIENTAL MOTOR (EUROPA) GmbH
Schiesstraße 74, 40549 Düsseldorf, Germany
Technical Support Tel:00 800/22 55 66 22
www.orientalmotor.de

ORIENTAL MOTOR (UK) LTD.
Tel:01256-347090
www.oriental-motor.co.uk

ORIENTAL MOTOR (FRANCE) SARL
Tel:01 47 86 97 50
www.orientalmotor.fr

ORIENTAL MOTOR ITALIA s.r.l.
Tel:02-93906346
www.orientalmotor.it

ORIENTAL MOTOR CO., LTD.
4-8-1 Higashiueno, Taito-ku, Tokyo 110-8536
Japan
Tel:03-6744-0361
www.orientalmotor.co.jp

ORIENTAL MOTOR ASIA PACIFIC PTE. LTD.
Singapore
Tel:1800-8420280
www.orientalmotor.com.sg

ORIENTAL MOTOR (MALAYSIA) SDN. BHD.
Tel:1800-806161
www.orientalmotor.com.my

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

ORIENTAL MOTOR (INDIA) PVT. LTD.
Tel:+91-80-41125586
www.orientalmotor.co.in

TAIWAN ORIENTAL MOTOR CO., LTD.
Tel:0800-060708
www.orientalmotor.com.tw

SHANGHAI ORIENTAL MOTOR CO., LTD.
Tel:400-820-6516
www.orientalmotor.com.cn

INA ORIENTAL MOTOR CO., LTD.
Korea

Tel:080-777-2042
www.inaom.co.kr

ORIENTAL MOTOR CO., LTD.
Hong Kong Branch
Tel:+852-2427-9800