



## OPERATING MANUAL

5-Phase Stepping Motor  
**RKII Series Motor**



## Introduction

### ■ Before use

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 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.

### ■ Operating manuals for the RKII Series

- Operating manuals for the **RKII Series** are listed below.  
 Read the manuals carefully before using the product.
- **RKII Series OPERATING MANUAL Motor (this document)**  
 This manual explains the functions as well as the installation method and others for the motor.
  - **RKII Series OPERATING MANUAL Driver (supplied with the driver)**  
 This manual explains the functions as well as the installation method and others for the driver.
  - **RKII Series USER MANUAL**  
 This manual explains the functions, installation and connection methods, troubleshooting and others for the motor and driver.  
 The "**USER MANUAL**" does not come with the product. For details, contact your nearest Oriental Motor sales office or download from Oriental Motor Website download page.
  - **APPENDIX UL Standards and CSA Standards for RKII Series (supplied with products)**  
 This appendix includes information required for certification of the UL Standards.

Thank you for purchasing an Oriental Motor product.  
 This 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.

### Description of signs




	<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.

### Description of graphic symbols

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

<b>WARNING</b>	
	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Do not transport, install the product, perform connections or inspections when the power is on. This may cause electric shock.</li> <li>• 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.</li> <li>• Do not forcibly bend, pull or pinch the cable. This may cause fire or electric shock.</li> <li>• Do not disassemble or modify the product. This may cause injury or damage to equipment.</li> </ul>
	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• Install the product in an enclosure. Failure to do so may result in electric shock or injury.</li> <li>• 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.</li> </ul>

## ⚠ CAUTION

	<ul style="list-style-type: none"> <li>Do not use the product beyond its specifications. This may cause electric shock, injury or damage to equipment.</li> <li>Keep your fingers and objects out of the openings in the product. Failure to do so may result in fire, electric shock or injury.</li> <li>Do not touch the product during operation or immediately after stopping. This may cause a skin burn(s).</li> <li>Do not hold the motor output shaft or motor cable. This may cause injury.</li> <li>Keep the area around the product free of combustible materials. Failure to do so may result in fire or a skin burn(s).</li> <li>Leave nothing around the product that would obstruct ventilation. Failure to do so may result in damage to equipment.</li> <li>Do not touch the rotating parts (output shaft etc.) during operation. This may cause injury.</li> <li>Do not touch the terminals while performing the insulation resistance test or dielectric strength test. This may cause electric shock.</li> </ul>
	<ul style="list-style-type: none"> <li>Provide a cover over the rotating parts (output shaft etc.). Failure to do so may result in injury.</li> <li>Use a motor and driver only in the specified combination. Failure to do so may result in fire.</li> <li>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.</li> <li>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.</li> </ul> <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 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.

### • When conducting the insulation resistance measurement and the dielectric strength test, be sure to separate the connection between 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 a 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. See p.5 for details.

### • Motor case temperature

- The motor does not have a function to protect from overheating. 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 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 selecting a motor, check the holding torque at motor standstill in the specifications on the catalog.

### • 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.

### • Preventing electrical noise

See [USER MANUAL](#) for measures with regard to noise.

### • Grease of geared motor

On rare occasions, a small amount of grease may ooze out from the geared 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
FC geared	All gear ratios	Same direction
PS geared	All gear ratios	Same direction
Harmonic geared	All gear ratios	Opposite direction

### • Peak torque of geared motor

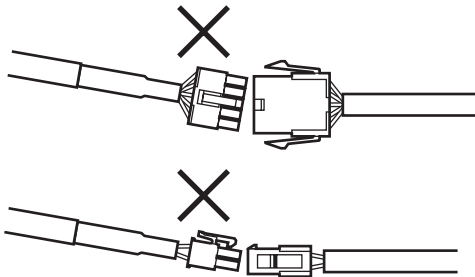
Always operate the geared motor under a load not exceeding the peak torque. If the load exceeds the peak torque, the gear will be damaged.

## ■ Notes for when the connection cable is used

Note the following points when a supplied cable or an accessory cable is used.

### ● When inserting the connector

Hold the connector main body, and insert it in straight securely. Inserting the connector in a inclined state may result in damage to terminals or a connection failure.



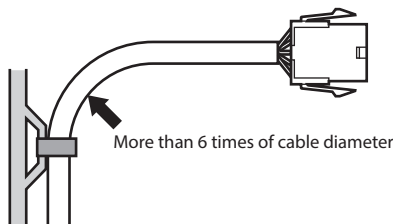
### ● When pulling out the connector

Pull out the connector in straight while releasing the lock part of the connector. Pulling out the connector with holding the cable (lead wire) may result in damage to the connector.

### ● Bending radius of cable

Use the cable in a state where the bending radius of the cable is more than 6 times of the cable diameter.

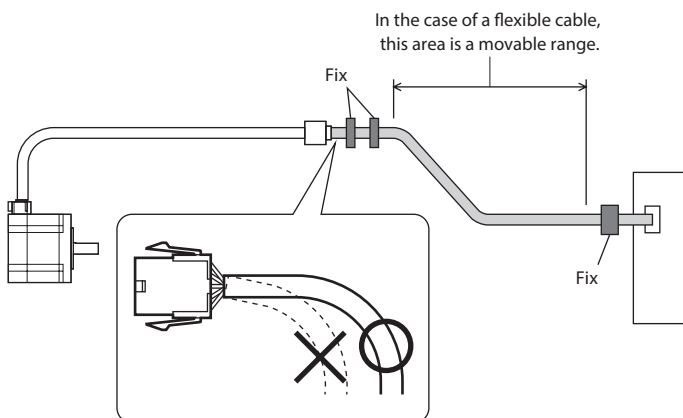
In the case of the lead wire type, use in a state where the bending radius is more than 4 times of the diameter of the lead wires.



### ● How to fix the cable

Fix the cable at the positions near the connector so as to apply no stress on the connector part.

Take measures so as to apply no stress on the connector by using wide clamps or by fixing at two places.



## 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 pc. \*1
- Motor mounting screw (M4)..... 4 pcs. \*2
- Motor mounting screw (M8)..... 4 pcs. \*3
- Cable for motor ..... 1 pc. \*4
- Cable for electromagnetic brake ..... 1 pc. \*4 \*5
- Cable for encoder ..... 1 pc. \*4 \*6
- OPERATING MANUAL Motor..... 1 copy (this document)

\*1 Supplied with geared types. (except for the PKE543-TS)

\*2 Supplied with PKE564-TS.

\*3 Supplied with PKE596-TS.

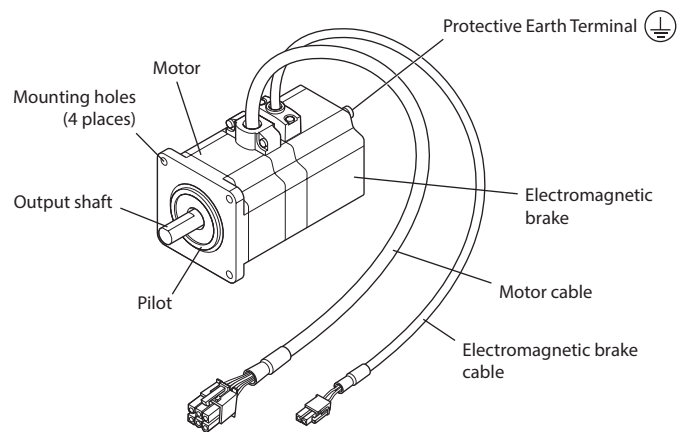
\*4 "Motor and driver packages that cables are included" only

\*5 "Motors with an electromagnetic brake" only

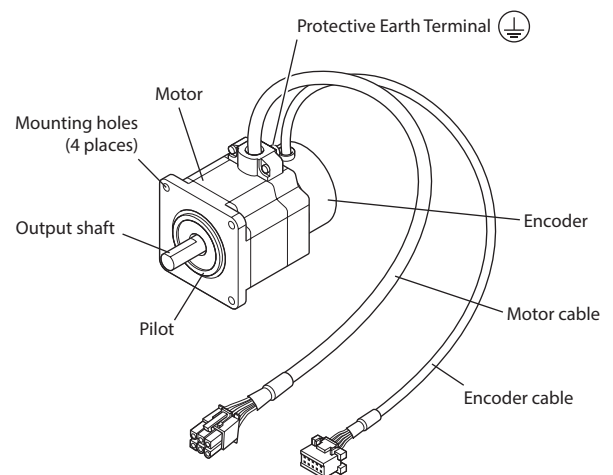
\*6 "Motors with an encoder" only

### ■ 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:
  - 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 direction

The motor can be installed in any direction.

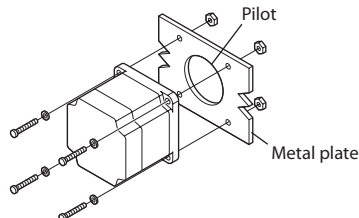
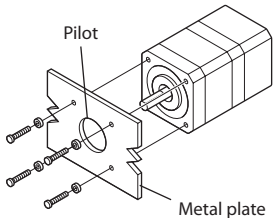
## Installation method

To allow for heat dissipation and prevent vibration, install the motor on a metal surface of sufficient strength.

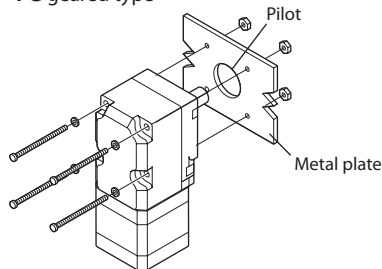
For PKE564-TS and PKE596-TS, install the motor using the supplied screws.

### Installation method A

### Installation method B



### FC geared type



## Nominal size, tightening torque and installation method

### Standard type

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

### FC geared type

Motor model	Nominal size	Tightening torque [N·m (oz·in)]	Effective depth of bolt thread [mm (in.)]	Installation method
PKE54	M4	2 (280)	–	B
PKE56	M5	2.5 (350)		

### PS geared type

Motor model	Nominal size	Tightening torque [N·m (oz·in)]	Effective depth of bolt thread [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 thread [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

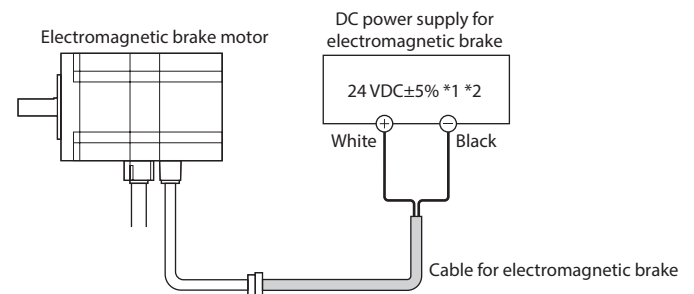
## Installing a load

When connecting a load to the motor, align the centers of the motor's output shaft and load shaft. Be careful not to damage the output shaft or the bearings (ball bearings) when installing a coupling or pulley to the motor's output shaft.

## Electromagnetic brake motor

To release the electromagnetic brake and install the load, a DC power supply is needed to power the electromagnetic brake. Use a cable for electromagnetic brake to connect a DC power supply of 24 VDC±5% to the motor.

When purchasing a motor and driver package product, the cable for electromagnetic brake is supplied with the product.



\*1 If the distance between the motor and driver is extended to 15 m (49.2 ft.) or longer, use a power supply of 24 VDC±4%.

\*2 The power supply current capacities are as follows.

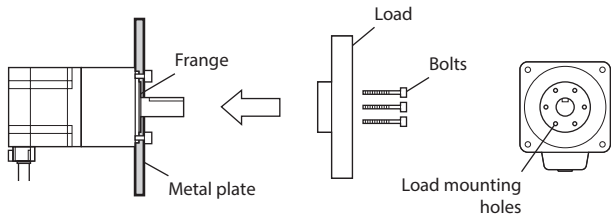
PKE54: 0.1 A or more

PKE56: 0.3 A or more

PKE59: 0.5 A or more

### ● Installing on the flange surface (Harmonic geared type)

With a Harmonic geared type (excluding PKE596), a load can be installed directly to the gear using the load mounting holes provided on the flange surface.



Motor model	Nominal size	Number of bolts	Tightening torque [N·m (oz·in)]	Effective depth of bolt thread [mm (in.)]
PKE543	M3	6	1.4 (198)	5 (0.2)
PKE564	M4	6	2.5 (350)	6 (0.24)



- When installing a load on the flange surface, the load cannot be affixed using the key groove in the output shaft.
- Design an appropriate installation layout so that the load will not contact the metal plate or bolts used for installing the motor.

### ■ Permissible radial load, permissible axial load and permissible moment load



If the radial load or axial load exceeds the specified allowable value, repeated load applications may cause the motor output shaft or bearing (ball bearings) to undergo a fatigue failure.



The permissible radial load and permissible axial load of the **PS** geared type represent the value that the service life of the gear part satisfies 20,000 hours when either of the radial load or axial load is applied to the gear output shaft.

### ● Standard type

Motor model	Gear ratio	Permissible radial load [N (lb.)]					Permissible axial load [N (lb.)]
		Distance from the tip of motor's output shaft [mm (in.)]					
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
PKE54	-	35 (7.8)	44 (9.9)	58 (13)	85 (19.1)	-	15 (3.3)
PKE56		90 (20)	100 (22)	130 (29)	180 (40)	270 (60)	30 (6.7)
PKE59		260 (58)	290 (65)	340 (76)	390 (87)	480 (108)	60 (13.5)

### ● TS geared type

Motor model	Gear ratio	Permissible radial load [N (lb.)]					Permissible axial load [N (lb.)]
		Distance from the tip of motor's output shaft [mm (in.)]					
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
PKE54	3.6 7.2 10	20 (4.5)	30 (6.7)	40 (9)	50 (11.2)	-	15 (3.3)
	20 30	40 (9)	50 (11.2)	60 (13.5)	70 (15.7)	-	

Motor model	Gear ratio	Permissible radial load [N (lb.)]					Permissible axial load [N (lb.)]
		Distance from the tip of motor's output shaft [mm (in.)]					
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
PKE56	3.6 7.2 10	120 (27)	135 (30)	150 (33)	165 (37)	180 (40)	40 (9)
	20 30	170 (38)	185 (41)	200 (45)	215 (48)	230 (51)	
PKE59	3.6 7.2 10	300 (67)	325 (73)	350 (78)	375 (84)	400 (90)	150 (33)
	20 30	400 (90)	450 (101)	500 (112)	550 (123)	600 (135)	

### ● FC geared type

Motor model	Gear ratio	Permissible radial load [N (lb.)]					Permissible axial load [N (lb.)]
		Distance from the tip of motor's output shaft [mm (in.)]					
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
PKE54	All gear ratios	180 (40)	200 (45)	220 (49)	250 (56)	-	100 (22)
PKE56		270 (60)	290 (65)	310 (69)	330 (74)	350 (78)	200 (45)

### ● PS geared type

Motor model	Gear ratio	Permissible radial load [N (lb.)]					Permissible axial load [N (lb.)]
		Distance from the tip of motor's output shaft [mm (in.)]					
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
PKE54	5	70 (15.7)	80 (18)	95 (21)	120 (27)	-	100 (22)
	7.2	80 (18)	90 (20)	110 (24)	140 (31)	-	
	10	85 (19.1)	100 (22)	120 (27)	150 (33)	-	
	25	120 (27)	140 (31)	170 (38)	210 (47)	-	
	36	130 (29)	160 (36)	190 (42)	240 (54)	-	
	50	150 (33)	170 (38)	210 (47)	260 (58)	-	
PKE56	5	170 (38)	200 (45)	230 (51)	270 (60)	320 (72)	200 (45)
	7.2	200 (45)	220 (49)	260 (58)	310 (69)	370 (83)	
	10	220 (49)	250 (56)	290 (65)	350 (78)	410 (92)	
	25	300 (67)	340 (76)	400 (90)	470 (105)	560 (126)	
	36	340 (76)	380 (85)	450 (101)	530 (119)	630 (141)	
	50	380 (85)	430 (96)	500 (112)	600 (135)	700 (157)	

Motor model	Gear ratio	Permissible radial load [N (lb.)]					Permissible axial load [N (lb.)]
		Distance from the tip of motor's output shaft [mm (in.)]					
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
PKE59	5	380 (85)	420 (94)	470 (105)	540 (121)	630 (141)	600 (135)
	7.2	430 (96)	470 (105)	530 (119)	610 (137)	710 (159)	
	10	480 (108)	530 (119)	590 (132)	680 (153)	790 (177)	
	25	650 (146)	720 (162)	810 (182)	920 (200)	1070 (240)	
	36	730 (164)	810 (182)	910 (200)	1040 (230)	1210 (270)	
	50	820 (184)	910 (200)	1020 (220)	1160 (260)	1350 (300)	

### ● Harmonic geared type

Motor model	Gear ratio	Permissible radial load [N (lb.)]					Permissible axial load [N (lb.)]
		Distance from the tip of motor's output shaft [mm (in.)]					
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
PKE54	All gear ratios	180 (40)	220 (49)	270 (60)	360 (81)	510 (114)	220 (49)
PKE56		320 (72)	370 (83)	440 (99)	550 (123)	720 (162)	450 (101)
PKE59		1090 (240)	1150 (250)	1230 (270)	1310 (290)	1410 (310)	1300 (290)

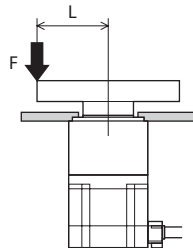
### Permissible moment load of the Harmonic geared type

When installing an arm or table on the flange surface, calculate the moment load using the formula below if the flange surface receives any eccentric load. The moment load should not exceed the permissible value specified in the table.

L: Distance from the center of the output flange (m)  
F: External force (N)

Moment load:  $M$  (N-m) =  $F \times L$

Motor model	Permissible moment load (N-m)
PKE543	5.6
PKE564	11.6



## Connection

### ■ Connecting to the driver

Refer to [OPERATING MANUAL Driver](#) or [USER MANUAL](#) for the connection method.

#### ● Motor connector pin assignment



Pin No.	Lead color	Lead size
1	Black	AWG22 (0.3 mm <sup>2</sup> )
2	Red	
3	Yellow	
4	Blue	
5	Orange	
6	Green	

### ■ Grounding the motor

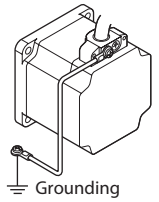
Be sure to ground the Protective Earth Terminal of the motor.

Screw size: M4

Grounding wire: AWG18 (0.75 mm<sup>2</sup>) or thicker

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 and maintenance

### ■ 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?
- Are there any abnormal noises in the motor 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?

### ■ Warranty

Check on the Oriental Motor Website for the product warranty.

### ■ Disposal

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

## Specifications

Check on the Oriental Motor Website for the product specifications.

## 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)
Shipping environment	Altitude	Up to 3000 m (10000 ft.) above sea level
	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: <ul style="list-style-type: none"> <li>• Case - Motor windings</li> <li>• Case - Electromagnetic brake windings</li> </ul>
Dielectric strength	Sufficient to withstand the following for 1 minute: <ul style="list-style-type: none"> <li>• Case - Motor windings 1.5 kVAC 50/60 Hz</li> <li>• Case - Electromagnetic brake windings 1.5 kVAC 50/60 Hz</li> </ul>

## Regulations and standards

### ■ UL Standards

Check the "APPENDIX UL Standards and CSA Standards for **RKII Series**" for recognition information about UL Standards.

### ■ CE Marking

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

#### • Low Voltage Directive

Applicable Standards	EN 60034-1, EN 60034-5, EN 60664-1
Installation conditions (EN Standard)	To be incorporated in equipment. Overvoltage category: II Pollution degree: 2 Degree of protection: IP20 Protection against electric shock: Class I

- This product cannot be used with cables normally used for IT power distribution systems.
- 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.

### ■ RoHS Directive

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

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