



OPERATING MANUAL

2-Phase Stepping Motor PK Series
Standard Type IP65 rated motor
PK26□AT, PK26□DAT



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.

Introduction

■ Before use

This product must be handled by qualified personnel with expert knowledge of electrical and mechanical engineering. Use the product correctly after thoroughly reading the section "Safety precautions." In addition, be sure to observe the contents described in warning and caution in this manual. The product described in this manual is designed and manufactured to be incorporated in general industrial equipment. Do not use the product for any other purpose. Oriental Motor shall not be liable whatsoever for any damage arising from the failure to observe this warning.

■ Product overview

This product is a 2-phase stepping motor employing a terminal block connection method.

This product is recognized by UL and certified by CSA, and bears the CE Marking (Low Voltage Directive) in compliance with the EN Standards.

Applicable Standards	Certification Body	Standards File No.
UL 1004-1, UL 1004-2 CSA C22.2 No.100 CSA C22.2 No.77	UL	E64199
EN 60034-1, EN 60034-5, EN 60664-1	Conforming to the respective standards.	

Degree of protection	IP65 (Excluding the gap between the shaft and the flange)	
Operating environment	Ambient temperature	-10 to +50 °C (+14 to +122 °F) (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 1,000 m (3,300 ft.) above sea level
Installation conditions	Ambient atmosphere	Free from corrosive gases
	To be incorporated in equipment Overvoltage category: II Pollution degree: Class 3 (excluding installation surface) Protection against electric shock: Class I equipment	

The user is responsible for confirming the EMC compatibility of the final equipment incorporating the motor.

■ RoHS Directive

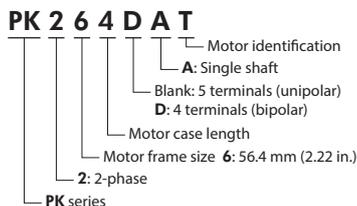
The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).

■ Checking the product

Confirm that all of the following items are available. Should you find any item missing or damaged, contact the Oriental Motor sales office where you purchased the product. Check the motor model with the nameplate.

- Motor..... 1 unit
- OPERATING MANUAL..... 1 copy

● Model



● Product types

PK264AT PK266AT PK268AT
PK264DAT PK266DAT PK268DAT

The connection methods and rated currents are listed below.

Model	Connection method	Rated current
PK26□AT	Unipolar connection	2.0 A/phase
PK26□DAT	Bipolar connection	2.8 A/phase

Safety precautions

The motor is designed for incorporation into industrial equipment. Touching the motor during operation may result in bodily injury or property damage, since the output shaft is rotating and the surface remains very hot. To prevent injury or damage to the motor, be sure the motor is handled and operated only by qualified personnel familiar with operations involving electronic equipment.

⚠ WARNING

Handling the product without observing the instructions that accompany a "WARNING" symbol may result in death or serious bodily injury.

- Do not use the motor in explosive or corrosive environments, in the presence of flammable gases, near combustible materials, or locations subjected to the splashing of oil or other hazardous liquids. Doing so may result in fire, electric shock or injury.
- Turn off the power before working on the product. Failure to do so may result in electric shock.
- Provide a measure to retain the position of the movable part of equipment when the product is used in a vertical application. The motor loses its holding torque when the power is cut off. Without appropriate measures the movable part will descend, resulting in injury or damage to equipment.
- Install the motor inside an enclosure to avoid contact with the hands, or provide sufficient earthing. Failure to do so may result in electric shock.
- Connect the product correctly and securely according to the wiring diagram. Failure to do so may result in fire or electric shock.
- After connecting the cable, securely fix and tighten the terminal box and cable clamp. Failure to do so may result in fire or electric shock.
- Turn off the power in case of a power failure. Failure to do so may result in injury or damage to equipment when the motor starts suddenly upon the recovery of power.
- Do not disassemble or modify the motor. This may cause electric shock or injury.

⚠ CAUTION

Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in bodily injury or property damage.

- Do not use the motor beyond its specifications. Doing so may result in electric shock, injury or damage to equipment.
- Do not touch the motor while the motor is conducting current. Doing so may result in burns.
- Use a round terminal for connection with the Protective Earth Terminal. Failure to do so may result in fire or electric shock.
- Do not carry the motor by its output shaft. Doing so may result in injury.
- Securely fix the motor to an appropriate metal plate. Failure to do so may result in injury or damage to equipment.
- Protect the rotating part of the motor (output shaft) with a cover. Failure to do so may result in injury.
- When conducting the insulation resistance measurement or the dielectric strength test, be sure to separate the connection between the motor and the driver. Failure to do so may result in damage to equipment.
- Immediately when trouble has occurred, stop running and turn off the power. Failure to do so may result in fire, electric shock or injury.

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

Precautions for use

● Drive unit

Use a motor driver unit appropriate for the method of motor connection.

● Connecting the motor

Use a multi-core cable of AWG26 to 16 (0.14 to 1.25 mm² [7 to 13 mm (0.28 to 0.51 in.) in outer diameter] for motor connection. Strip away 40 to 50 mm (1.57 to 1.97 in.) of sheath from the end of the cable. Stripping the cable sheath by more than 50 mm (1.97 in.) will reduce the sealing effect of the cable clamp.

● Cable clamp

"Cable clamp" is a section through which a cable passes. The cable clamp conforms to the IP65 specification and consists of the cap, gasket and receptacle. To ensure watertightness at the cable clamp, tighten the cap after confirming that the cover of the connection cable is securely sealed by the gasket.

● Motor case temperature

The motor is designed to the class B insulation specification. When operating the motor, keep the motor case temperature to 100 °C (212 °F) or below. Operating the motor at temperatures above 100 °C (212 °F) will shorten the life of the motor coil and ball bearing. [The maximum temperature is 75 °C (167 °F) if the equipment is to receive UL/CSA certification, because the motor must conform to the class A insulation requirement.]

Installation

■ Installation requirements

The motor is designed to be incorporated in equipment. It will be used in an environment conforming to overvoltage category II, pollution degree of class 3 and protection against electric shock of class I equipment.

Degree of protection: IP65 (Excluding the gap between the shaft and the flange)

Install the motor 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)
- Operating ambient humidity: 85 % or less (non-condensing)
- Area free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- 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

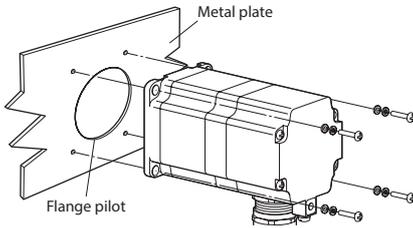
Installation method

Mount the motor on the smooth surface of a metal plate. When installing the motor, secure it with four bolts (not included) through the four mounting holes provided in the motor's installation surface, so as to leave no gaps between the installation surface and metal plate.

Bolt size: M4

Tightening torque: 2 N·m (280 oz-in)

Insert the pilot located on the motor's installation surface into the flange pilot.



Installing the load

When installing 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 bearings within when installing a flexible coupling or pulley to the motor's output shaft.

Permissible radial load and permissible axial load

The radial load and axial load of the motor's output shaft must not exceed the permissible values shown in the table below.

Permissible radial load [N (lb.)]

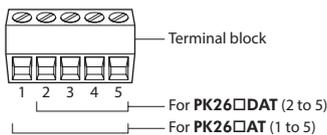
Distance from the tip of motor's output shaft [mm (in.)]			
0 (0)	5 (0.20)	10 (0.39)	15 (0.59)
54 (12.1)	67 (15)	89 (20)	130 (29)

Permissible axial load [kg (lb.)]

PK264	0.6 (1.32) *	The axial value must be kept at or below the mass (*) of the motor.
PK266	0.9 (1.98) *	
PK268	1.2 (2.64) *	

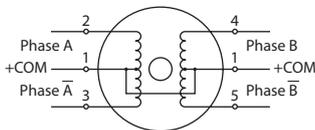
Connection

Connect the PK26□AT to terminals 1 to 5 on the terminal. Connect the PK26□DAT to terminals 2 to 5 on the terminal.

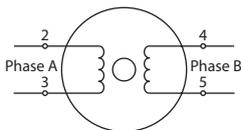


Wiring diagrams

PK26□AT (Unipolar connection)

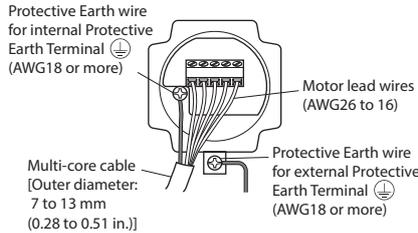


PK26□DAT (Bipolar connection)

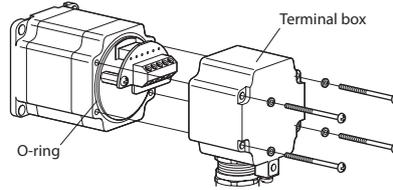


Connection method

Connect the respective wires as illustrated below. Connect either the internal Protective Earth Terminal or external Protective Earth Terminal to the ground. Use the internal Protective Earth Terminal in a corrosive environment. If the wiring distance between the motor and driver is long, use the external Protective Earth Terminal. Use a Protective Earth wire thicker than AWG18 (0.75 mm²).

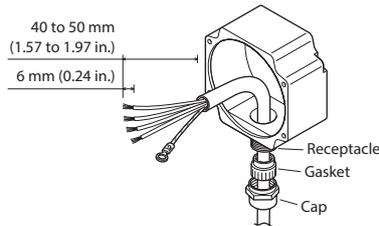


1. Remove the terminal box
Loosen the mounting screws (M3) for securing the terminal box, then remove the terminal box from the motor.



2. Repair the connection cable

- Stripping the cable sheath by more than 50 mm (1.97 in.) from the end of the cable will reduce the sealing effect of the cable clamp.
- When using the internal Protective Earth Terminal, crimp a round terminal (M4) to the Protective Earth wire.



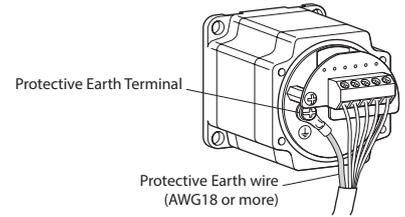
3. Connect the terminal
Loosen the screws on the respective terminals on the terminal block, insert the motor lead wires from the openings, and then tighten the screws.

Tightening torque: 0.6 N·m (85 oz-in)

4. Connect the Protective Earth Terminal
Connect to the minimum distance.

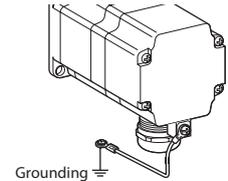
- Using the internal Protective Earth Terminal
Connect the Protective Earth wire to the Protective Earth Terminal.

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



- Using the external Protective Earth Terminal
Two screw holes are provided for connecting the Protective Earth Terminal. Use a round terminal (M4) to connect one of the two points to the ground.

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

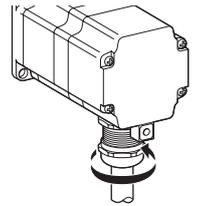


5. Install the terminal box
Confirm that an O-ring is set in the groove, align the motor case and terminal cover, then tighten the mounting screws (M3) for securing the terminal cover.

Tightening torque: 0.5 N·m (71 oz-in)

6. Tighten the cable cap
Place the gasket on the receptacle and tighten the cap. Before tightening the cap, confirm that the sheath of the cable is sealed by the gasket.

Tightening torque: 4.0 to 5.0 N·m (560 to 710 oz-in)
Adjust the tightening torque depending on the diameter and material of the cable.



Inspection

It is recommended that the following items be checked regularly after the motor has been operated. Should any abnormality be found, stop using the motor and contact your nearest Oriental Motor sales office.

- Is there any abnormal noise coming from the bearings (ball bearings) of the motor or other parts?
- Is there a loose terminal box or cable cap?
- Is there any scratch or sign of stress on the connection cable?
- Are the output shaft and load shaft properly aligned at their centers?

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