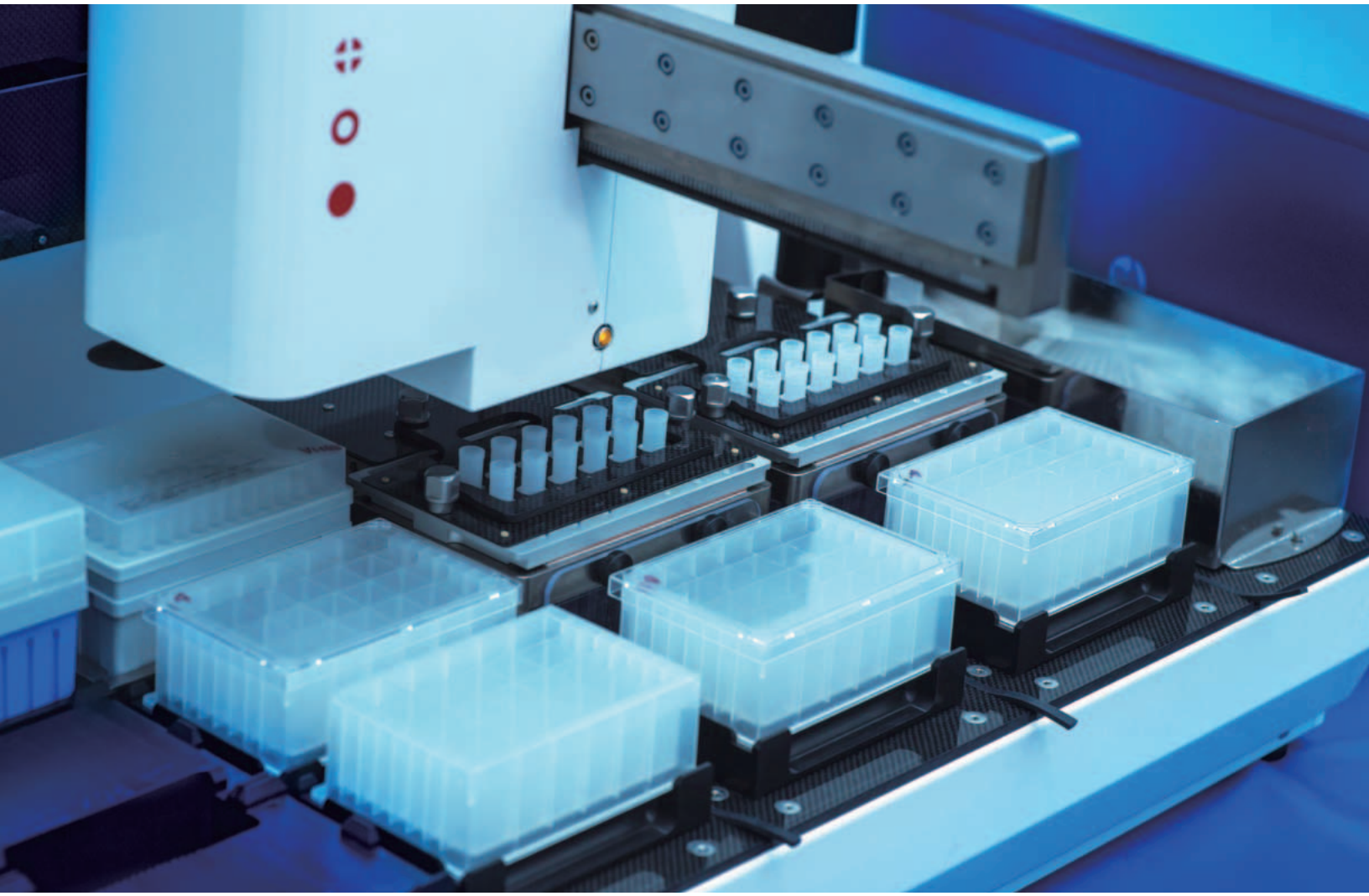
Oriental motor

Product Guide for Medical Applications



Oriental Motor Corporate Overview

Company	ORIENTAL MOTOR CO., LTD.
Founded	1885
Established	1950
Representative	President Eiji Kawahito
Capital	4.1 billion yen
Sales	Consolidated 66.8 billion yen (At the end of March 2022)
Number of Employees	Consolidated 3,079 (At the end of March 2022)
Company Activity	Development, manufacture and sale of small precision motors and electronic circuits for motion control
Head Office	4-8-1, Higashiueno, Taito-ku, Tokyo, 110-8536, Japan

R&D Center	Tsuruoka-Chuo Plant
Factories	Tsuruoka-Nishi Plant
	Soma Plant
	Tsukuba Plant
	Tsuchiura Plant
	Kashiwa Plant
	Kofu Plant
	Takamatsu-Kozai Plant
	Takamatsu-Kokubunji Plant
	Manufacturing Technology R&D Center (Joso, Ibaraki)

Tsuruoka-Chuo Plant

Development of standard AC motors and brushless motors. Development and manufacturing of control circuits and cooling fans.

Tsuruoka-Nishi Plant

Manufacturing of standard AC motors, brushless motors and gearheads.

Soma Plant

Development and manufacturing of stepper motors and control circuits.

Tsukuba Plant

Development of various motor and control circuits. Manufacturing of control motors.
Evaluating, analyzing, and measuring various products.

Tsuchiura Plant

Development and manufacturing of gearheads and motorized actuators.

Kashiwa Plant

Research and development on the ideal accessories and peripheral equipment for every product.

Kofu Plant

Manufacturing and production technology development of control circuits. Evaluating, analyzing and measuring various products.

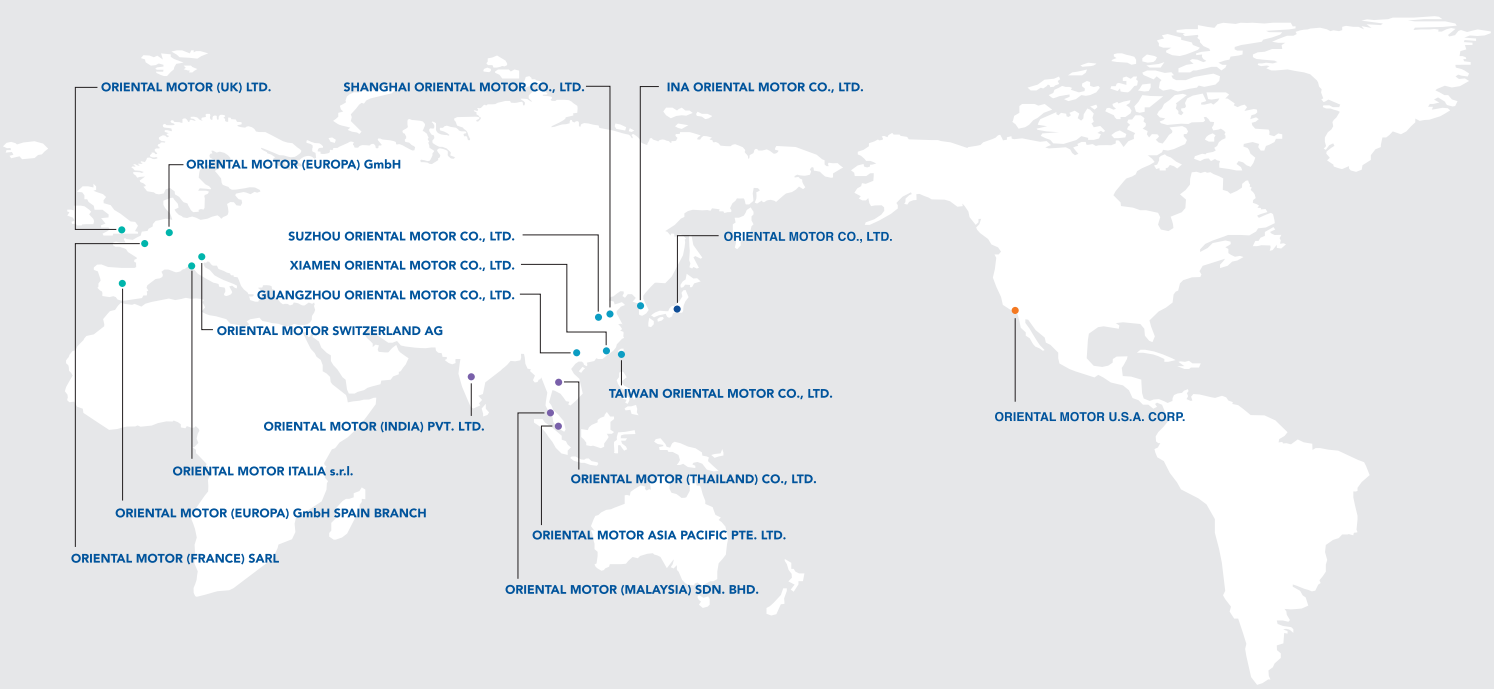
Takamatsu-Kozai Plant

Development and manufacturing of stepper motors.

Takamatsu-Kokubunji Plant

Manufacturing of stepper motors.

Global Network



Product Overview

αSTEP Hybrid Step-Servo Control System

- Mechanical Absolute Encoder Stepper Motors
- Closed Loop
- Positioning, Speed, Torque Control
- Electromagnetic Brake Types
- Geared Types
- Linear & Rotary Actuators

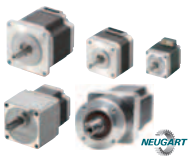
Servo

- 400 W Battery Free Absolute Encoder Servo Motors
- 50 W up to 750 W Tuning Free Servo Motors
- Hybrid Servo Motors available
- Gear and Electromagnetic Brake options

Network Drivers/Controllers

- EtherNet/IP
- EtherCAT
- PROFINET
- Modbus (RTU)
- CC-Link
- MECHATROLINK
- Network Compatible Drivers/Controllers

Stepper Motors



- 2 Phase 1.8°, 0.9°
- 5 Phase 0.72°, 0.36°
- Dedicated Drivers for best performance
- Encoder Motors
- Electromagnetic Brake Types
- Geared Types

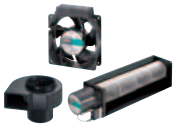
Brushless Motors

- Speed Control
- Compact Yet Powerful
- Excellent Speed & Torque Performance
- Space Saving
- Energy Saving
- No Brushes = No Maintenance

Standard AC Motors

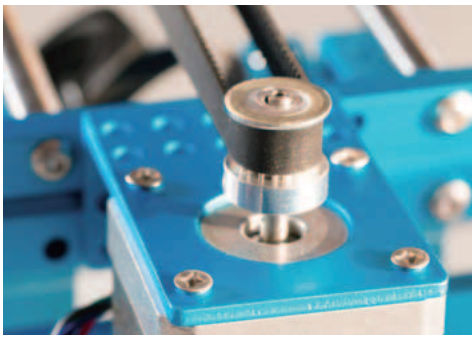
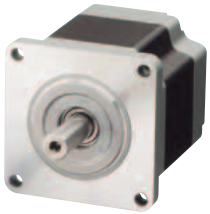
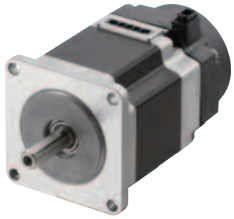
- 1 W (1/750 HP)~3 HP
- Single & Three-Phase
- Fixed Speed
- Speed Control
- Electromagnetic Brake Types
- Geared Types

Cooling Fans

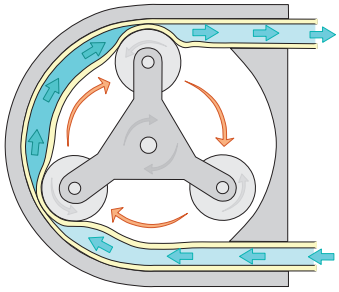
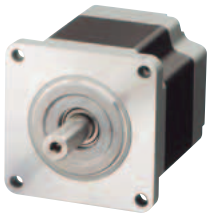


- AC or DC Input
- Alarms
- Axial Flow
- Blowers
- Cross Flow
- Thermostats
- Enclosure Types

Applications for Medical Equipment

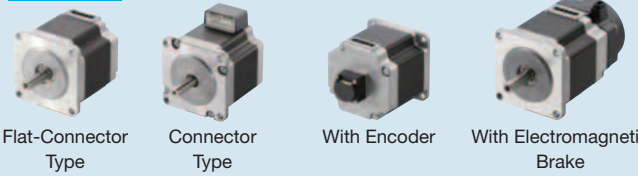
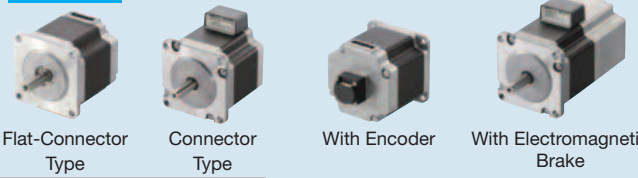
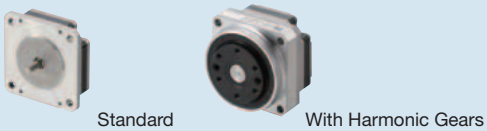
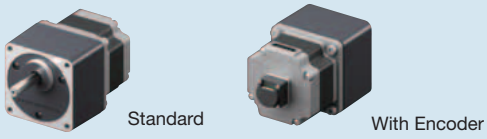
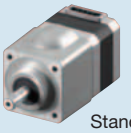
Application	Common Needs	Product
Index Table 	•Large inertial load	**PKP** Series Geared Type  ➜ P10
Pick and Place (Belt Pulley) 	•High overhung load	**PKP** Series  ➜ P6
Conveyor 	•Compact •Stable speed •Flat speed torque curve	**BLH** Series  ➜ P28
XYZ Gantry 	•Z-axis (vertical) brake	**PKP** Series Brake Type  ➜ P9

Applications for Medical Equipment

Application	Common Needs	Product
Peristaltic Pump 	• Compact • Reduced noise • Large starting torque	**BLH** Series  ➜ P28
		**PKP** Series  ➜ P6
Syringe Pump 	• Resistance to frictional load	**PKP** Series High-Resolution Type  ➜ P8
Dispenser 	• Integrated motor and ball screw for space saving	**DR** Series  ➜ P27

2-Phase Stepper Motors **PKP** Series High Torque Low Vibration

●Bipolar (4 lead wires) and unipolar (5 or 6 lead wires) wiring types are available.

Motor Type	Motor Frame Size	Additional Function		
		Standard	With Encoder	With Electromagnetic Brake
Standard Type (Basic Step Angle: 1.8°/step) High Torque  Flat-Connector Type / Connector Type / With Encoder / With Electromagnetic Brake Standard	□13 mm	●	–	–
	□20 mm	●	●	–
	□28 mm	●	●	●
	□35 mm	●	●	●
	□42 mm	●	●	●
	□56.4 mm	●	●	●
	□60 mm*	●	–	–
	□85 mm	●	–	–
High-Resolution Type (Basic Step Angle: 0.9°/step) High Torque  Flat-Connector Type / Connector Type / With Encoder / With Electromagnetic Brake Standard	□28 mm	●	●	–
	□42 mm	●	●	●
	□56.4 mm	●	●	●
Flat Type (Basic Step Angle: 0.018° to 1.8°/step)  Standard / With Harmonic Gears	□42 mm	●	–	–
	□60 mm	●	–	–
	□51 mm	With Harmonic Gears		
	□61 mm	With Harmonic Gears		
SH Geared Type (Basic Step Angle: 0.05° to 0.5°/step)  Standard / With Encoder	□28 mm	●	●	–
	□42 mm	●	●	–
	□60 mm	●	●	–
	□90 mm*	●	–	–
CS Geared Type (Basic Step Angle: 0.09 to 0.36°/step)  Standard	□28 mm	●	–	–
	□42 mm	●	–	–
	□60 mm	●	–	–

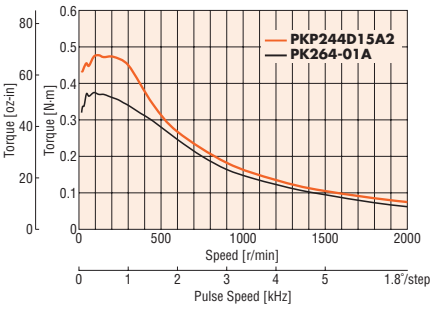
●: 2 types are available—the "Flat-Connector Type" and the "Connector Type".

*This is the conventional **PK** Series.

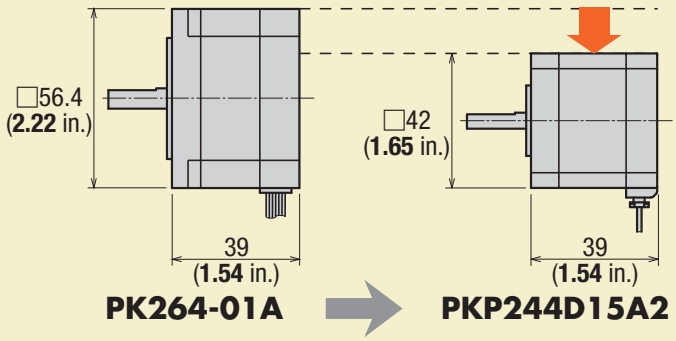
Downsizing

Use a **PKP** Series motor in place of a standard motor from the **PK** Series with the equivalent torque in order to downsize motors.

Torque Characteristics Comparison of
PKP244D15A2 and **PK264-01A**



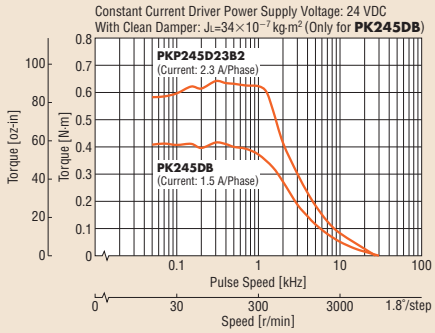
Provides torque equivalent to the next larger frame size!



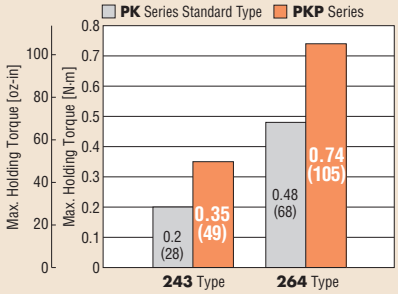
Increased Torque over the Entire Speed Range from Low to High

After revising the magnetic and structure design of the **PKP** Series, it produces much more torque than the standard **PK** Series motors of the same size. In addition, torque can be increased in the high-speed range by using high current motors.

Comparison of Speed – Torque Characteristics of the Same Size Motors



Comparison of Maximum Holding Torque

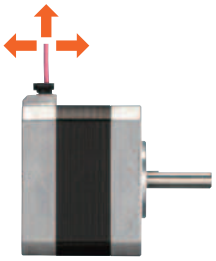


High current is possible due to the revised motor winding design and the highly efficient design of the drive circuit that can be combined. Increased torque over the entire speed range from low to high is achieved.

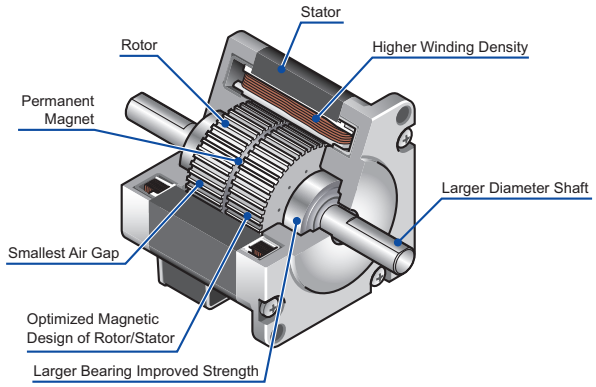
Compact and Flat Connector

The **PKP** Series uses a compact and flat connector, which shortens the length of the connector's overhang. In addition, the degree of freedom for the cable outlet direction has been increased, because the outlet direction points upward.

● Because the connector is provided for some products only, refer to dimensions of each model for details.



● New Design: Run Cooler or Downsize

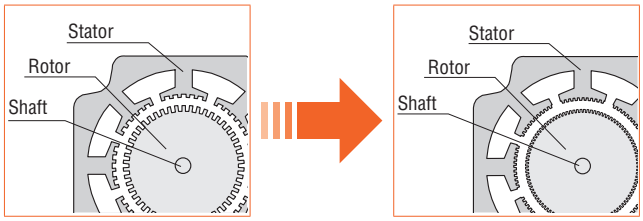


High-Resolution Type

This is a high-resolution stepper motor with a basic step angle of 0.9°. Stopping accuracy is improved.

●Increased Resolution (Compared to Standard Type)

The number of rotor teeth is doubled to 100, compared to 50 with the standard type. As a result, the basic step angle is 0.9°/step, which is half that of the standard type.



Standard Type (50 teeth) High-Resolution Type (100 teeth)

●Avoidance of Resonance Regions

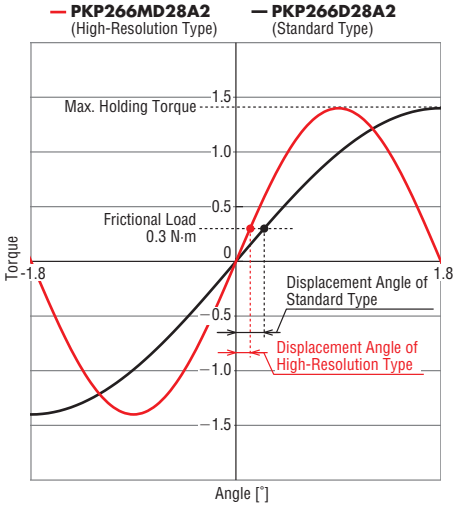
If the pulse speed is within a resonance region, vibration may increase. Resonance regions can be avoided by switching to a high-resolution type.

●Improved Stopping Accuracy

This motor has a smaller displacement angle when a friction load is applied to the motor compared to the standard type (basic step angle 1.8°). This improves the stopping accuracy in applications where a frictional load is constantly applied, such as ball screw mechanisms.

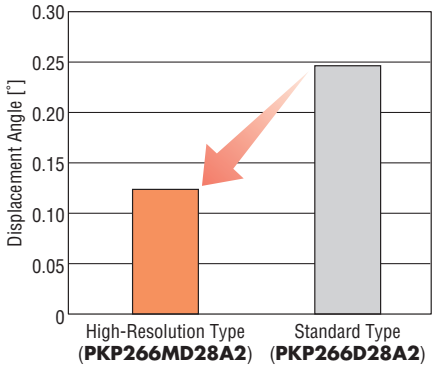
◇Comparison of Angle – Torque Characteristics (Reference values)

Frictional load 0.3 N·m (42.4 oz-in)



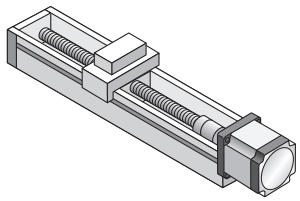
◇Comparison of Displacement Angles Due to Frictional Load (Reference values)

Frictional load 0.3 N·m (42.4 oz-in)



◇Example of a Mechanism in Which a Frictional Load is Constantly Applied

With a ball screw mechanism like that shown in the diagram, for example, a frictional load is constantly applied to the motor due to the guide block and guide rail.

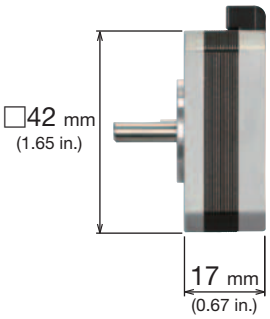


Flat Type

This is Oriental Motor's flattest type of 2-phase stepper motors.

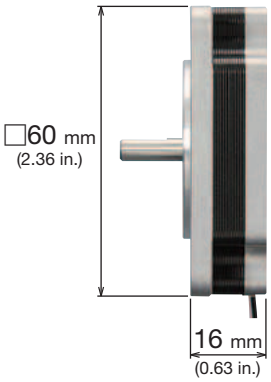
●Flat and Lightweight Design

The motor can be installed in a narrow space.



Maximum Holding Torque: 0.1 N·m (14.2 oz-in)

Mass: 0.11 kg (0.24 lbs)



Maximum Holding Torque: 0.18 N·m (25.5 oz-in)

Mass: 0.2 kg (0.44 lbs)

●With Harmonic Gears

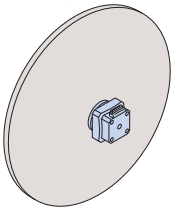
◇Attach the load to the surface of the flange.

Example: Frame size 51 mm (2.01 in.)

Gear ratio: 100:1
Max. holding torque: 2.4 N·m (339 oz-in)
Mass: 0.32 kg (11.3 oz)

◇Capable of large inertial driving.

Example: Frame size 51 mm (2.01 in.)



Inertia 0.12 kg·m^2 (2.84 lb-ft^2)
(Approximately 7 times the rotor inertia)
Inertial load: Diameter 0.35 m (13.8 in.),
Thickness 0.01 m (0.39 in.)
Mass 7.6 kg (268 oz),
Material iron
Motor: Length 17 mm (0.67 in.)
Gear ratio: 100:1

● is a registered trademark of Harmonic Drive Systems Inc.

Product Line Equipped with Additional Functions for Many More Applications

●With Encoder

(Available for standard type, high-resolution type, and **SH** Geared Type)

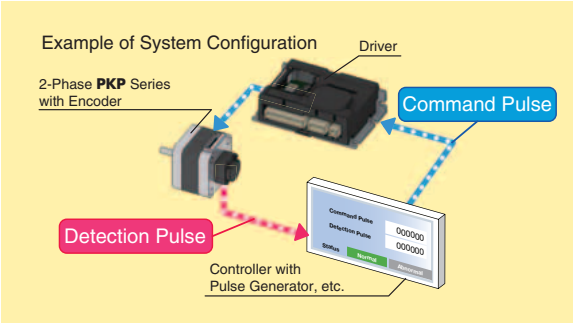
● Main Specifications

Type	Standard Type	High-Resolution Type, **SH** Geared Type
Resolution	200 P/R, 400 P/R*	400 P/R
Output Signals	A phase, B phase, Z phase (3ch)	

*A product line with resolution of 1000 P/R is available with frame sizes of 42mm and 56.4mm

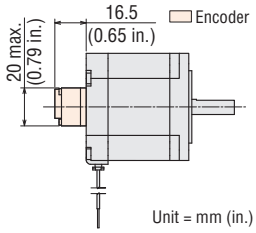
◇Motor Position Detection is Possible

Monitoring the current position and detecting positional errors are possible. For example, comparing the command position and current position enables you to check the normal operation of the motor.



◇Equipped with a Compact Encoder

● When frame size is 56.4 mm (2.22 in.)



◇High Reliability with Line Driver Output Circuit Type

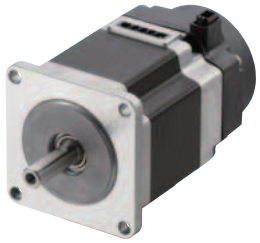
Noise resistance is improved by differential output, and the wiring distance can be longer than with the voltage output type.

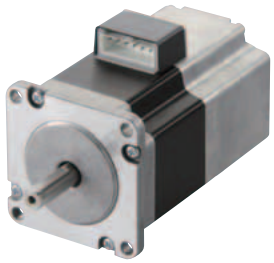
● The cables which are convenient for wiring with an encoder are available, sold separately.

Encoder Connection Cables

●With Electromagnetic Brake

(Provided for standard type and high-resolution type)





◇Position Can Be Held When the Power Is OFF or a Power Failure Occurs

This type features an electromagnetic brake that activates when the power is off.

When the power is accidentally cut off due to a power failure or other unexpected event, the electromagnetic brake holds the load in position to prevent it from dropping or moving. Also, the load can be held by the electromagnetic brake when the motor is stopped, and the heat generated by the motor can be curtailed by switching the motor current off.

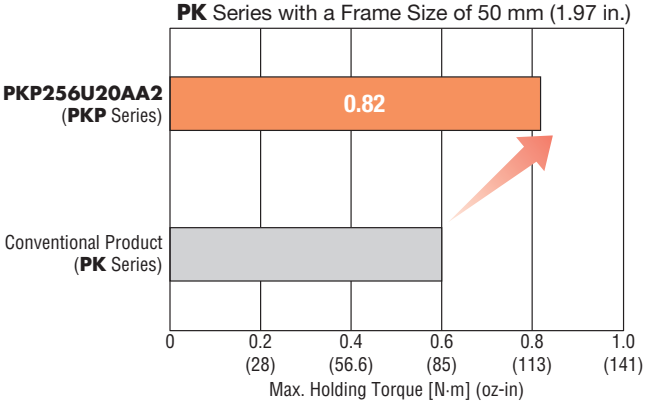
Motor with a Frame Size of 50 mm (1.97 in.) with Significantly Increased Torque

●Significantly Increased Torque Contributes to Compact & High-Torque Applications

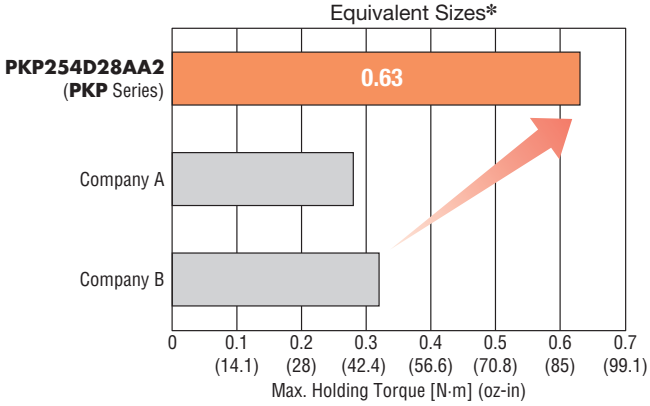
The new and improved design has significantly increased the torque output.

Increased torque shortens the positioning time and allows for larger load driving and holding.

Comparison with a Conventional Product from the **PK** Series with a Frame Size of 50 mm (1.97 in.)



Comparison with Other Companies' Products of Equivalent Sizes*



*Oriental Motor survey conducted in November 2018.

Features of Geared Types

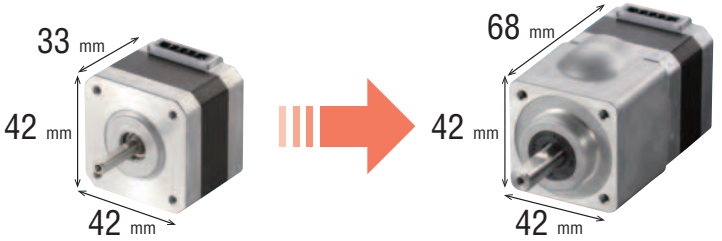
Using a geared type motor can provide advantages such as deceleration, high torque, and high resolution

●Comparing Features of the **CS** Geared Type and the **SH** Geared Type

Type				**CS** Geared Type 	**SH** Geared Type 
Features				●Center Shaft Configuration ●High Torque ●High Permissible Radial Load	●Wide Variety ・90 mm Frame Size and Unipolar Wiring ・Includes Encoder ・Many Gear Ratio Types
Frame Size	28 mm	Maximum Holding Torque	[N·m]	0.4～0.8	0.3, 0.4
		Speed Range (Max. value)	[r/min]	300～600	83～416
		Permissible Radial Load (Max. value)	[N]	73	23
	42 mm	Maximum Holding Torque	[N·m]	0.5～2	0.2～0.8
		Speed Range (Max. value)	[r/min]	150～600	83～833
		Permissible Radial Load (Max. value)	[N]	96	30
	60 mm	Maximum Holding Torque	[N·m]	1.3～4.5	1～4
		Speed Range (Max. value)	[r/min]	150～600	83～833
		Permissible Radial Load (Max. value)	[N]	260	160
	90 mm	Maximum Holding Torque	[N·m]	–	2.5～12
		Speed Range (Max. value)	[r/min]	–	50～500
		Permissible Radial Load (Max. value)	[N]	–	400

●Achieves Increased Torque with the Same Motor Frame Size

Switching to a geared type motor increases torque without changing the motor frame size.
This is effective when installation is not possible because the motor installation space is limited.



Standard Type	Motor Type	**CS** Geared Type
PKP243D15A2	Product Name	**PKP243D15A2-CS20**
0.35 N·m	Max. Holding Torque	2 N·m

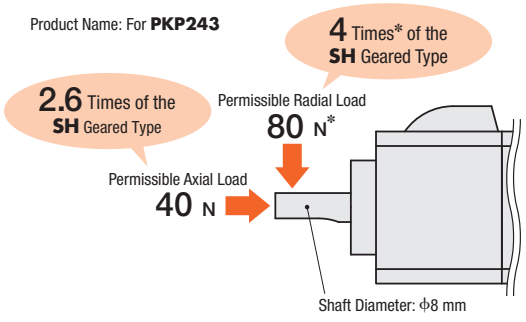
CS Geared Type

The geared type with center shaft addresses torque, shaft load capacity and installation demands.

●Increased Shaft Load Capacity Reduces Assembly Time

Increased permissible radial load and permissible axial load can reduce assembly time.

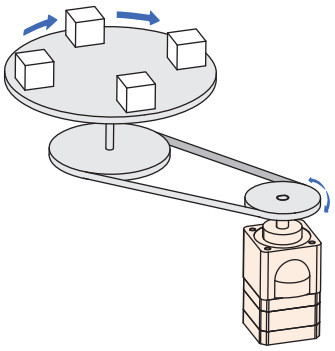
◇Permissible Radial Load and Permissible Axial Load



*When distance from shaft end is 10 mm

◇Applications

Belt and Pulley Mechanism



◇Advantages

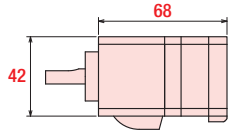
- Reduce adjustments during assembly because belt tension can be higher than with conventional products
- The components for supporting the radial load on the shaft are no longer needed
- The degree of freedom in pulley selection is increased

● Increase Torque Contributes to Reduced Size and Weight of the Motor

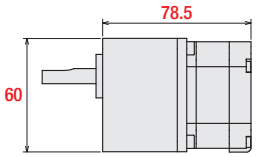
High torque, shorter motor length and a frame size that's one size smaller.

◇Dimensions: (Unit = mm)

CS Geared Type (**PKP243D15A2-CS20**)



SH Geared Type (**PKP264D14A2-SG7.2**)



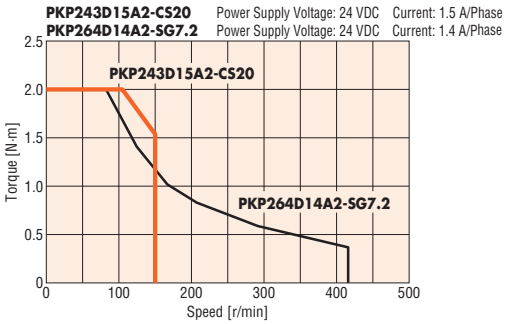
Maximum Holding Torque: Same

Frame Size: Reduced by **18** mm

Motor Length: Reduced by **10.5** mm

Mass: Reduced by **47** %

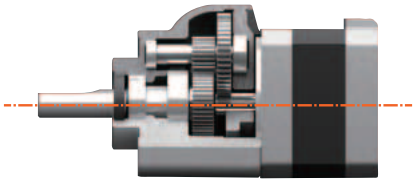
◇Torque Characteristics Comparison



●Center Shaft Makes Designing Easier

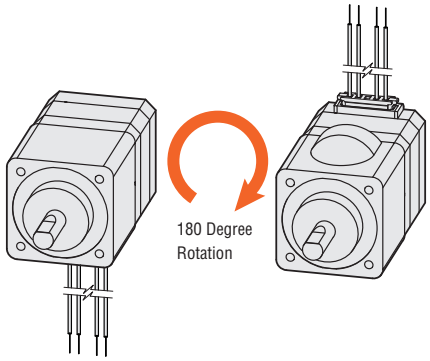
A review of the gear structure has led to the center shaft design. It is easier to design the installation plate.
In addition, the degree of freedom for the cable outlet direction has been increased.

◇Output Shaft now Placed in Center

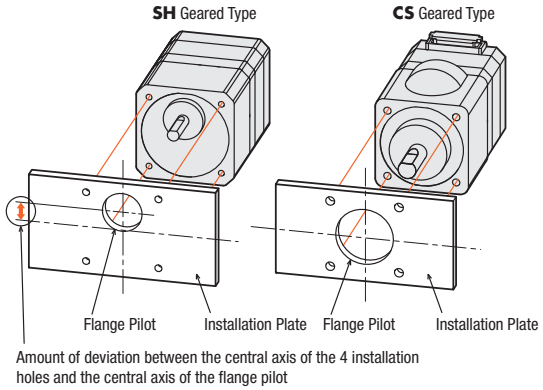


Internal Gearhead Structure Figure

◇Increased Degree of Freedom for Cable Outlet Direction



◇Installation Plate Designing Made Easier



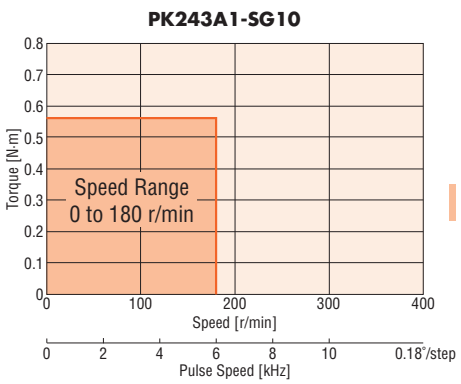
Amount of deviation between the central axis of the 4 installation holes and the central axis of the flange pilot

SH Geared Type

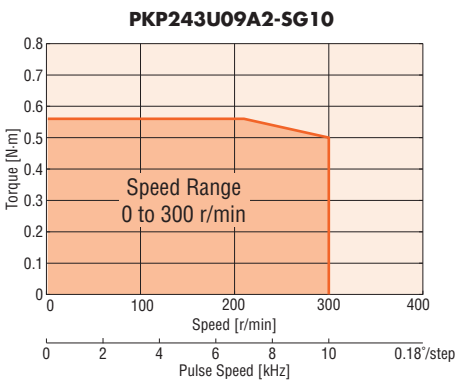
This type is well-suited for deceleration, increased torque, high resolution, and limited vibration.
It experiences less backlash than conventional products.

●Wider Speed Range makes it Easier to Use than Conventional Products

PK243A1-SG10



PKP243U09A2-SG10



Standard Type

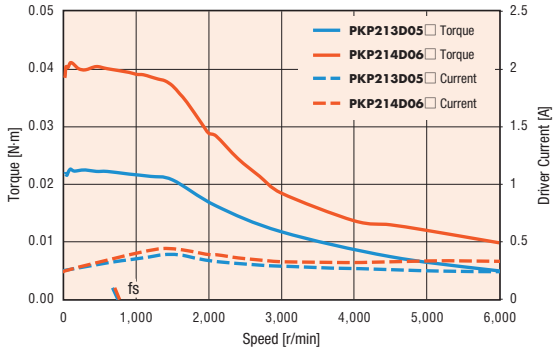
Frame Size 20 mm (0.79 in.) (Bipolar 4 Lead Wires)

Specifications

Product Name	Maximum Holding Torque N·m (oz-in)	Rotor Inertia J: kg·m^2 (oz-in^2)	Rated Current A/Phase	Voltage VDC	Winding Resistance Ω/Phase	Inductance mH/Phase	Basic Step Angle	Recommended Driver Product Name
PKP213D05□	0.02 (2.8)	1.6×10^{-7} (0.0088)	0.5	4.25	8.5	4.1	1.8°	**CVD205BR-K**
PKP214D06□	0.036 (5.1)	2.9×10^{-7} (0.0159)	0.6	3.9	6.5	3.5		**CVD206BR-K**

● The box □ in the product name indicates the shaft **A** (single shaft) or **B** (double shaft).

Speed – Torque Characteristics (Reference Values) fs: Max. Starting Frequency



Note

● Data for the speed – torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. Be sure to keep the temperature of the motor case under 100°C (212°F).

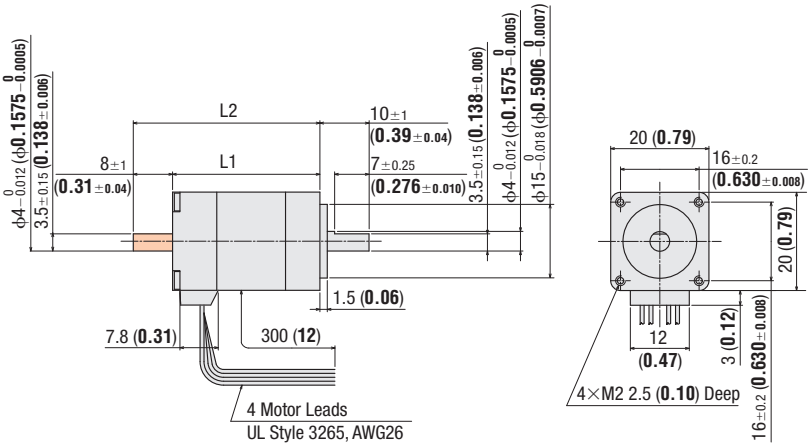
● Set the current of the driver so that it does not exceed the rated current of the motor.

Dimensions Unit = mm (in.)

Motor

2D & 3D CAD

Product Name	L1	L2	Mass kg (lb.)	2D CAD
PKP213D05A	30 (1.18)	–	0.05 (0.110)	B976
PKP213D05B		38 (1.50)		
PKP214D06A	40 (1.57)	–	0.07 (0.154)	B978
PKP214D06B		48 (1.89)		



● These dimensions are for double shaft products.

● For single shaft products, ignore the ▭ areas.

● Back shaft of double shaft products have a flat the whole length.

Standard Type

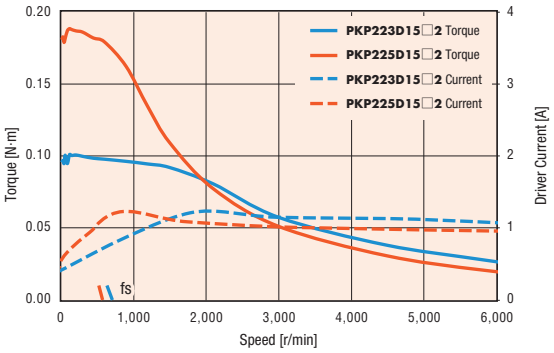
Frame Size 28 mm (1.10 in.) (Bipolar 4 Lead Wires)

Specifications

Product Name	Maximum Holding Torque N·m (oz-in)	Rotor Inertia J: kg·m² (oz-in²)	Rated Current A/Phase	Voltage VDC	Winding Resistance Ω/Phase	Inductance mH/Phase	Basic Step Angle	Recommended Driver Product Name
PKP223D15□2	0.095 (13.4)	9×10^{-7} (0.049)	1.5	1.77	1.18	0.96	1.8°	**CVD215BR-K**
PKP225D15□2	0.19 (26)	18×10^{-7} (0.098)		3	2	1.6		

● The box □ in the product name indicates the shaft **A** (single shaft) or **B** (double shaft).

Speed – Torque Characteristics (Reference Values) fs: Max. Starting Frequency



Note

● Data for the speed – torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the encoder, be sure to keep the motor case temperature at 85°C (185°F) max.

● Set the current of the driver so that it does not exceed the rated current of the motor.

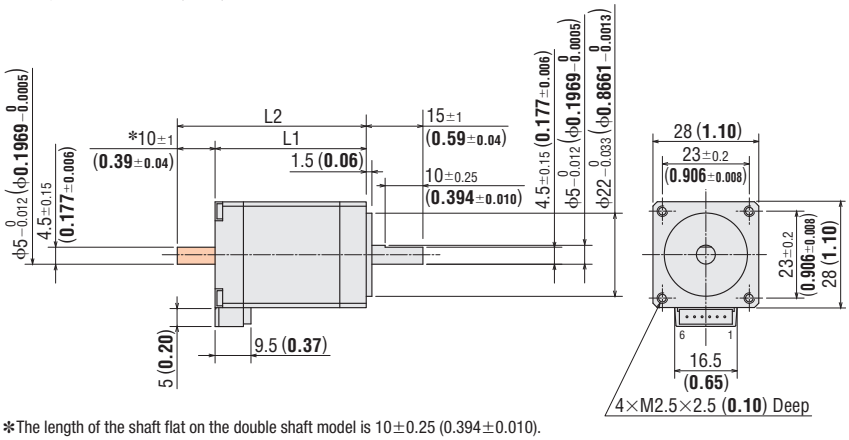
Dimensions Unit = mm (in.)

Motor

2D & 3D CAD

Product Name	L1	L2	Mass kg (lb.)	2D CAD
PKP223D15A2	32 (1.26)	–	0.11 (0.24)	B980
PKP223D15B2		42 (1.65)		
PKP225D15A2	51.5 (2.03)	–	0.2 (0.44)	B982
PKP225D15B2		61.5 (2.42)		

● Applicable Connector
Connector Housing: 51065-0600 (Molex)
Contact: 50212-8100 (Molex)
Crimp Tool: 57176-5000 (Molex)



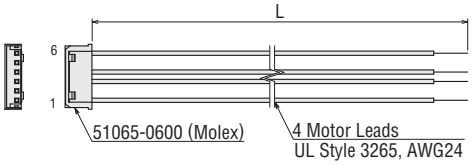
*The length of the shaft flat on the double shaft model is 10±0.25 (0.394±0.010).

● These dimensions are for double shaft motors.
For single shaft motors, ignore the shaded ▭ areas.

Connection Cable (Sold separately)

◇Motor Connection Cable

Product Name	Length L [m (ft.)]
LC2B06A	0.6 (2)
LC2B10A	1 (3.3)



Standard Type

Frame Size 35 mm (1.38 in.) (Bipolar 4 Lead Wires)

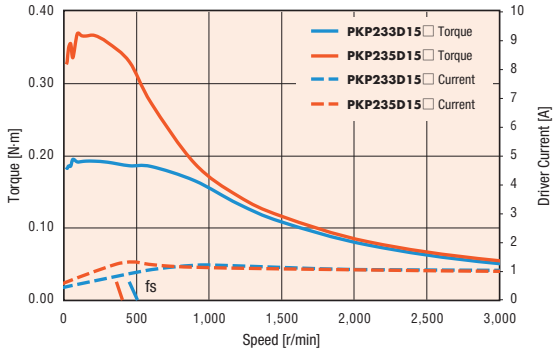
Specifications

Product Name	Maximum Holding Torque N·m (oz-in)	Rotor Inertia J: kg·m^2 (oz-in^2)	Rated Current A/Phase	Voltage VDC	Winding Resistance Ω/Phase	Inductance mH/Phase	Basic Step Angle	Recommended Driver Product Name
PKP233D15□	0.2 (28)	24×10^{-7} (0.131)	1.5	2.43	1.62	1.5	1.8°	**CVD215BR-K**
PKP233D23□			2.3	1.56	0.68	0.67		**CVD223BR-K**
PKP235D15□	0.37 (52)	50×10^{-7} (0.27)	1.5	3.6	2.4	2.6		**CVD215BR-K**
PKP235D23□			2.3	2.23	0.97	1.2		**CVD223BR-K**

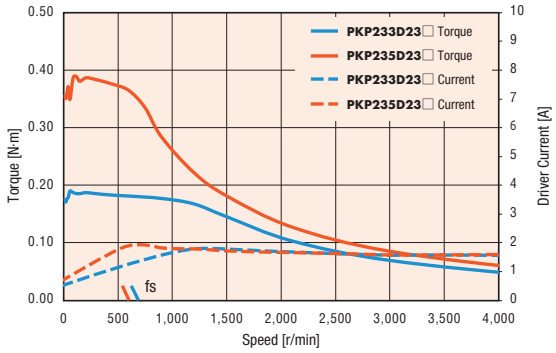
● The box □ in the product name indicates the shaft **A** (single shaft) or **B** (double shaft).

Speed – Torque Characteristics (Reference Values) fs: Max. Starting Frequency

PKP233D15/PKP235D15



PKP233D23/PKP235D23



Note

● Data for the speed – torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. Be sure to keep the temperature of the motor case under 100°C (212°F).

● Set the current of the driver so that it does not exceed the rated current of the motor.

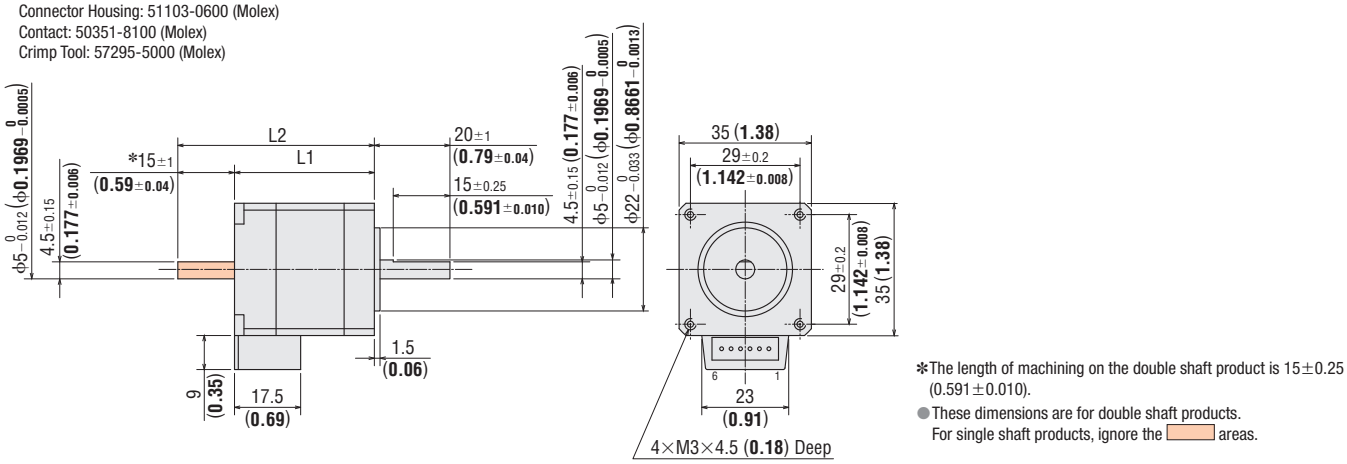
Dimensions Unit = mm (in.)

Motor

2D & 3D CAD

Product Name	L1	L2	Mass kg (lb.)	2D CAD
PKP233D15A	37 (1.46)	–	0.18 (0.4)	B983
PKP233D15B		52 (2.05)		
PKP233D23A		–		B1111
PKP233D23B		52 (2.05)		
PKP235D15A	52 (2.05)	–	0.285 (0.63)	B984
PKP235D15B		67 (2.67)		
PKP235D23A		–		B1112
PKP235D23B		67 (2.67)		

● Applicable Connector
Connector Housing: 51103-0600 (Molex)
Contact: 50351-8100 (Molex)
Crimp Tool: 57295-5000 (Molex)



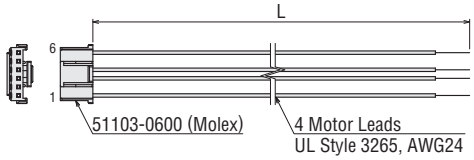
*The length of machining on the double shaft product is 15±0.25 (0.591±0.010).

● These dimensions are for double shaft products.
For single shaft products, ignore the ▭ areas.

Connection Cable (Sold separately)

◇Motor Connection Cable

Product Name	Length L [m (ft.)]
LC2B06B	0.6 (2)
LC2B10B	1 (3.3)



Standard Type

Frame Size 42 mm (1.65 in.) (Bipolar 4 Lead Wires)

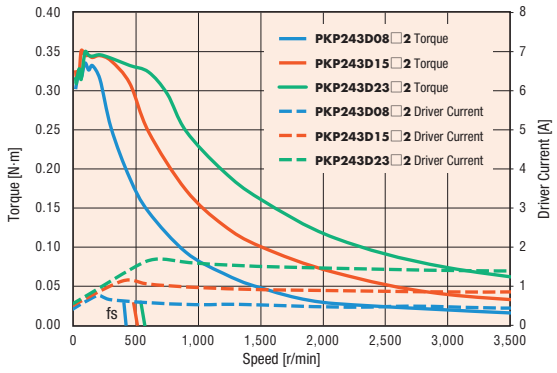
Specifications

Product Name	Maximum Holding Torque N·m (oz-in)	Rotor Inertia J: kg·m^2 (oz-in^2)	Rated Current A/Phase	Voltage VDC	Winding Resistance Ω/Phase	Inductance mH/Phase	Basic Step Angle	Recommended Driver Product Name
PKP243D08□2	0.35 (49)	36×10^{-7} (0.197)	0.85	4.6	5.4	10	1.8°	**CVD223FBR-K**
PKP243D15□2			1.5	2.7	1.8	3.3		
PKP243D23□2			2.3	1.8	0.78	1.4		
PKP244D08□2	0.48 (68)	54×10^{-7} (0.3)	0.85	5.7	6.7	14		
PKP244D15□2			1.5	3.2	2.1	4.4		
PKP244D23□2			2.3	2.1	0.93	1.9		
PKP245D08□2	0.66 (93)	73×10^{-7} (0.4)	0.85	6	7.1	16		
PKP245D15□2			1.5	3.3	2.2	5.3		
PKP245D23□2			2.3	2.3	1	2.2		
PKP246D15□2	0.99 (140)	110×10^{-7} (0.6)	1.5	4.4	2.9	7.9		
PKP246D23□2			2.3	3.2	1.4	3.3		

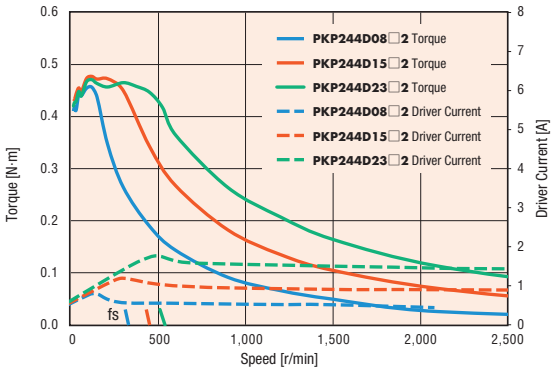
● The box □ in the product name indicates the shaft **A** (single shaft) or **B** (double shaft).

Speed – Torque Characteristics (Reference Values) fs: Max. Starting Frequency

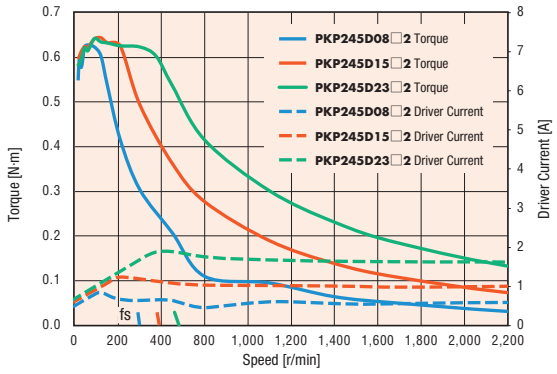
PKP243



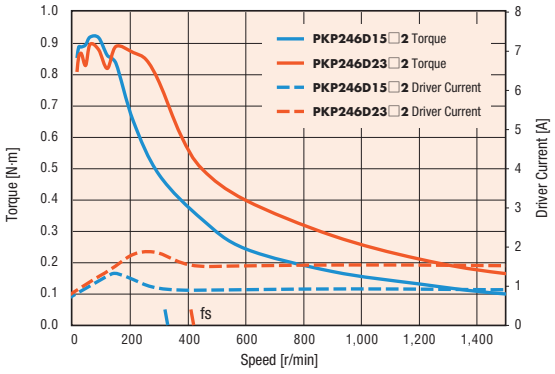
PKP244



PKP245



PKP246



Note

● Data for the speed – torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. Be sure to keep the temperature of the motor case under 100°C (212°F).

● Set the current of the driver so that it does not exceed the rated current of the motor.

Dimensions Unit: mm (in.)

Motor

2D & 3D CAD

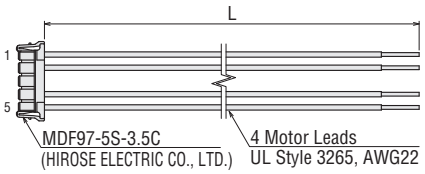
Product Name	L1	L2	Mass kg (lb.)	2D CAD
PKP243D08A2	33 (1.30)	–	0.23 (0.51)	B1260
PKP243D08B2		48 (1.89)		
PKP243D15A2		–		
PKP243D15B2		48 (1.89)		
PKP243D23A2		–		
PKP243D23B2		48 (1.89)		
PKP244D08A2	39 (1.54)	–	0.3 (0.66)	B1261
PKP244D08B2		54 (2.13)		
PKP244D15A2		–		
PKP244D15B2		54 (2.13)		
PKP244D23A2		–		
PKP244D23B2		54 (2.13)		
PKP245D08A2	47 (1.85)	–	0.37 (0.81)	B1262
PKP245D08B2		62 (2.44)		
PKP245D15A2		–		
PKP245D15B2		62 (2.44)		
PKP245D23A2		–		
PKP245D23B2		62 (2.44)		
PKP246D15A2	59 (2.32)	–	0.5 (1.1)	B1263
PKP246D15B2		74 (2.91)		
PKP246D23A2		–		
PKP246D23B2		74 (2.91)		

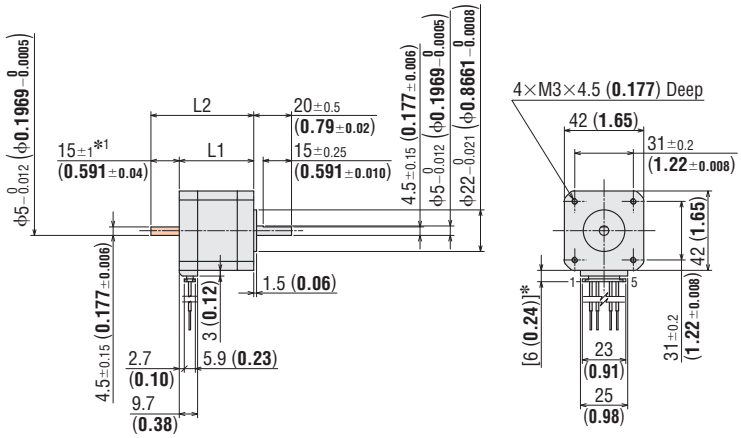
● Applicable Connector
Connector Housing: MDF97-5S-3.5C (HIROSE ELECTRIC CO., LTD.)
Contact: MDF97-22SC (HIROSE ELECTRIC CO., LTD.)
Crimp Tool: HT801/MDF97-22S (HIROSE ELECTRIC CO., LTD.)

Connection Cables (Sold separately)

◇Motor Connection Cable

Product Name	Length L [m (ft.)]
LC2B06E	0.6 (2)
LC2B10E	1 (3.3)





*1 The length of machining on the double shaft product is 15±0.25 (0.591±0.010).
*2 With connection cable
● These dimensions are for double shaft products. For single shaft products, ignore the areas.

Standard Type

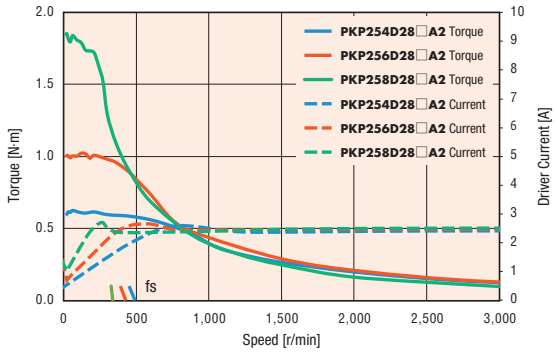
Frame Size 50 mm (1.97 in.) (Bipolar 4 Lead Wires)

Specifications

Product Name	Maximum Holding Torque N·m (oz-in)	Rotor Inertia J: kg·m^2 (oz-in^2)	Rated Current A/Phase	Voltage VDC	Winding Resistance Ω/Phase	Inductance mH/Phase	Basic Step Angle	Recommended Driver Product Name
PKP254D28□A2	0.63 (89)	120×10^{-7} (0.66)	2.8	1.5	0.55	1.1	1.8°	**CVD228BR-K**
PKP256D28□A2	1.08 (153)	220×10^{-7} (1.20)		2	0.7	1.6		
PKP258D28□A2	1.99 (280)	450×10^{-7} (2.5)		3.1	1.1	2.8		

● The box □ in the product name indicates the shaft **A** (single shaft) or **B** (double shaft).

Speed – Torque Characteristics (Reference Values) fs: Max. Starting Frequency



Note

● Data for the speed – torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. Be sure to keep the temperature of the motor case under 100℃ (212℉).

● Set the current of the driver so that it does not exceed the rated current of the motor.

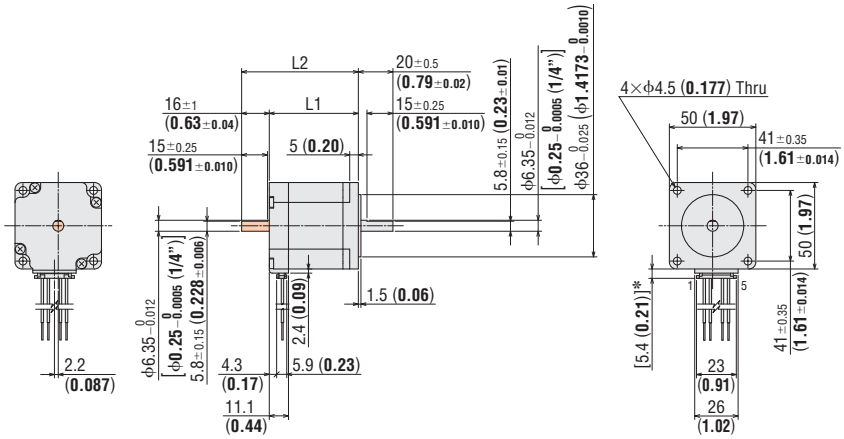
Dimensions Unit: mm (in.)

Motor

2D & 3D CAD

Product Name	L1	L2	Mass kg (lb.)	2D CAD
PKP254D28AA2	39 (1.54)	–	0.37 (0.81)	B1452
PKP254D28BA2		55 (2.17)		
PKP256D28AA2	51.5 (2.03)	–	0.54 (1.19)	B1453
PKP256D28BA2		67.5 (2.66)		
PKP258D28AA2	81 (3.19)	–	0.93 (2.0)	B1454
PKP258D28BA2		97 (3.82)		

● Applicable Connector
Connector Housing: MDF97-5S-3.5C (HIROSE ELECTRIC CO., LTD.)
Contact: MDF97-22SC (HIROSE ELECTRIC CO., LTD.)
Crimp Tool: HT801/MDF97-22S (HIROSE ELECTRIC CO., LTD.)



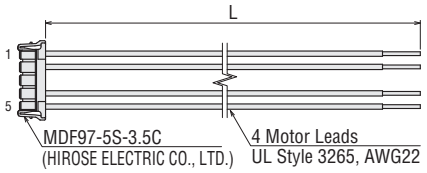
*With connection cable

● These dimensions are for double shaft products.
For single shaft products, ignore the ▭ areas.

Connection Cables (Sold separately)

◇Motor Connection Cable

Product Name	Length L [m (ft.)]
LC2B06E	0.6 (2)
LC2B10E	1 (3.3)



Standard Type

Frame Size 56.4 mm (2.22 in.) (Bipolar 4 Lead Wires)

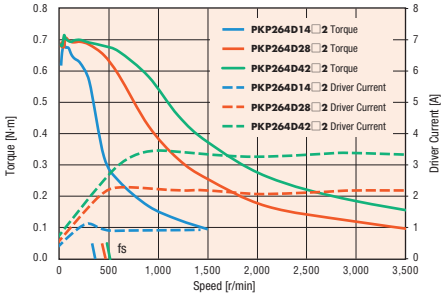
Specifications

Product Name	Maximum Holding Torque N·m (oz-in)	Rotor Inertia J: kg·m^2 (oz-in^2)	Rated Current A/Phase	Voltage VDC	Winding Resistance Ω/Phase	Inductance mH/Phase	Basic Step Angle	Recommended Driver Product Name
PKP264D14□2	0.74 (105)	140×10^{-7} (0.77)	1.4	2.9	2.1	6	1.8°	**CVD228BR-K**
PKP264D28□2			2.8	1.6	0.57	1.5		
PKP264D42□2			4.2	1	0.24	0.65		**CVD242BR-K**
PKP266D14□2	1.4 (198)	270×10^{-7} (1.48)	1.4	4.6	3.3	12		**CVD228BR-K**
PKP266D28□2			2.8	2.4	0.86	2.9		
PKP266D42□2			4.2	1.6	0.38	1.3		**CVD242BR-K**
PKP268D14□2	2.5 (350)	500×10^{-7} (2.7)	1.4	6.6	4.7	18		**CVD228BR-K**
PKP268D28□2			2.8	3.4	1.2	4.6		
PKP268D42□2			4.2	2.2	0.53	2		**CVD242BR-K**

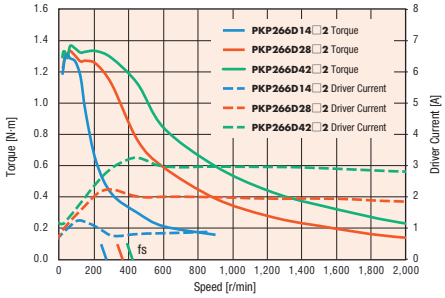
● The box □ in the product name indicates the shaft **A** (single shaft) or **B** (double shaft).

Speed – Torque Characteristics (Reference Values) fs: Max. Starting Frequency

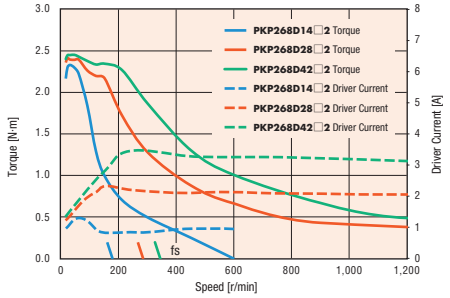
PKP264



PKP266



PKP268



Note

● Data for the speed – torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. Be sure to keep the temperature of the motor case under 100°C (212°F).

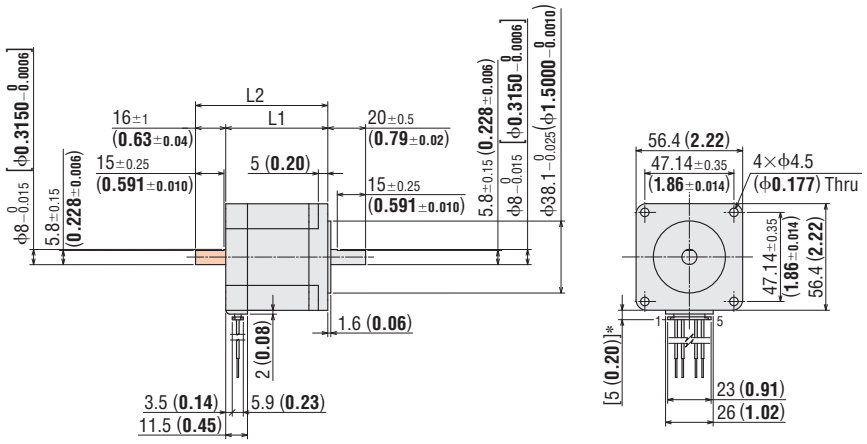
● Set the current of the driver so that it does not exceed the rated current of the motor.

Dimensions Unit: mm (in.)

Motor

2D & 3D CAD

Product Name	L1	L2	Mass kg (lb.)	2D CAD
PKP264D14A2	39 (1.54)	–	0.45 (0.99)	B1357
PKP264D14B2		62 (2.44)		
PKP264D28A2		–		
PKP264D28B2		62 (2.44)		
PKP264D42A2		–		
PKP264D42B2		62 (2.44)		
PKP266D14A2	54 (2.13)	–	0.7 (1.54)	B1358
PKP266D14B2		77 (3.03)		
PKP266D28A2		–		
PKP266D28B2		77 (3.03)		
PKP266D42A2		–		
PKP266D42B2		77 (3.03)		
PKP268D14A2	76 (2.99)	–	1.1 (2.4)	B1251
PKP268D14B2		99 (3.90)		
PKP268D28A2		–		
PKP268D28B2		99 (3.90)		
PKP268D42A2		–		
PKP268D42B2		99 (3.90)		



*With connection cable

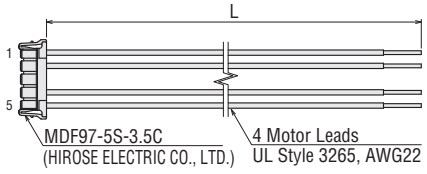
● These dimensions are for double shaft products.
For single shaft products, ignore the ▭ areas.

● Applicable Connector
Connector Housing: MDF97-5S-3.5C (HIROSE ELECTRIC CO., LTD.)
Contact: MDF97-22SC (HIROSE ELECTRIC CO., LTD.)
Crimp Tool: HT801/MDF97-22S (HIROSE ELECTRIC CO., LTD.)

Connection Cables (Sold separately)

◇Motor Connection Cable

Product Name	Length L [m (ft.)]
LC2B06E	0.6 (2)
LC2B10E	1 (3.3)



Standard Type

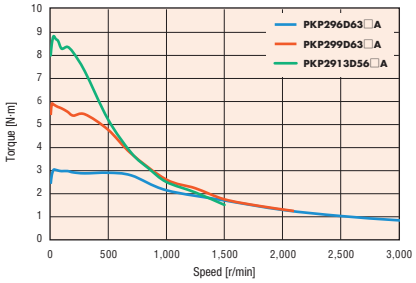
Frame Size 85 mm (3.35 in.) (Bipolar 4 Lead Wires)

Specifications

Product Name	Maximum Holding Torque N·m (oz-in)	Rotor Inertia J: kg·m^2 (oz-in^2)	Rated Current A/Phase	Voltage VDC	Winding Resistance Ω/Phase	Inductance mH/Phase	Basic Step Angle	Recommended Driver Product Name
PKP296D63□A	3.3 (29)	1100×10^{-7} (6)	6.3	1.4	0.23	1.6	1.8°	–
PKP299D63□A	6.4 (56)	2200×10^{-7} (12)	6.3	2	0.32	2.6		–
PKP2913D56□A	9.5 (84)	3400×10^{-7} (18.6)	5.6	2.6	0.47	4.4		–

● The box □ in the product name indicates the shaft **A** (single shaft) or **B** (double shaft).

Speed – Torque Characteristics (Reference Values) fs: Max. Starting Frequency



Note

● Data for the speed – torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. Be sure to keep the motor case temperature at 100°C (212°F) max.

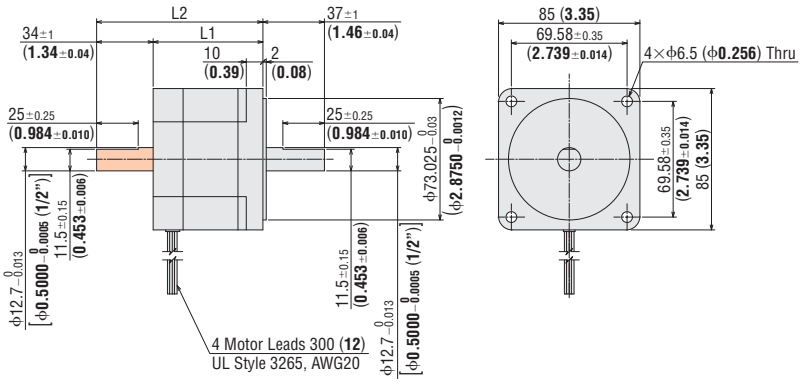
● Set the current of the driver so that it does not exceed the rated current of the motor.

Dimensions Unit = mm (in.)

Motor

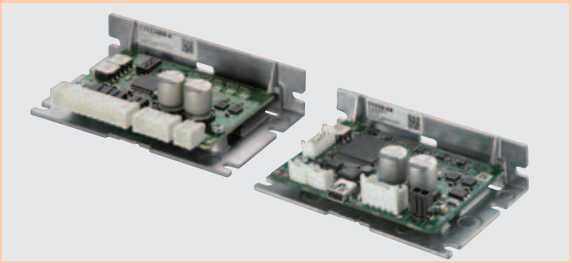
2D & 3D CAD

Product Name	L1	L2	Mass kg (lb.)	2D CAD
PKP296D63AA	66 (2.60)	–	1.8 (4.0)	B1240
PKP296D63BA		100 (3.94)		
PKP299D63AA	96 (3.78)	–	2.9 (6.4)	B1241
PKP299D63BA		130 (5.12)		
PKP2913D56AA	126 (4.96)	–	4 (8.8)	B1242
PKP2913D56BA		160 (6.30)		



● These dimensions are for double shaft motors.
For single shaft motors, ignore the shaded areas.

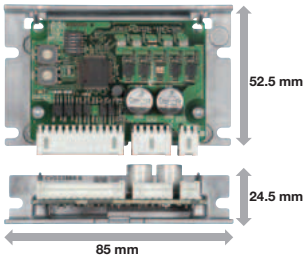
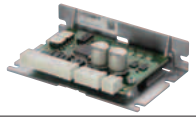
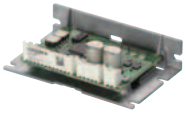
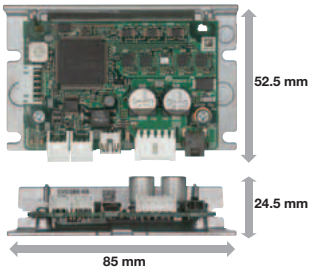
CVD Series Driver for 2-Phase/ 5-Phase Stepper Motors



These are DC power supply input drivers for stepper motors. The bipolar/unipolar driver for 2-phase stepper motors and the driver for 5-phase stepper motors are available.
Using the microstep drive function for a low-vibration driver reduces vibration and noise.

Features and Types

Bipolar Driver for 2-Phase Stepper Motor
Driver for 5-Phase Stepper Motor
CVD Series

Driver Type		External View	Overview	Driver Installation Direction
●**CVD** Series Pulse Input Type  ・Mass 20 g to 70 g (The value differs according to the driver type)	Right Angle with Installation Plate	The connector points outward. 	・Can be controlled depending on the positioning module (pulse generator) ・Running current can be easily set with the digital switch	・Horizontal Installation ・Vertical Installation
	With Installation Plate	The connector points upward. 		
	Without Installation Plate	The connector points upward. 		
●**CVD** Series RS-485 Communication Type  ・Mass 65 g	Right Angle with Installation Plate	The connector points outward. 	・Compatible with RS-485 communication (Modbus Protocol) ・Easy overwriting of data and multi-axis settings ・Reduced wiring of equipment and remote monitoring by host system possible ・Compatible with **MEXE02** support software	
	With Installation Plate	The connector points upward. 		

Note
●The driver cannot be shared by both a 2-phase stepper motor and 5-phase stepper motor. Each must use its respective dedicated driver.

For 2-Phase/5-Phase Stepper Motors
Bipolar Driver
CVD Series **S** Type

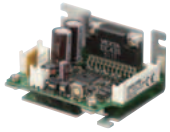

・SPI Communication-Compatible ・Pulse Input-Compatible

This is a compact board driver.

For 5-Phase Stepper Motors
Driver
CVD Series **SC** Type

This driver can easily control speed by sensing the speed control motor.

For 2-Phase Stepper Motors
Unipolar Driver



The Microstep Drive drivers are compact and lightweight.

The **CVD** Series drivers, developed exclusively for the **PKP** Series stepper motors, enable increased performance and functionality.

Features of the **CVD** Series

Industry's Top, Compact, High Performance Driver

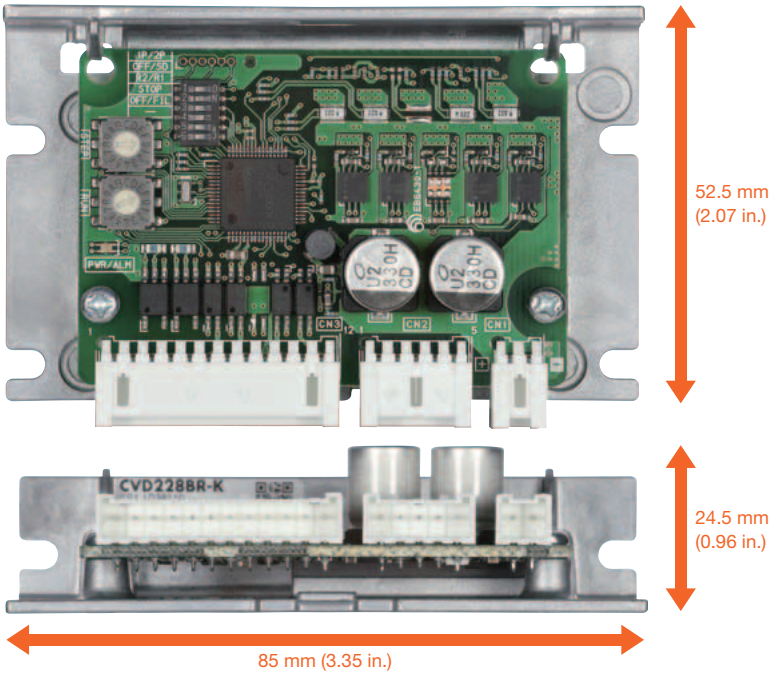
These compact and lightweight drivers contribute to space savings. The 2-phase and 5-phase drivers are identical in size, installation and I/O connectors. This allows for the selection and evaluation of 2-phase or 5-phase drivers based on the required specifications.

- A 2-phase driver and 5-phase driver cannot be used together. Different phases require dedicated drivers.

Actual Size

Mass 20 g (0.71 oz) to 70 g (2.47 oz)

(Differs according to the driver type.)



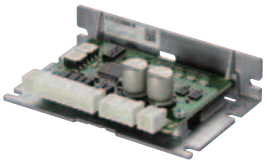
Select Drivers by Mounting Method

Drivers with different shapes and connector locations are available to match the mounting method.

- Available for both 2-phase and 5-phase.

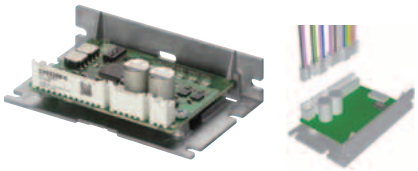
Right Angle Type with Installation Plate

The connector points outward.



With Installation Plate

The connector points upward.

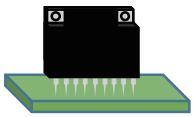


Board-Mount S Type

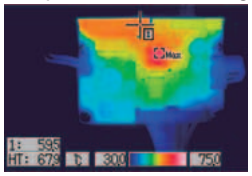
This is a board-mount type driver.

High-Efficiency Design

The **CVD** Series provides increased torque by increasing the output current compared to conventional products.
In order to allow the increase of output current, the design incorporates measures to reduce the amount of heat generated.



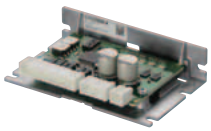
Conventional product or custom-built driver



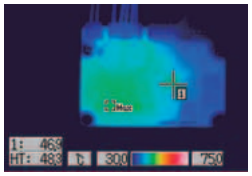
Thermographic driver heat distribution when operated under identical conditions

Lower Heat Generation

Increased Torque

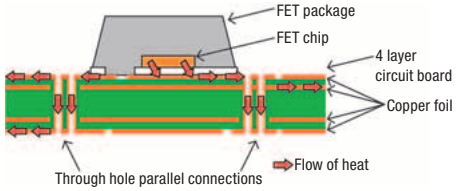


CVD Driver

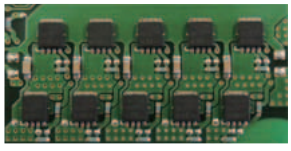


Thermographic driver heat distribution when operated under identical conditions

- Adoption of low-loss FET
- Pattern design that accounts of heat dissipation to the circuit board
- Adoption of FET with good heat dissipation properties



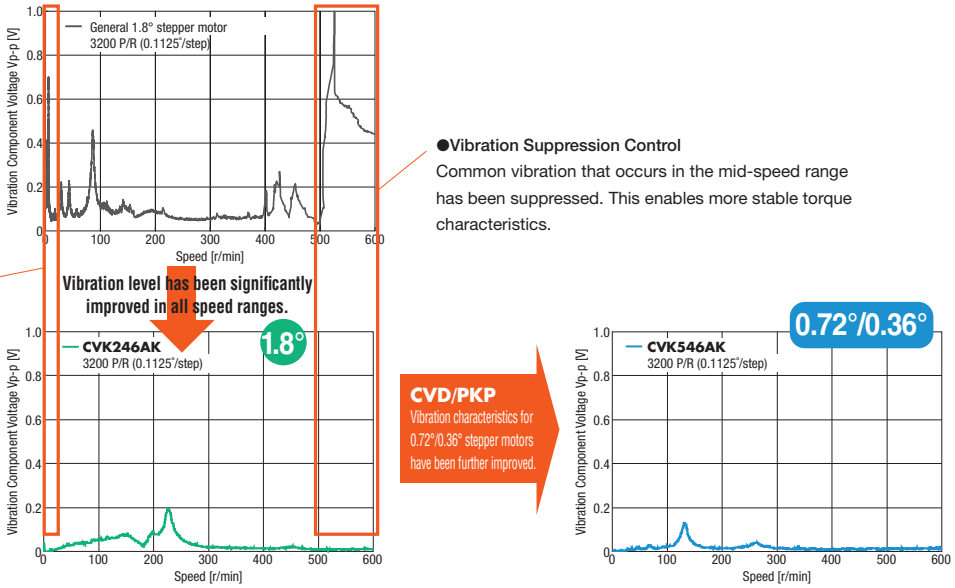
Cross section schematic view of FET and printed circuit board



Actual printed circuit board pattern

Low Vibration with Full-Time Microstepping

Low vibration and noise reduction have been achieved across all speed ranges by significantly improving the vibration level with the use of a fully digital-controlled full-time microstep driver. The **CVD** 5 phase driver and motor has further improved vibration characteristic.



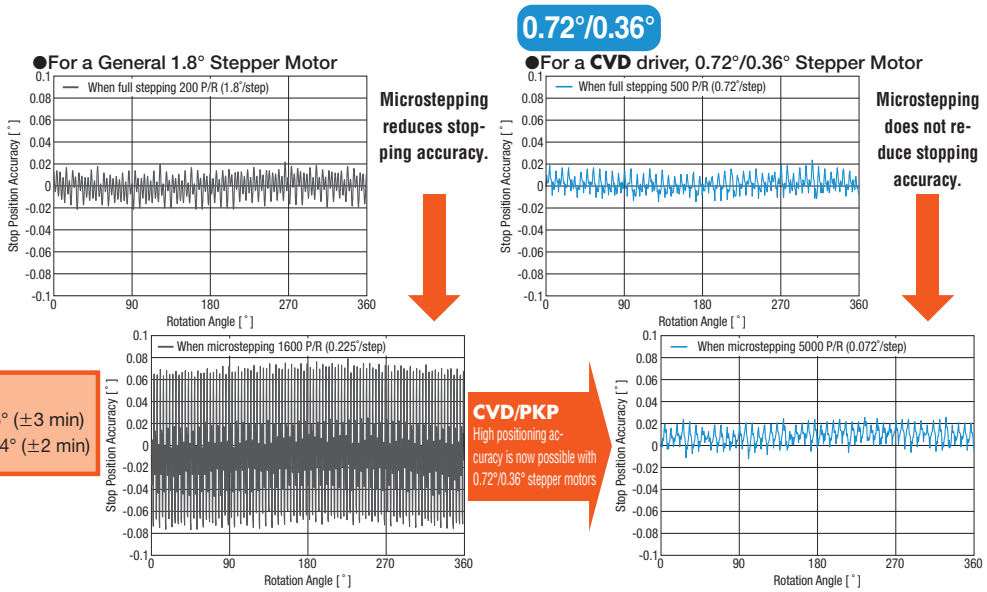
●Vibration Suppression Control
Common vibration that occurs in the mid-speed range has been suppressed. This enables more stable torque characteristics.

●Reduced Step Vibration
The new smooth drive control with higher current control increases the basic step angle to a maximum resolution of 2048. As a result, a reduction in step vibration in the low-speed range is achieved.

For High Positioning Accuracy Use a 0.72°/0.36° Stepper Motor

In general, stopping accuracy tends to be lower during microstep operation* than full step operation and this effect is more noticeable in a 1.8° motor. In this situation, using a **CVD** 5 phase driver and motor enables a higher positioning accuracy.

*Max. resolution 125000 P/R



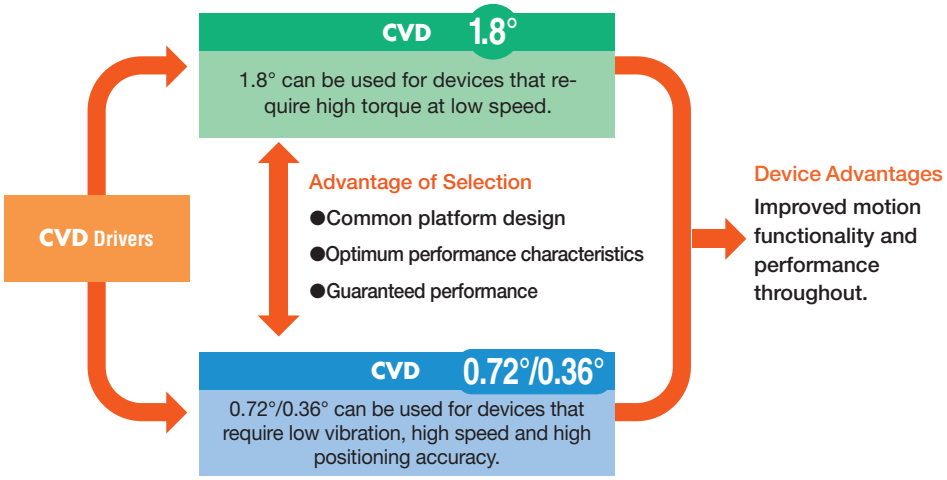
●Stopping Accuracy

0.72° stepper motor standard type	±0.05° (±3 min)
0.36° stepper motor high-resolution type	±0.034° (±2 min)

There's a Wide Choice with 1.8° and 0.72°/0.36° Stepper Motors

The size, installation and I/O connectors for the **CVD** drivers and 1.8° or 0.72°/0.36° motors are the same. Because of this, it is easy to evaluate and select the proper package for the requirement.

*The driver for a 1.8° stepper motor and the driver for a 0.72°/0.36° stepper motor are not interchangeable. Each motor type has a dedicated driver. Use the Step Angle Setting Switch to set the proper resolution without changing your controller's pulse output.

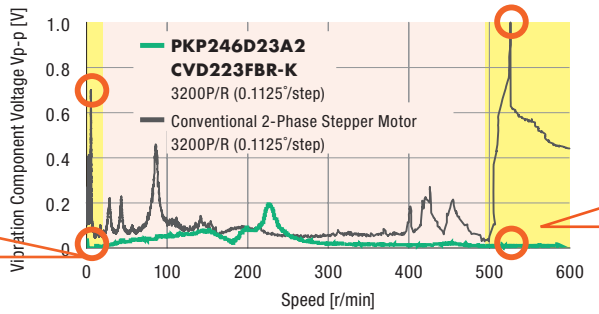


Low Vibration Achieved by Full-Time Microstep Drive

The **CVD** Series is a fully digital control driver. Currents are controlled digitally and calculated by a high-performance CPU.
The waveform of the current for each phase is changed from the conventional trapezoidal to sinusoidal, which allows for micro-step driving in all speed regions, and has reduced vibration even more.

Reduction in Step Vibration

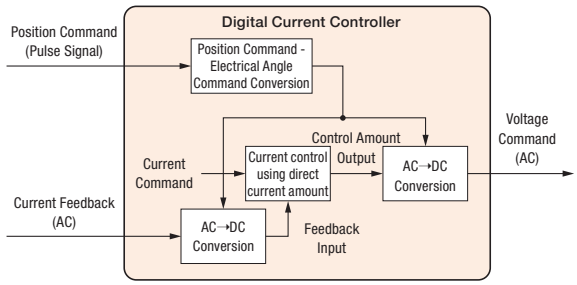
The new smooth drive control with its increased current control resolution allows the basic step angle to be divided into a max. of 2048 microstep angles. This has greatly reduced the step vibration at low speeds.



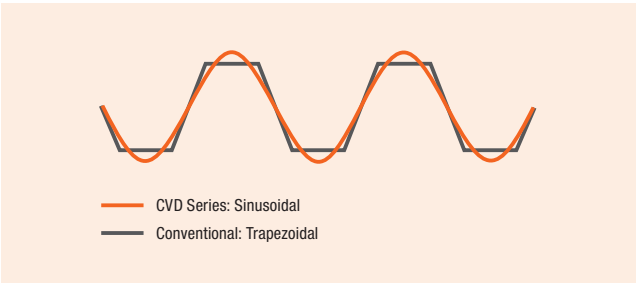
Vibration Suppression Control

Vibration in the medium speed regions, which generally occurs regardless of the number of phases and the drive system type, has been suppressed. This stabilizes the torque characteristics and allows the motor to operate at high speeds without mis-stepping.

■ Digital Current Controller Mechanism



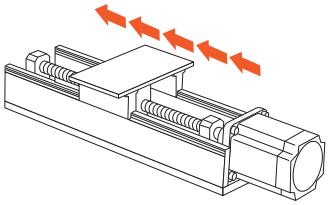
■ Illustration of Motor Current Waveform

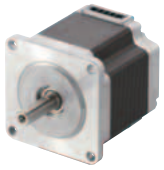


A motor that Matches the Desired Specifications can be Selected from a Wide Range of Speed and Torque Variations

Example — Inching Operation Over Short Distances

For applications that require rapid acceleration and deceleration,
2-phase stepper motors with high torque at low speeds are recommended.

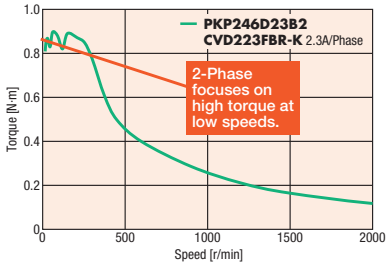




2-Phase Stepper Motor
PKP Series

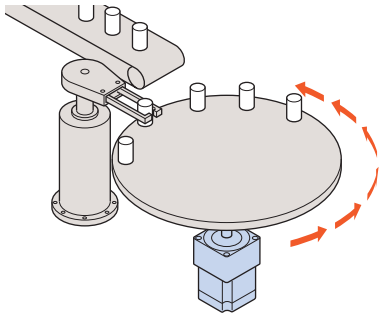
2-Phase Driver
CVD Series

■ High torque at low speeds

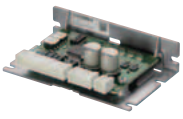


Example — Inching Operation Over Short Distances with Large Amount of Inertia

For applications that require rapid acceleration and deceleration with large amounts of inertia, 2-phase stepper motors with geared motors are recommended

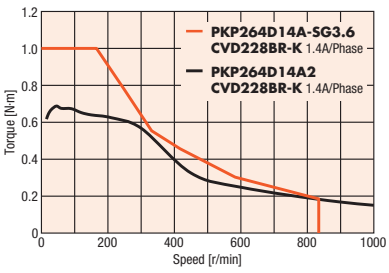


2-Phase Stepper Motor
PKP Series
SH Geared Type



2-Phase Driver
CVD Series

■ Comparison of Speed – Torque Characteristics



More powerful 5-phase **RK**Ⅱ Series stepper motors (AC input type) are also available.

αSTEP AZ Series Hybrid Step-Servo Motor

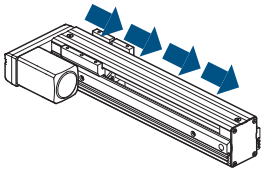
What is αSTEP?

αSTEP is a "hybrid" stepper motor-based motor & driver that together, performs independent control which combines the advantages of "open loop" and "closed loop" performance. In addition to high-accuracy positioning and speed control, it can perform control that restricts the motor's generated torque to a user set value (such as push-motion operation).

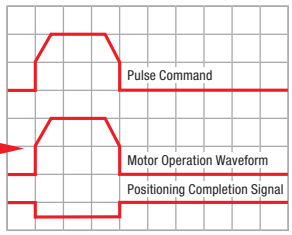
Normal Condition (Positioning deviation is less than ±1.8°)

Motor is controlled in open loop mode like a stepper motor.

- The tuning-free feature allows for high accuracy and high responsiveness to commands
- Hunting-free (Complete stop)
- Constant monitoring of the motor's status



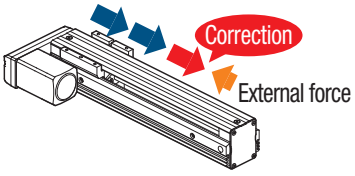
No time lag between command and actual operation



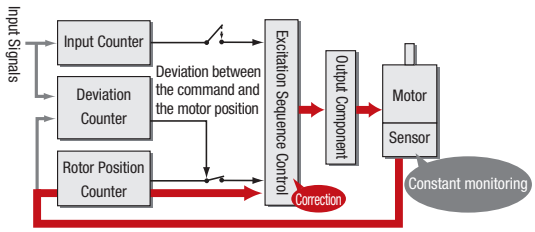
Overload Condition (Positioning deviation is ±1.8° min.)

The closed loop mode is engaged to maintain the positioning operation.

Reliability as a result of monitoring and correction of positions and speed



●Closed Loop Control System

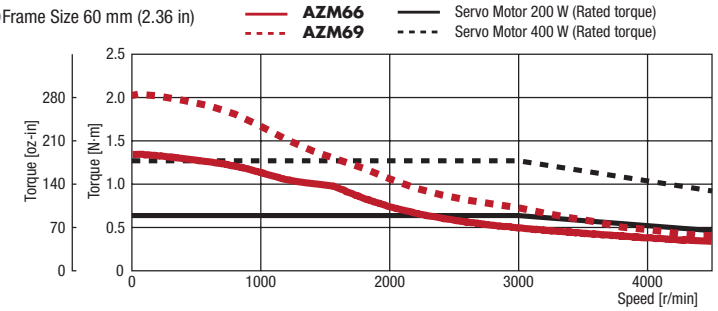


Performance

"Rated output" is not listed because αSTEP has no "rated speed." Refer to the graph on the right to compare rated torque of αSTEP to watts of servo motor's rated output torque.

- ●Generates high torque in the mid-to-low speed range
- ●Excels at frequent starting and stopping operation that requires acceleration/deceleration torque

●Frame Size 60 mm (2.36 in)

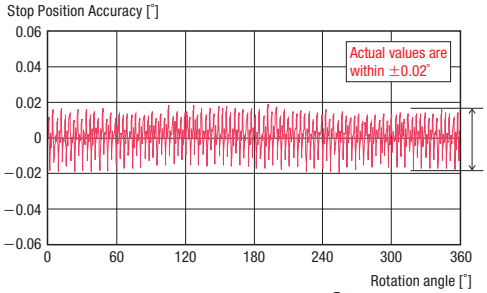


●Data for the speed–torque characteristics is based on Oriental Motor's internal measurement conditions. If the conditions are changed, the characteristics may also change as a result.

Stopping Accuracy

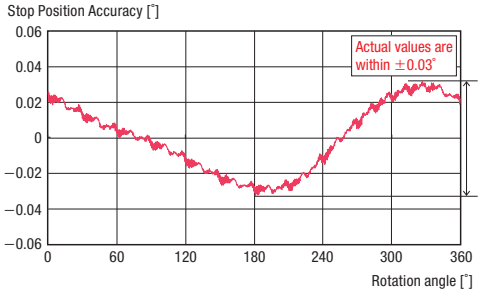
The stopping accuracy of a typical αSTEP is ±0.05° (under no load), which is equivalent to that of servo motors. These graphs show the actual measured stopping accuracies when an αSTEP and an AC servo motor were rotated once.

●Stopping accuracy of αSTEP (Actual measurements)



[Example] When the ball screw lead is 10 mm, the αSTEP stopping accuracy is ±1.4μm and the repetitive positioning accuracy of a common ground ball screw is ±10μm.

●Stopping accuracy of AC servo motor with a common 20-bit encoder (Actual measurements)



The stopping accuracy of an AC servo motor is the encoder resolution ±1 pulse*. The above shows the actual values that result from differences in the encoder's assembly.
*1,048,576 p/rev at 20 bits

Advantages of the **AZ** Series

The **AZ** Series α_{STEP} hybrid control system features absolute sensing using a multiple-rotation mechanical sensor. The system constantly monitors the motors position even during a sudden power off situation.

- **Mechanical-Type Sensor / Multiple-Rotation Absolute System**
  ±900 rotations the driver knows where the motor position is.
  No return to home is necessary.

- **Home Setting Method Improves Return-to-Home Accuracy**
  Home operation does not depend on a sensor sensitivity.

- **No External Sensors or Batteries Required**
  The driver uses the motor sensor to determine rotor position

- **No Hunting / No Gain Tuning**
  Utilizes the high response and mechanical advantage of a Stepper Motor

- **Continues Operation Even with Sudden Load Fluctuations and Sudden Acceleration**
  Runs in normally open loop control. If overloaded, switches to closed loop control.

- **Monitoring Functions**
  Speed, motor, driver temperature, load factor, odometer and much more can easily be monitored.

No External Sensors Required with the **AZ** Series

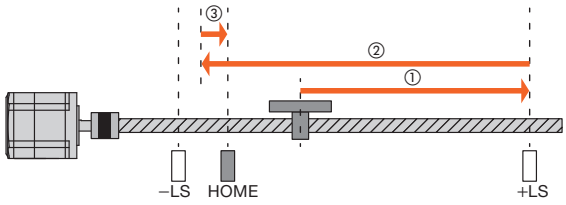
The **AZ** Series driver uses the positioning information managed by the mechanical absolute sensor. The position information can be preserved, even if the power turns off or if the cable between the motor and the drive is disconnected. No battery required.

Shortened Reset Time ① High Speed Return-to-Home

Because return-to-home is possible without using an external sensor, return-to-home can be performed at high speed without taking the sensor sensitivity into account, allowing for a shortened machine cycle.

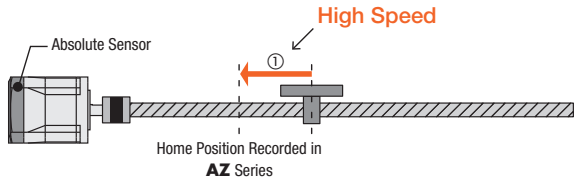
Previous Home Detection for Control Motor

The home position is detected at low speed by detecting the limit sensor (±LS) and home sensor (HOME).



Return-to-Home Operation of AZ Series

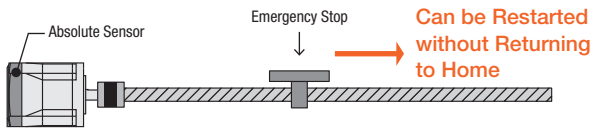
There is no need to detect the limit sensor, and it can travel directly at high speed to the home position recorded by the Absolute Sensor.



Shortened Reset Time ② Return-to-Home is not Necessary

If the power shuts down during a positioning operation, the positioning information is retained. For built-in controller types, positioning operations can restart without performing a return-to-home operation when recovering from an emergency stop of the production line or a blackout.

Built-in Controller Type



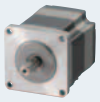
αSTEP AZ Series Step-Servo Motor Overview

AZ Series Product Line

A product line compatible with a variety of equipment, controls and systems is available.

Motor

Standard Type

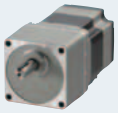


Frame Size 20 mm to 85 mm
(0.79 in. to 3.35 in.)

TS Geared Type

Spur gear mechanism

Backlash-free
High-speed Operation

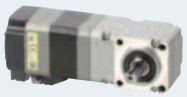


Frame Size 42 mm to 90 mm
(1.65 in. to 3.54 in.)

Right-Angle FC Geared Type

Face gear mechanism

Backlash-free
Space Saving

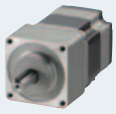


Frame Size 42 mm, 60 mm
(1.65 in., 2.36 in.)

PS Geared Type

Planetary gear mechanism

Backlash-free
Space Saving



Frame Size 28 mm to 90 mm
(1.10 in. to 3.54 in.)

PLE Geared Type

Planetary gear mechanism

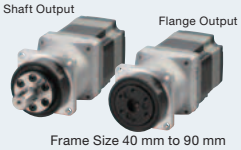
Backlash-free
Space Saving

Frame Size 42 mm to 90 mm
(1.65 in. to 3.54 in.)

HPG Geared Type

Harmonic Planetary®

Backlash-free
Space Saving



Frame Size 40 mm to 90 mm
(1.57 in. to 3.54 in.)

Harmonic Geared Type

Harmonic Drive®

Non-Backlash
High Torque and High Accuracy

Frame Size 30 mm to 90 mm
(1.18 in. to 3.54 in.)

Driver

Network Compatible Drivers

FA Network Control

Drivers compatible with a variety of networks, including EtherNet/IP™, EtherCAT, SSCNET Ⅲ/H and MECHATROLINK-Ⅲ are available.

AC Input
DC Input

AC Input
DC Input

DC Input

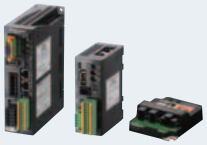
Built-in Controller Type

FLEX

Set positioning data to the driver (256 points).
FA Network control is possible through
the use of a network converter (sold separately).

I/O control
or
Modbus control

Network Converters
(Sold separately)



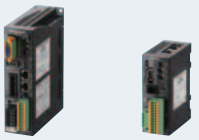
AC Input DC Input DC Input

FLEX is the collective name for products that support I/O control, Modbus (RTU) control, and FA network control via network converters.

RS-485 Communication Pulse Input Type

Pulse Signal Control

The motor position, speed, torque, alarms and temperature can be monitored via RS-485 communication.



AC Input DC Input

Pulse Input Type

Pulse Signal Control

Controls the motor using a positioning module (pulse generator).

AC Input DC Input

Product Line of Linear & Rotary Actuators Equipped with **AZ** Series

Wiring, control, and maintenance parts have been standardized, since the same motors and drivers are equipped, which reduces the startup time and simplifies operation.

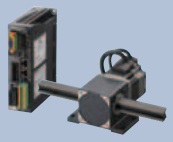
Electric Linear Slides
EZS Series
- Simple dustproofing function, cleanroom-compatible

Electric Cylinders
EAC Series

Hollow Rotary Actuators
DGII Series
- The motor is integrated with a large-diameter hollow rotary table
- High power and high rigidity

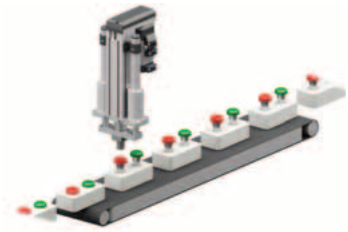
Compact Electric Cylinders
DR Series
DRS2 Series
- Compact actuator that integrates the motor and ball screw
- Optimal for minute feeding with linear motion and high positioning accuracy

Rack-and-Pinion
L Series
- A compact and strong linear motion mechanism
- Long stroke
- High transportable mass

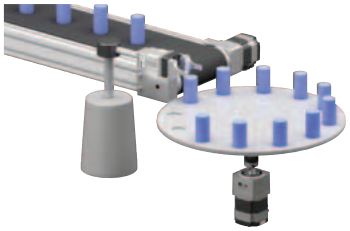


Electric Gripper
EH Series
- Provides delicate grip
- Compact and lightweight

Application Examples

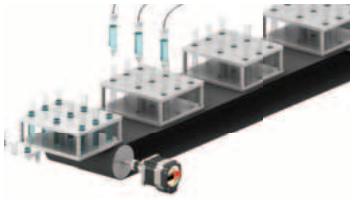


Push-motion operation



Transfer of large inertial load

Syringe/Dispenser



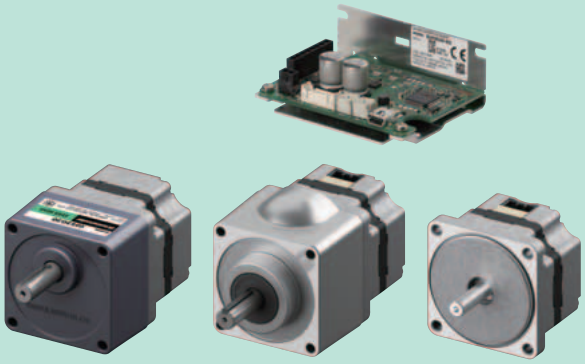
Frequent repetitive starting and stopping

Brushless Motors DC Input

BLH Series

- Power Supply Voltage 24 VDC
- Output 15 W (1/50 HP)/30 W (1/25 HP)/ 50 W (1/15 HP)/100 W (1/8 HP)
- Speed Control Range 100 ～ 3000 r/min
- Speed Regulation ±0.5%
- Compact Driver
  W72 mm (2.83 in.) × D55 mm (2.17 in.) × H27 mm (1.06 in.), M 46 g (0.10 lbs)*

*For 15 ～ 50 W (1/50 ～ 1/15 HP)



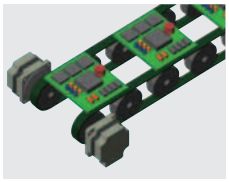
Increase Equipment Value with the Optimal Control of Compact Drivers

- Applies to digital setting type and RS-485 communication type.

Speed Matching and Little Speed Fluctuation with Digital Setting

Setting in 1 r/min units is possible.

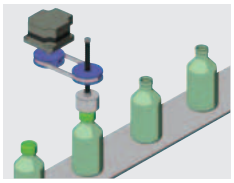
Optimized with good speed repeatability and dual-axis synchronous operation.



Dual-Axis Conveyor Belt

Torque Limiting Function

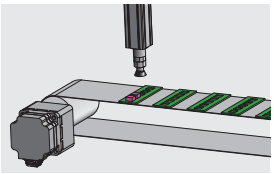
Torque adjustment and tightening torque adjustment is possible.



Cap Tightening

Load-Holding Function

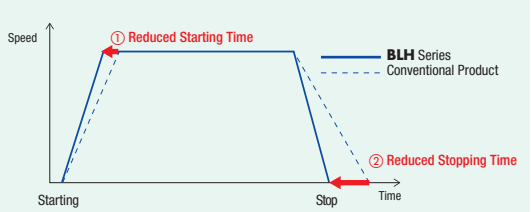
Load is held in place by an electromagnetic holding brake.



Holds Conveyor Belt

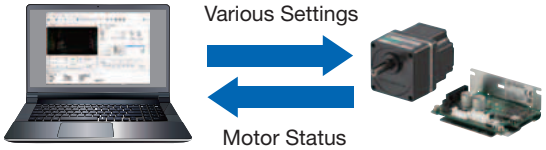
Reduced Equipment Tact Time

Reduced equipment tact time can be achieved by utilizing maximum instantaneous torque and deceleration time settings to reduce stopping time.



Safe Startup and Maintenance with MEXE02 Support Software

- Applies to digital setting type and RS-485 communication type.
- The Support Software **MEXE02** can be downloaded free of charge from the Oriental Motor website.

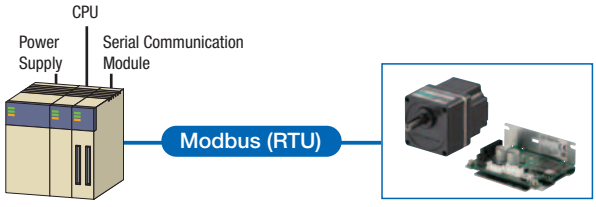


Support Software
MEXE02

Common Settings and Uniform Management with Network Communication

- Applies to RS-485 communication type.
- Can be Controlled from a PLC or Touch Screen

Modbus (RTU) Control



Features of Brushless Motors

Brushless motors do not have the brushes that are a disadvantage of DC motors, so there is little noise and they are maintenance-free. Because they use permanent magnets, these motors are smaller than AC motors and are able to achieve higher output and higher efficiency.

Wide Speed Control Range

Brushless motors have a wider speed control range than AC speed control motors and inverters. They are suited to applications that require a constant torque from low speed to high speed.

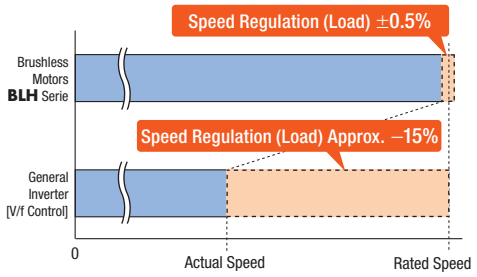
Product Group	Speed Control Range*	Speed Ratio
Brushless Motors (For **BLH** Series)	100～3000 r/min	1:30
Inverter-Controlled Three-Phase Induction Motor	200～2400 r/min	1:12
AC Speed Control Motor	50 Hz:90～1400 r/min 60 Hz:90～1600 r/min	1:15 1:17

*The speed control range varies depending on the model.

Stable Speed Control

Brushless motors constantly monitor the feedback signals from the motor, compare it with the setting speed, and adjust the applied voltage. For this reason, even if the load changes, stable rotation is performed from low speed to high speed.

● Comparison of Speed Variation (Reference Values)



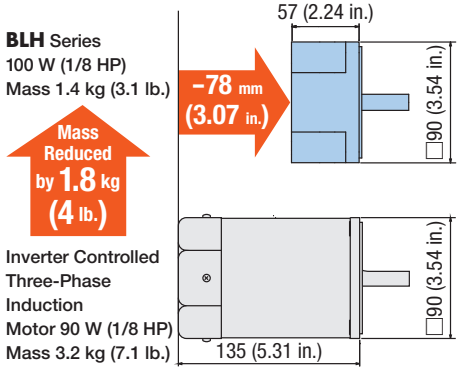
Speed regulation (Iwith respect to the load) for each model is shown in the table on the right. The level to which the speed changes when the load changes from 0 to the rated torque is shown.

Product Name	Speed Regulation with Respect to the Load	
		Conditions
BMU Series	±0.2%	0～Rated Torque At rated speed
BLE2 Series	±0.2%	
BLE Series	±0.5%	
BXII Series	±0.05%	
BLH Series	±0.5%*	

*The digital setting is ±0.2%.

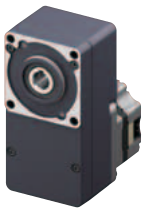
Compact and Lightweight yet Powerful

Brushless motors have slim bodies and provide high power due to permanent magnets being used in the rotor. This contributes to downsizing of equipment.



Motor and Driver System

Geared Type

Product Line	Parallel Shaft Gearhead **GFS** Gears	**CS** Geared Motors*1	Hollow Shaft Flat Gearhead **FR** Gears
External View			
Features	· Wide Range of Gear Ratios · Rated Life of 10,000 Hours*2	· Increased Load-bearing Capacity (Compared to a Parallel Shaft Gearhead) · Center Shaft · Rated Life of 10,000 Hours	· Space Saving, Low Cost · Permissible Torque without Saturation · Rated Life of 10,000 Hours
Motor Output Power	15 W (1/50 HP), 30 W (1/25 HP), 50 W (1/15 HP), 100 W (1/8 HP)	15 W (1/50 HP), 30 W (1/25 HP), 50 W (1/15 HP)	30 W (1/25 HP), 50 W (1/15 HP), 100 W (1/8 HP)
Gear Ratio	5~200*3	5~20	5~200

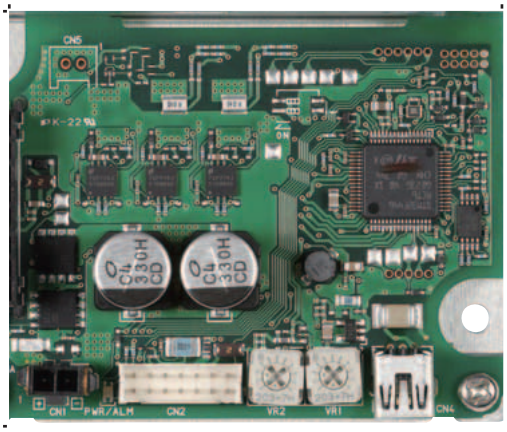
*1 Connector type only
*2 The rated life for 15 W (1/50 HP) is 5,000 hours.
*3 For the connector type, the gear ratio is 5 ~ 100.

Compact and Light Drivers that are Smaller than a Business Card

Actual Size

72 mm (2.83 in.)

55 mm (2.17 in.)



Mass 46 g (0.10 lbs)

• The photo is of 15 W (1/50 HP), 30 W (1/25 HP) and 50 W (1/15 HP) drivers.

3 Selectable Drivers - Their Setting Methods and Functions

Driver Types	Analog Setting Type	Digital Setting Type	RS-485 Communication Type
External View			
Features	Simple Speed Settings with Potentiometer and External Analog Signal	Set from a PC with the **MEXE02** Support Software	Set from Network with Modbus Communication
Output	15 W (1/50 HP)/30 W (1/25 HP)/ 50 W (1/15 HP)/100 W (1/8 HP)	15 W (1/50 HP)/30 W (1/25 HP)/ 50 W (1/15 HP)	15 W (1/50 HP)/30 W (1/25 HP)/ 50 W (1/15 HP)
Speed Control Range	100~3000 r/min	80~3000 r/min	80~3000 r/min

Brushless Motor - Motor Only Lineup

If there are special functions and features that our drivers do not offer, Oriental Motor can supply only the brushless motor. Our motor sizes range from 15 W to 200 W, and come with a variety of gearheads to choose from. If encoder feedback is needed, we can assemble the motor with an encoder from our factory.

Available Lineup

Output	Power Supply	Round Shaft Type	Gearhead Type	Gear Ratio	With Encoder
15 W	24 VDC	•	Parallel	5 / 10 / 15 / 20 / 30 / 50 / 100	–
30 W	24 VDC	•	Parallel / Flat Gearhead	5 / 10 / 15 / 20 / 30 / 50 / 100 / 200	•
50 W	24 VDC	•			•
100 W	24 VDC	•			•
200 W	24 VDC	•			•

Semi-Standard Product

50 W motor with parallel gearhead and encoder

100 W motor with flat gearhead

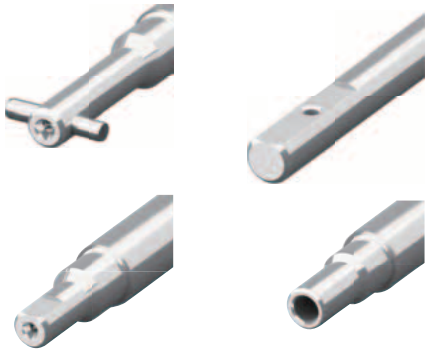
Examples of Encoder Specifications

Resolution	500	1000	2000
Output Circuit Type	Differential		
Output Mode	Incremental		
Output Signal	A phase, B phase	A phase, B phase, Index	
Power Supply Voltage	5 VDC ±10%		
Current	56 mA Typ.		

Value Added Modifications

Oriental Motor offers various types of value adds to match the exact needs of the axis on the machine. Below are some examples. Contact us for more information.

Shaft Modification



Examples
Length / Key Slot / Knotch / Chamfer / Threaded

Cable Assembly

Examples
Length / Twisted Pairs / Connectors / Label / Marking Tie

Examples Of Connectors
Molex / Hirose / JST / TE

Pulley / Gears / Sprocket

Examples
SDP / Gates Unitta / Inhouse

Encoders

Examples
Magnetic Encoders MR Type

Accessories

We offer various types of accessories that are convenient for installation and operation of Oriental Motor products.

For Motors

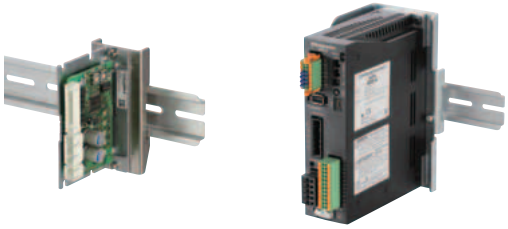
Flexible Couplings

Mounting Brackets

Clean Dampers

For Drivers

Driver Cover
✻For use with **CVD** drivers



DIN Rail Mounting Plate

Quality Testing

Product Safety/ Dependability

The establishment of on-site laboratories, to test and evaluate the safety standard and regulations of our products, allows Oriental Motor to provide products that our customers can safely use.

Locked rotor test (in Product Safety Testing Laboratory)

EMC Testing Center

Conducting Environmental Testing to Enhance Product Reliability

Major Testing Equipment Owned by Oriental Motor

Measurement

- Coordinate measuring machine
- Video measuring machine
- Roundness and cylindrical profile measuring machine
- Surface texture and contour measuring machine

Analysis

- Stereo microscope
- Metallurgical microscope
- Scanning electron microscope (SEM)
- Energy dispersive X-ray spectrometer (EDX)
- Fourier transform infrared spectrophotometer (FT-IR)

Test

- Compact low and constant temperature chamber
- Motor shaft fatigue testing machine
- Highly accelerated temperature and humidity stress test (HAST)
- Combined temperature and humidity, vibration testing machine
- Thermal shock testing machine
- Salt spray testing machine
- Temperature and humidity chamber
- Drop testing machine

Combined environment testing machine

Motor shalt fatigue testing machine

Compact low and constant temperature bath

Scanning electron microscope (SEM)

Improvement of Productivity

Oriental Motor's continued improvement in our production and shipping systems provides the stability needed to carry out our mission as a manufacturer who ensures timely delivery of our products, while keeping up with rapid changes in social environments.

Motor assembly line collaborated with autonomation and human skills

Delivery

Oriental Motor offers competitive lead times. For example, a standard stepper motor can be delivered to the customer within a week if the item is stocked in the USA.
If the product needs to be brought from Japan, production for a few pieces typically takes 5 to 10 business days for production, and 1 week to ship the products from Japan to the USA warehouse.

Contract Inventory

Oriental Motor offers a contract inventory program to serve customers with shorter lead time depending on the needs of the products.

Program Examples
- Min / Max
- Dedicated stock

Inventory Location
OM Chicago or Los Angeles warehouse
(the closest warehouse from your location)

Contact your point of contact to start a contract inventory program. With a mutual written agreement, a contract inventory program can be started.

Documentation Support

To support customer's product release, we can provide the customer with the documentations below.
We also have inpsection capabilities for returned products.

- First Article Inspection Report (FAIR)
- Certificate of Conformance (CoC)
- REACH
- RoHS
- CE
- UL
- CMR
- Inspection Reports
- Packing List


CERTIFICATE

Oriental Motor USA Corporation

ISO 9001 : 2015

ISO Certification

Acquisition Status of Certification

	ISO 9001	ISO 14001	ISO 45001
Registration Date	February 23, 2005 *The date on which the Company obtained company-wide certification		December 20, 2019
Renewal Date	February 15, 2020 *The issuance date of the latest version of certification		–
Certified Plants and Offices	Tsuruoka-Chuo Plant, Tsuruoka-Nishi Plant, Tsukuba Plant, Tsuchiura Plant, Takamatsu-Kozai Plant, Takamatsu-Kokubunji Plant, Soma Plant, Kashiwa Plant, Tokyo Branch, Nagoya Branch, and Osaka Branch		Soma Plant
Certification Standards	ISO 9001 : 2015	ISO14001 : 2015	ISO45001 : 2018
Certification Authority	General Incorporated Foundation Japan Quality Assurance Organization (JQA)		
Certification Numbers	JQA-QMA15799	JQA-EM7425	JQA-OH0309

Technical Support

Product & Technology Training

Virtual or On-Site Technical Seminar

Oriental Motor offers virtual or in-person training and product demonstrations at your location. Contact your local sales office or our Technical Support Team for more information or to schedule a training seminar.

Lunch & Learn Seminars

You can schedule an on-site lunch & learn seminar with our Sales and Application Engineer staff. For this one-hour session, Oriental Motor will discuss our latest technology for solving simple to challenging motion requirements.

We can Customize Any Technical Seminars to Your Needs.

Seminar examples

- Stepper motor technology
- Steppers vs. Servos
- 2 phase stepper vs. 5 phase stepper
- Brushless motor technology
- Motor sizing

Onsite/Online Consultation

Onsite and online, We can support your motor sizing, delivery date, technical data etc.
We also have an application engineer who has more in-depth knowledge of motors and applications.

Warranty and Limitation of Liability

Scope of Intended Applications

Our products are designed and manufactured for use in general industrial applications. They are not intended for use in nuclear power generation, aerospace, railway, vehicle, entertainment machinery, safety equipment, medical equipment or any other application having a significant effect on human life or property.

Safety Precautions

Before using any product, carefully read the “operating manual” to ensure correct operation.

Return, Replacement and Repair After Delivery

- ORIENTAL MOTOR U.S.A. CORP. is confident that you will be completely satisfied with your purchase. In the unlikely event that a delivered product has been damaged during shipping or if you receive an incorrect order, ORIENTAL MOTOR U.S.A. CORP. will correct the problem. Please contact your local sales office or distributor where the product was purchased.
- If you need to return a product because of a technical issue, please contact ORIENTAL MOTOR U.S.A. CORP. technical support at 1-800-468-3982 (847-871-5931 or 310-715-3303 if outside the USA & Canada) to try to determine the cause of the problem. If your problem cannot be resolved, you will receive instructions on how to obtain an RMA number and how to return the product.

Lead Time

Oriental Motor's lead time is characterized by best in class, with many of our catalog products available to ship in 3 to 9 business days (for orders placed before 12pm PST). Your order is shipped using only reputable carriers or any carrier of your choice to ensure on-time and damage free-delivery. Our manufacturing processes support our fast delivery and short lead time to allow us to support your needs. Our Just-In-Time production system allows the manufacturing of an order with little notice, in any quantity requested. Additionally, our one-by-one process allows us to manufacture one product as easily as one thousand.
In addition, Oriental Motor will quote “Available to Ship” shipping dates for guaranteed quantities on our website for most products. For larger quantities please contact your local sales office.

Warranty and Limitation of Liability

Warranty

Oriental Motor U.S.A. Corporation (the “Company”) warrants to the first end user Buyer that the products and parts thereof, when shipped will be free from defects in materials comprising the same and in the Company’s workmanship. If any such defects exist or later appear, the Company shall undertake, at its sole expense, prompt remedial action as stated herein to correct the same; provided however, that the Company shall have no obligation or liability under this warranty unless it shall have received written notice specifying such defects no later than two (2) years from the date of shipment.

LIMITATION OF LIABILITY

THE COMPANY SHALL HAVE NO LIABILITY WHATSOEVER IN ANY EVENT FOR PAYMENT OF ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, DAMAGES FOR INJURY TO ANY PERSON OR PROPERTY. BY ACCEPTING THE PRODUCTS AND/OR PARTS THEREOF, THE FIRST END USER BUYER OR SUBSEQUENT USER AGREES THAT THE COMPANY SHALL NOT BE LIABLE FOR INDEMIFICATION OR CONTRIBUTION (IN WHOLE OR IN PART) EITHER EXPRESSLY OR BY IMPLICATION. IF FOR ANY REASON OF THE FOREGOING PROVISIONS SHALL BE INEFFECTIVE, THE COMPANY’S LIABILITY FOR DAMAGES ARISING OUT OF ITS MANUFACTURE OR SALE OF ITS PRODUCTS OR PARTS, OR USE THEREOF, WHETHER SUCH LIABILITY IS BASED ON WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE, SHALL NOT IN ANY EVENT EXCEED THE FULL PURCHASE PRICE OF SUCH PRODUCTS AND PARTS THEREOF.

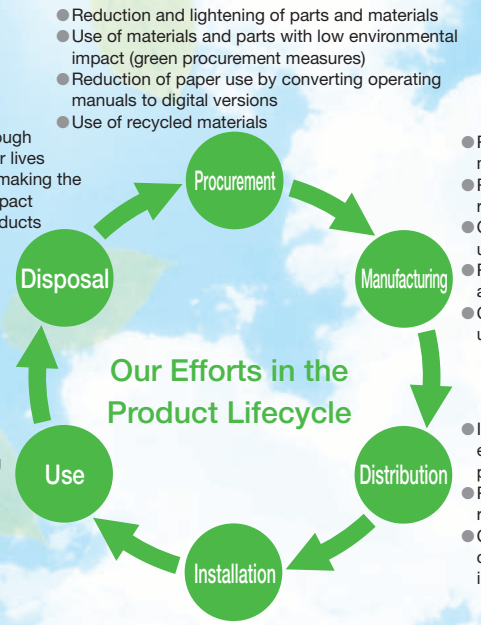
Any action against the Company based upon any liability or obligation arising hereunder any law applicable to the sale or its products or parts thereof, or the use thereof, must be commenced within two (2) years after the cause of such actions arises.

Environmental Efforts

Oriental Motor's Carbon Neutral Initiative

Oriental Motor supports our customers' MOTION with consideration for the environment.

Oriental Motor has proactively supported activities that give consideration to global environmental conservation. Energy savings, conservation of natural resources and reduction of waste and carbon dioxide are implemented at various stages of the product lifecycle. By providing beneficial products that feature high efficiency, compact size, high power and long life, Oriental Motor hopes to be involved with various "motion" that our customers require, while contributing to environmental conservation activities.



- Reduction and lightening of parts and materials
- Use of materials and parts with low environmental impact (green procurement measures)
- Reduction of paper use by converting operating manuals to digital versions
- Use of recycled materials

- Reduced waste through products with longer lives
- Reduced waste by making the products more compact
- Easy-to-recycle products

- Reduced energy use during manufacturing
- Reduced consumption of resources during manufacturing
- Control of chemical substances used in manufacturing processes
- Reduction of waste and appropriate processing
- Control of chemical substances used in products

- Improved transportation efficiency through optimal packaging design
- Packaging that is easy to recycle
- Communication about the chemical substances contained in products

- Decreased energy consumption during product use (development of energy-efficient products)

- Reduced waste through optimally-designed packaging
- Reduced wiring with network-compatible products
- Reduced waste through products with longer lives

①Energy Savings (High Efficiency)

A motor converts electric energy into mechanical energy. Energy savings require higher efficiency by reducing the energy loss from the motor. Going forward, Oriental Motor will surpass the international standards with compact, precision motors aimed at higher efficiency.

②Conservation of Natural Resources and Longer Life

We have saved on natural resources by producing compact, more efficient products, thereby making more effective use of the natural resources in the product lifecycle. In the future we will promote longer product life and less wiring to match product features.

③Controlling Chemical Substances in Products

Oriental Motor uses green procurement standards that take into consideration the global electrical and electronic industry standard IEC 62474 and customer requirements to curb the chemical substances in products.

✻IEC 62474: Material declaration for products of and for the electrotechnical industry

(a) Green Procurement

Products, parts, materials, packaging, etc. with a low environmental impact are given priority in procurement. The basic requirements are established as "Green Procurement Standards", which are promoted during business transactions.

- For details, refer to "Green Procurement" on the Oriental Motor website.

(b) Measures and Responses to Chemical Substances in Products

- RoHS Directive Compliance Initiatives for the EU
- REACH Regulation Compliance
- Initiatives Concerning the Measures for Administration of the Pollution Control of Electronic Information Products Act (People's Republic of China)
- Other Regulations Concerning Handling of Chemical Substances in Products

- Global Regulations & Standards/Management of Chemical Substances in Products WEB

Brushless Motors

Simple operation

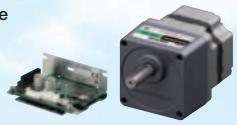
BMU Series

AC Input

Small board type

BLH Series

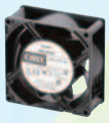
DC Input



Brushless Motors Fans

EMU Series

AC Input



High Torque Stepper Motors

PKP Series

DC Input

Environmental Policy

Oriental Motor's Basic Environmental Philosophy and Environmental Policy

- ISO 9001 and ISO 14001 WEB

www.orientalmotor.com

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at www.orientalmotor.com

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