Stepping Motors

Introduction

AS

AS PLUS

ASC

RK

CFK II

CSK

PMC

UMK

CSK

PK/PV

PK

UI2120G

EMP401
EMP402

SG8030J

SMK

Accessories

Before Using
a Stepping
Motor

Closed Loop αSTEP
AC Input

DC Input

Motor & Driver Packages
5-Phase Microstep
AC Input

DC Input

5-Phase Full/Half
DC Input

2-Phase Full/Half
AC Input   DC Input

2-Phase Stepping Motors
without
Encoder

with
Encoder

Driver
with Indexer

Controllers

Low-Speed
Synchronous
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Accessories

Cables

● ●

Extension cables provide convenient connection between a motor, driver and controller.

■ Type of Cables

Cable for connection between motor and driver

Stepping Motor

Driver

or

Dedicated Type

Cable for connection between driver and controller

General-Purpose Type

Controller **EMP400** Series

Controllers
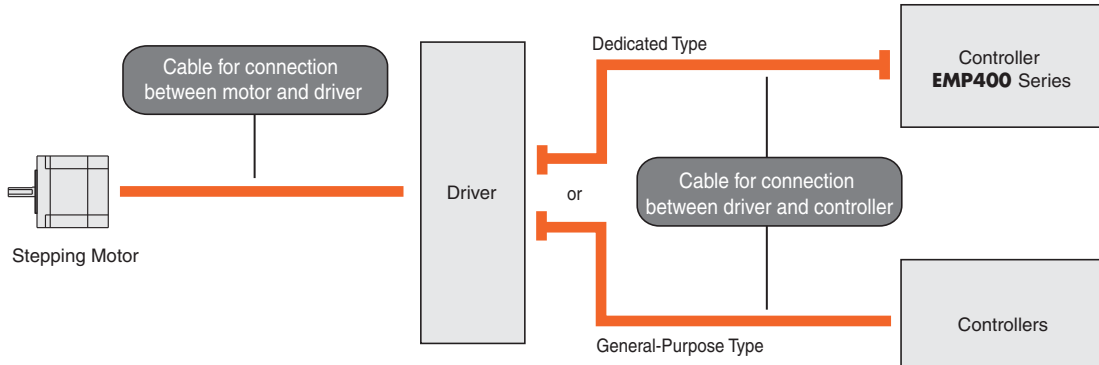
For Connection between a Motor and Driver

These cables are available to extend the distance between the motor and the driver for α*STEP* and **RK** Series.

Cable Name	Page		Applicable Series
Extension Cable	C-286	3	**RK** Series
Extension Cable	C-286	4	α*STEP*
Flexible Cable	C-286	5	α*STEP*
Motor Cable	C-287	6	**PK** Series Standard **P** Type

For Connection between a Driver and Controller

These cables are available to extend the connection between the driver and controller. There are both dedicated cables for connection between the **EMP400** and the α*STEP* or **RK** Series, as well as general purpose cables for the α*STEP* and **RK** Series.

|	Cable Name	Page		Applicable Series
Driver Cable	Dedicated Type	C-285	1	α*STEP*
				RK Series
	General-Purpose Type	C-285	2	α*STEP*
				RK Series
				UI2120G

Cable set for DC input stepping motor & driver package

As an option for DC input drivers, lead wires with connectors are available.
Crimping is not necessary, and the connection with the motor, power supply, input/output signal is also easy.

Cable Name	Page		Applicable Series
Optional Cables	C-287	7	5-phase **PMC** Series

The optional cable includes three cables (for motor, power supply and input/output signal).

Stepping Motor

For Motor

Driver

For Input/Output Signal

Controllers

For Power Supply

Power supply
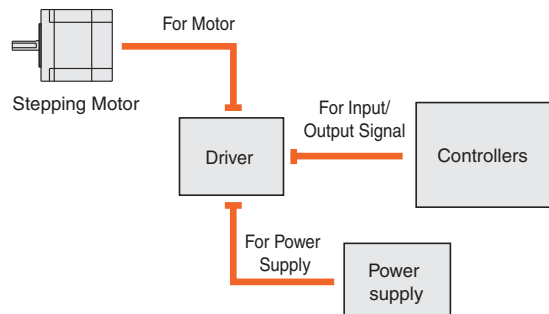
Driver Cables

These cables are convenient for connecting α_{STEP} and **RK** series drivers to controllers. General-Purpose Type and Dedicated Type (equipped with the connector for the **EMP** series controller) are available.

① Dedicated Type

One end of the cable is a half-pitch connector that snaps into the driver for α_{STEP} and **RK** series. The other end of the cable is equipped with the connector for the **EMP400** series controller.

Note:
Note that as the length of the pulse signal line increases, the maximum transmission frequency decrease. (→Technical Reference Page F-36)

● Product Line
◆ For α_{STEP}

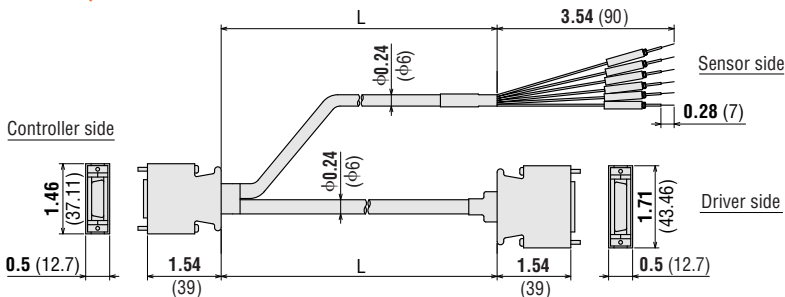| Model	Applicable Series	Length L ft. (m)
CC01EMP4	**AS, ASC** Series	3.3 (1)
CC02EMP4		6.6 (2)

Note:
● The alarm clear signal of the AS and ASC series cannot be used with the EMP400 series controller.
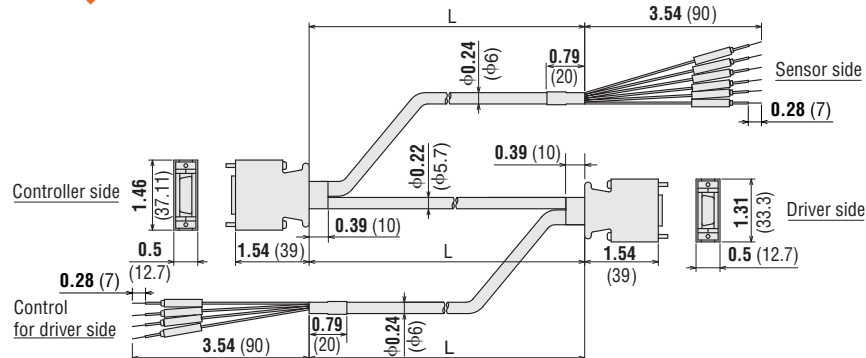
● For **RK** Series

Model	Length L ft. (m)
CC01EMP5	3.3 (1)
CC02EMP5	6.6 (2)

● Dimensions Scale 1/4, Unit = **inch** (mm)
◆ For α_{STEP}

◆ For **RK** Series

② General-Purpose Type

This is a ribbon cable equipped with, at one end of the cable, the half-pitch connector that snaps into the driver for α_{STEP}, **RK** series and **UI2120G**.

Note:
Note that as the length of the pulse signal line increases, the maximum transmission frequency decrease. (→Technical Reference Page F-36)
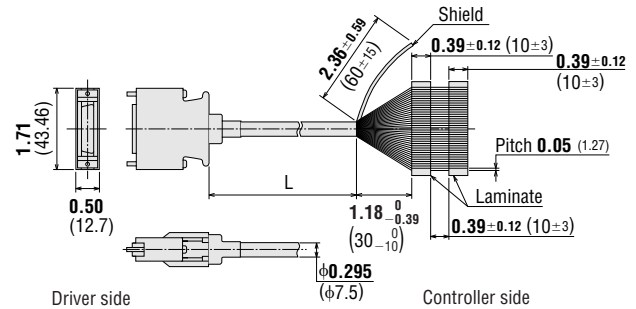● Install a connector that matches the controller you are using to the other end of the cable.

● Product Line

Model	Applicable Series	Length L ft. (m)
CC36D1-1	α_{STEP}	3.3 (1)
CC36D2-1		6.6 (2)
CC20D1-1	α_{STEP} **AS PLUS**	3.3 (1)
CC20D2-1	**RK** Series **UI2120G**	6.6 (2)

● Dimensions Scale 1/4, Unit = **inch** (mm)
◆ For α_{STEP}
Conductor: AWG28

◆ For α_{STEP} (**AS PLUS**), **RK** Series and **UI2120G**
Conductor: AWG28
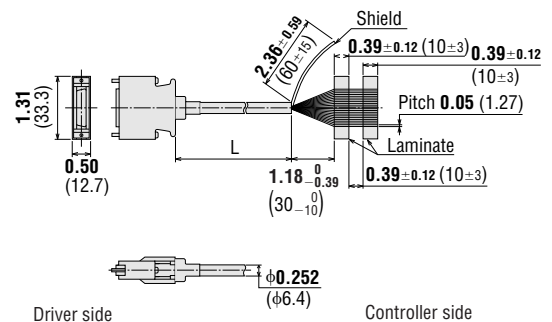
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Closed Loop α_{STEP}
AC Input | DC Input

Motor & Driver Packages
5-Phase Microstep
AC Input | DC Input
5-Phase Full/Half
DC Input
2-Phase Full/Half
AC Input | DC Input

2-Phase Stepping Motors
without Encoder | with Encoder

Driver
with Indexer

Controllers

Low-Speed Synchronous Motors

Before Using a Stepping Motor

3 Extension Cable (For **RK** Series)

These extension cables are used between **RK** series motors and dedicated drivers. They come in three lengths: 16.4 feet (5 m), 32.8 feet (10 m), and 65.6 feet (20 m).

Model	Length L ft. (m)	Conductors
CC05PK5	16.4 (5)	
CC10PK5	32.8 (10)	5
CC20PK5	65.6 (20)	

- Conductor size: AWG22
- Finished outer diameter: φ0.28 inch (φ7.2mm)
- Cable rating: 221°F (105°C)
- Outer casing: oil-resistant, heat-resistant, non-migrating vinyl

Note:
These extension cables are only for the **RK** Series. Do not use them on other stepping motor & driver packages.

4 Extension Cable (For α*STEP*)

These extension cables are convenient when using the α*STEP* stepping motor and driver more than 1.31 feet (0.4 m) apart from each other.
It's not necessary when the following products are used where the distance between the driver and the motor is 1.31 ft. (0.4 m) or less.

- **AS**, **AS PLUS**, **ASC** Series w/o electromagnetic brake
- **AS**, **AS PLUS**, **ASC** Series electromagnetic brake type [Motor Frame Size: 1.65 inch (42 mm)]

● Product Line

◆ For Standard

Model	Length L feet (m)
CC01AIP	3.3 (1)
CC02AIP	6.6 (2)
CC03AIP	9.8 (3)
CC05AIP	16.4 (5)
CC07AIP	23 (7)
CC10AIP	32.8 (10)
CC15AIP	49.2 (15)*
CC20AIP	65.6 (20)*

◆ For with Electromagnetic Brake

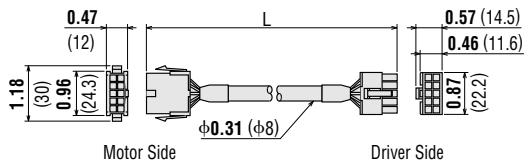| Model	Length L feet (m)
CC01AIPM	3.3 (1)
CC02AIPM	6.6 (2)
CC03AIPM	9.8 (3)
CC05AIPM	16.4 (5)
CC07AIPM	23 (7)
CC10AIPM	32.8 (10)
CC15AIPM	49.2 (15)*
CC20AIPM	65.6 (20)*

Note:
- Electromagnetic Brake models must use an extension cable for an Electromagnetic Brake. But motor frame size □1.65 in. (□42 mm) model can use a standard extension cable for the Electromagnetic Brake.
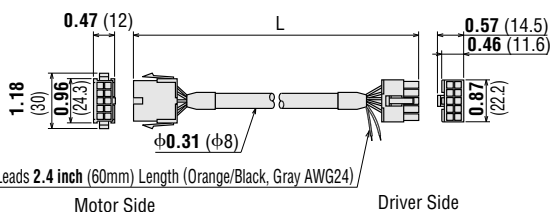- ✽ **ASC** Series can not use extension cable with 49.2 ft. (15 m), 65.6 ft. (20 m) length.

● Dimensions   Scale 1/4, Unit = **inch** (mm)
For Standard

0.47 (12)   L   0.57 (14.5)   0.46 (11.6)
1.18 (30)   0.96 (24.3)   0.87 (22.2)
φ**0.31** (φ8)
Motor Side   Driver Side

For with Electromagnetic Brake

0.47 (12)   L   0.57 (14.5)   0.46 (11.6)
1.18 (30)   0.96 (24.3)   0.87 (22.2)
φ**0.31** (φ8)
Electromagnetic Brake Leads **2.4 inch** (60mm) Length (Orange/Black, Gray AWG24)
Motor Side   Driver Side

5 Flexible Cable (For α*STEP*)

This flexible cable is used between α*STEP* motors and dedicated drivers. We recommend this cable when the motor is installed on a moving section and the cable is repeatedly bent and extended.
It is not necessary when the following products are used where the distance between the driver and the motor is 1.31 ft. (0.4 m) or less.

- **AS** Series, **AS PLUS**, **ASC** Series w/o electromagnetic brake
- **AS** Series, **AS PLUS**, **ASC** Series electromagnetic brake type [Motor Frame Size: 1.65 inch (42 mm)]

● Product Line

◆ For Standard

Model	Length L feet (m)
CC01SAR	3.3 (1)
CC02SAR	6.6 (2)
CC03SAR	9.8 (3)
CC05SAR	16.4 (5)
CC07SAR	23 (7)
CC10SAR	32.8 (10)

◆ For with Electromagnetic Brake

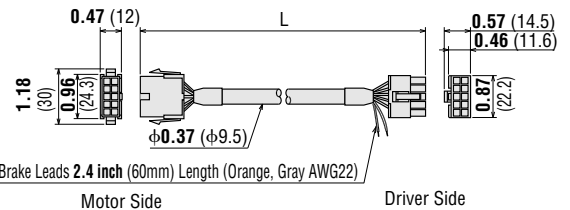| Model	Length L feet (m)
CC01SARM2	3.3 (1)
CC02SARM2	6.6 (2)
CC03SARM2	9.8 (3)
CC05SARM2	16.4 (5)
CC07SARM2	23 (7)
CC10SARM2	32.8 (10)

Note:
- Electromagnetic Brake models must use an extension cable for an Electromagnetic Brake. But motor frame size □1.65 in. (□42 mm) model can use a standard extension cable for the Electromagnetic Brake.

● Dimensions   Scale 1/4, Unit = **inch** (mm)
For Standard

0.47 (12)   L   0.57 (14.5)   0.46 (11.6)
1.18 (30)   0.96 (24.3)   0.87 (22.2)
φ**0.37** (φ9.5)
Motor Side   Driver Side

For with Electromagnetic Brake
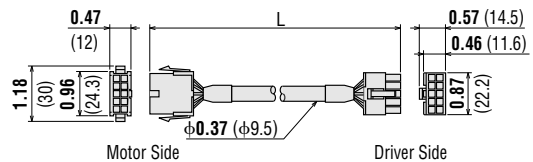
0.47 (12)   L   0.57 (14.5)   0.46 (11.6)
1.18 (30)   0.96 (24.3)   0.87 (22.2)
φ**0.37** (φ9.5)
Electromagnetic Brake Leads **2.4 inch** (60mm) Length (Orange, Gray AWG22)
Motor Side   Driver Side

- When only the extension between motor and driver is needed, use an extension cable.

⑥ Motor Cables

As an option, lead wires with connectors are available. A 2 ft. (0.6 m) lead wire connector is included with the motor and driver packages.

● Product Line

Model	Package	Motor only	Length ft. (m)
LC5N06A	CFK513P□	PK513P□	2 (0.6)
LC5N10A			3.3 (1)
LC2U06A	—	PK22□P	2 (0.6)
LC2U10A		PK223-SG□	3.3 (1)
LC2U06B	—	PK23□P	2 (0.6)
LC2U10B		PK24□P	3.3 (1)

■ Communication Cable

Use this 16.4 ft. (5 m) communication cable to connect the α_{STEP} **AS PLUS** driver to a PC.
(DSUB9F to RJ 11 cable)

Model: **FC04W5**

⑦ Optional Cables

As an option for DC input drivers, lead wires with a connector are available.
Crimping is not necessary, and the connection with the motor, power supply, input/output signal is also easy. The optional cable includes three cables (for motor, power supply and input/output signal).

● Product Line

Model	Applicable Series	Applicable Driver	Length ft. (m)
LCS01PMC	**PMC** Series	PMD03CA	2 (0.6)

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Before Using a Stepping Motor

Closed Loop α_{STEP} AC Input DC Input

Motor & Driver Packages 5-Phase Microstep AC Input DC Input

5-Phase Full/Half DC Input

2-Phase Full/Half AC Input DC Input

2-Phase Stepping Motors without Encoder with Encoder

Driver with Indexer

Controllers

Low-Speed Synchronous Motors

Flexible Couplings

MC Motor Couplings

■ Selecting an MC Coupling

Once you have decided on a motor and the shaft diameter of the equipment to be connected, determine the proper flexible coupling to use. Oriental Motor flexible couplings are available in external diameter sizes that provide the strength required for the motor torque.

All motor shaft diameters of stepping motor units are available with the exception of geared models.
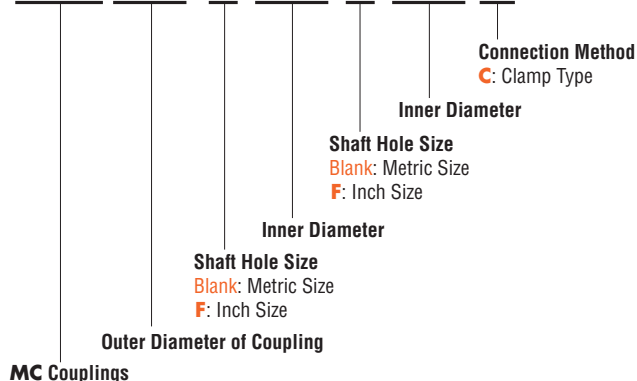
There are three broad categories for the shaft diameter on the equipment to be connected based on the motor shaft diameter (except for some clamp types).

■ Features

● No backlash.
● Plate springs formed of slits reliably absorb eccentricity, declination and end play.
● Torsional rigidity is high, responsiveness excellent.
● Characteristics are the same in forward and reverse.
● Maintenance free (excellent resistance to oil and chemicals).
● Aluminum alloy construction.
● Standardized shaft hole sizes for motor shafts and driven shafts of different diameters.

■ Product Number Code

MC 25 F 04 F 04 C

- **Connection Method**
  C: Clamp Type
- **Inner Diameter**
- **Shaft Hole Size**
  Blank: Metric Size
  F: Inch Size
- **Inner Diameter**
- **Shaft Hole Size**
  Blank: Metric Size
  F: Inch Size
- **Outer Diameter of Coupling**
- **MC Couplings**

Examples **MC 25 08 F 04 C**

Internal Diameter   **Internal Diameter**

① When the motor is a **RK566AA** [outer diameter of shaft: 0.315 inch (8 mm) and the shaft diameter of the equipment to be connected to the motor is 0.25 inch (6.35 mm)] use **MC2508F04C**.
② When the motor is a **RK5913AA** [outer diameter of shaft: 0.5512 inch (14 mm)] and the shaft diameter of the equipment to be connected to the motor is 0.5 inch (12.7 mm)] use **MC5014F08C**.

> **MC** coupling can be selected using with motor sizing calculation result (→Page F-2). Select a coupling which has rated torque bigger than motor required torque. In this way, smaller coupling may be able to use.

Type	Shaft Diameter in. (mm)	αSTEP	5-Phase Stepping Motors	2-Phase Stepping Motor Package	2-Phase Stepping Motors	Low-Speed Synchronous Motors	0.1875 (4.763)	0.25 (6.35)	0.3125 (7.938)	0.375 (9.525)	0.5 (12.7)	0.625 (15.875)
							Driven Shaft Diameter in. (mm)					
MC12	φ0.1969 (φ5)	—	RK543, CFK53□, CFK543, CSK543, PMC3□	UMK243, CSK243	PK22□P	SMK014	○					
MC16	φ0.1969 (φ5)	AS46A(M), ASC34AK, ASC36AK, ASC46A(M)K	RK544, RK545, CFK544, CFK545, CSK544, CSK545	UMK244, CSK244	PK233P, PK243		○	○				
MC20	φ0.1969 (φ5)	—	—	UMK245, CSK245	PK235P, PK244, PK245	—	○	○	○			
MC25	φ0.25 (φ6.35)	—	—	UMK264, CSK264 UMK266, CSK266	PK264	SMK237		○	○	○		
	φ0.312 (φ7.937)	—	CFK564, CFK566 CSK564, CSK566	—	—	—				○		
	φ0.315 (φ8)	—	RK564, RK566	—	—	—		○	○	○		
MC32	φ0.25 (φ6.35)	—	—	UMK268, CSK268	PK266, PK268 PV264, PV266	—		○	○	○		
	φ0.312 (φ7.937)	—	CFK569,CSK569	—	—	—				○		
	φ0.315 (φ8)	AS66A(M), AS69A(M) ASC66A(M)K	RK569	—	—	—		○	○	○		
MC40	φ0.5 (φ12.7)	—	CFK596, CFK599, CSK596, CSK599	UMK296, UMK299, CSK296, CSK299	PK296	SMK5100 SMK5160				○	○	○
	φ0.5512 (φ14)	AS98A(M), AS911A	RK596, RK599	—	—					○	○	○
MC50	φ0.5 (φ12.7)	—	CFK5913, CSK5913	UMK2913, CSK2913	PK299, PK2913	—					○	○
	φ0.5512 (φ14)	—	RK5913	—	—	—					○	○

■ Dimensions Unit = **inch** (mm)

● MC12-C, MC16-C, MC20-C, MC25-C, MC32-C

● MC40-C, MC50-C
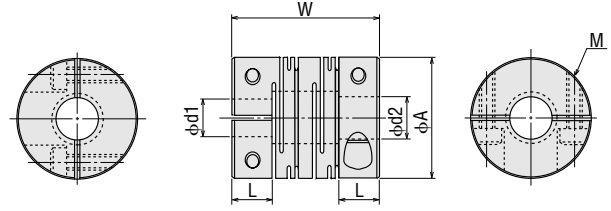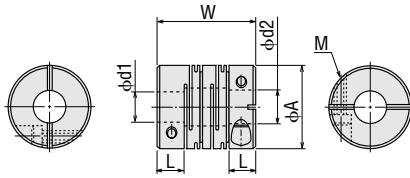
■ Specifications

Model	Dimensions				L in.(mm)	Screw Used M	Rated Torque oz-in (N·m)	Weight oz.(g)	Inertia oz-in² (kg·m²)	Static Torsion Spring Constant lb-in/rad (N·m/rad)	Permissible Eccentricity in.(mm)	Permissible Declination degrees	Permissible End Play in.(mm)
	Outer Diameter φA in.(mm)	Length W in.(mm)	Shaft Hole Diameter d1 in.(mm)	Shaft Hole Diameter d2 in.(mm)									
MC1205F03C	0.472 (12)	0.73 (18.5)	$\phi0.1969^{+0.0007}_{0}$ ($\phi5^{+0.018}_{0}$)	$\phi0.1875^{+0.0007}_{0}$ ($\phi4.763^{+0.018}_{0}$)	0.2 (5)	M2	28 (0.2)	0.14 (4)	0.0055 (1×10^{-7})	280 (32)	0.0039 (0.1)	2	±0.011 (±0.3)
MC1605F03C	0.63 (16)	0.91 (23)	$\phi0.1969^{+0.0007}_{0}$ ($\phi5^{+0.018}_{0}$)	$\phi0.1875^{+0.0007}_{0}$ ($\phi4.763^{+0.018}_{0}$)	0.26 (6.5)	M2.5	42 (0.3)	0.32 (9)	0.022 (4×10^{-7})	390 (45)	0.0039 (0.1)	2	±0.015 (±0.4)
MC1605F04C				$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)									
MC2005F03C	0.79 (20)	1.02 (26)	$\phi0.1969^{+0.0007}_{0}$ ($\phi5^{+0.018}_{0}$)	$\phi0.1875^{+0.0007}_{0}$ ($\phi4.763^{+0.018}_{0}$)	0.3 (7.5)	M2.5	71 (0.5)	0.67 (19)	0.06 (11×10^{-7})	750 (85)	0.0039 (0.1)	2	±0.015 (±0.4)
MC2005F04C				$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)									
MC2005F05C				$\phi0.3125^{+0.0009}_{0}$ ($\phi7.938^{+0.022}_{0}$)									
MC2008F04C			$\phi0.3150^{+0.0009}_{0}$ ($\phi8^{+0.022}_{0}$)	$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)									
MC2008F05C				$\phi0.3125^{+0.0009}_{0}$ ($\phi7.938^{+0.022}_{0}$)									
MC25F04F04C	0.98 (25)	1.22 (31)	$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)	$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)	0.33 (8.5)	M3	142 (1)	1.2 (34)	0.175 (32×10^{-7})	2000 (230)	0.0059 (0.15)	2	±0.019 (±0.5)
MC25F04F05C				$\phi0.3125^{+0.0009}_{0}$ ($\phi7.938^{+0.022}_{0}$)									
MC25F04F06C				$\phi0.3750^{+0.0009}_{0}$ ($\phi9.525^{+0.022}_{0}$)									
MC2508F04C			$\phi0.3150^{+0.0009}_{0}$ ($\phi8^{+0.022}_{0}$)	$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)									
MC2508F05C				$\phi0.3125^{+0.0009}_{0}$ ($\phi7.938^{+0.022}_{0}$)									
MC2508F06C				$\phi0.3750^{+0.0009}_{0}$ ($\phi9.525^{+0.022}_{0}$)									
MC32F04F04C	1.26 (32)	1.61 (41)	$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)	$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)	0.47 (12)	M4	280 (2)	2.6 (75)	0.66 (120×10^{-7})	3100 (360)	0.0059 (0.15)	2	±0.019 (±0.5)
MC32F04F05C				$\phi0.3125^{+0.0009}_{0}$ ($\phi7.938^{+0.022}_{0}$)									
MC32F04F06C				$\phi0.3750^{+0.0009}_{0}$ ($\phi9.525^{+0.022}_{0}$)									
MC3208F04C			$\phi0.3150^{+0.0009}_{0}$ ($\phi8^{+0.022}_{0}$)	$\phi0.2500^{+0.0009}_{0}$ ($\phi6.35^{+0.022}_{0}$)									
MC3208F05C				$\phi0.3125^{+0.0009}_{0}$ ($\phi7.938^{+0.022}_{0}$)									
MC3208F06C				$\phi0.3750^{+0.0009}_{0}$ ($\phi9.525^{+0.022}_{0}$)									
MC40F08F06C	1.57 (40)	2.2 (56)	$\phi0.5000^{+0.0011}_{0}$ ($\phi12.7^{+0.027}_{0}$)	$\phi0.3750^{+0.0009}_{0}$ ($\phi9.525^{+0.022}_{0}$)	0.59 (15)	M5	710 (5)	5.6 (160)	2.2 (400×10^{-7})	6700 (760)	0.0078 (0.2)	2	±0.019 (±0.5)
MC40F08F08C				$\phi0.5000^{+0.0011}_{0}$ ($\phi12.7^{+0.027}_{0}$)									
MC40F08F10C				$\phi0.6250^{+0.0011}_{0}$ ($\phi15.875^{+0.027}_{0}$)									
MC4014F06C			$\phi0.5512^{+0.0011}_{0}$ ($\phi14^{+0.027}_{0}$)	$\phi0.3750^{+0.0009}_{0}$ ($\phi9.525^{+0.022}_{0}$)									
MC4014F08C				$\phi0.5000^{+0.0011}_{0}$ ($\phi12.7^{+0.027}_{0}$)									
MC4014F10C				$\phi0.6250^{+0.0011}_{0}$ ($\phi15.875^{+0.027}_{0}$)									
MC50F08F08C	1.97 (50)	2.8 (71)	$\phi0.5000^{+0.0011}_{0}$ ($\phi12.7^{+0.027}_{0}$)	$\phi0.5000^{+0.0011}_{0}$ ($\phi12.7^{+0.027}_{0}$)	0.71 (18)	M6	1420 (10)	12 (330)	6.6 (1200×10^{-7})	26000 (3000)	0.0078 (0.2)	2	±0.019 (±0.5)
MC50F08F10C				$\phi0.6250^{+0.0011}_{0}$ ($\phi15.875^{+0.027}_{0}$)									
MC5014F08C			$\phi0.5512^{+0.0011}_{0}$ ($\phi14^{+0.027}_{0}$)	$\phi0.5000^{+0.0011}_{0}$ ($\phi12.7^{+0.027}_{0}$)									
MC5014F10C				$\phi0.6250^{+0.0011}_{0}$ ($\phi15.875^{+0.027}_{0}$)									

MCL Geared Motor Couplings

■ **Selecting an MCL Coupling**

Once you have decided on a motor and the shaft diameter of the equipment to be connected to it, determine the proper flexible coupling to use. Oriental Motor flexible coupling are available external diameter in sizes that provide the strength required for the motor torque.
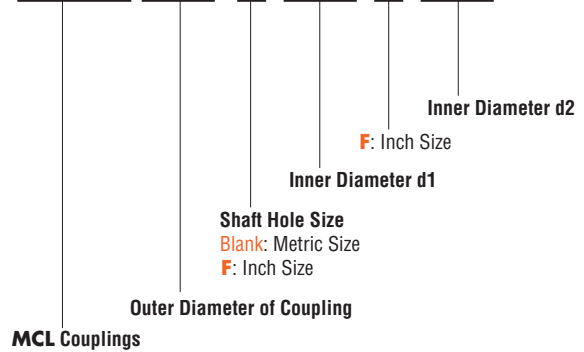
These flexible couplings are clamp types and connect geared stepping motors to other shafts. Select the coupling to match the motor.

■ **Features**

- Couplings come with shaft holes and have standardized combinations of different diameter shaft holes.
- Characteristics are the same for clockwise and counterclockwise rotation.
- Oil-resistant and electrically insulated couplings are available.
- Aluminum alloy construction.
- The shaft being driven is not damaged, since shafts are joined by clamping.
- Easy installation due to separating hub and sleeve design.

■ **Product Number Code**

MCL 40 F 06 F 08

Inner Diameter d2
F: Inch Size

Inner Diameter d1

Shaft Hole Size
Blank: Metric Size
F: Inch Size

Outer Diameter of Coupling

MCL Couplings

Examples   **MCL 30 F 05 F 06**

Internal Diameter d1   Internal Diameter d2

When the motor is **CSK264ATA-SG3.6** [outer diameter of shaft: 0.3125 inch (7.938 mm)] and the axis diameter of the equipment to be connected to the motor is 0.375 inch (9.525 mm), use **MCL30F05F06**.
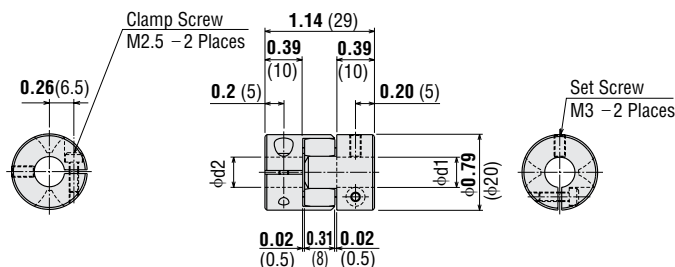
Type	Shaft Diameter in. (mm)	5-Phase Stepping Motors	2-Phase Stepping Motors	Low-Speed Synchronous Motor	Driven Shaft Diameter in. (mm)					
					0.1875 (4.763)	0.25 (6.35)	0.3125 (7.938)	0.375 (9.525)	0.5 (12.7)	0.625 (15.875)
MCL20	φ0.1968 (φ5)	**PMC33-MG□**	**CSK243-SG□, PK223-SG□ PK243-SG□**	**SMK0A-□A**	○	○	○			
MCL30	φ0.25 (φ6.35)	—	—	**SMK216-GN / 2GN□KA**			○			
	φ0.3125 (φ7.938)	—	**CSK264-SG□ PK264-SG□**	—					○	○
MCL40	φ0.5 (φ12.7)	—	**PK296-SG□**	**SMK550-GN / 5GN□KA**				○	○	○

Stepping Motors

Introduction | AS | AS PLUS | ASC | RK | CKII | CSK | PMC | UMK | CSK | PK/PV | PK | UI2120G | EMP401 EMP402 | SG8030J | SMK | Accessories | Before Using a Stepping Motor

Closed Loop αSTEP | Motor & Driver Packages | 2-Phase Stepping Motors | Driver | Controllers | Low-Speed Synchronous Motors

■ Specifications

Model	Dimensions				Normal Torque	Weight	Inertia	Permissible Eccentricity	Permissible Declination	Permissible End Play
	Outer Diameter in. (mm)	Length in. (mm)	Axis Hole Diameter d1 in. (mm)	Axis Hole Diameter d2 in. (mm)	lb-in (N·m)	oz. (g)	oz-in² (kg·m²)	in. (mm)	degrees	in. (mm)
MCL2005F03				$\phi 0.1875^{+0.0007}_{0}$ ($\phi 4.763^{+0.018}_{0}$)						
MCL2005F04	0.79 (20)	1.14 (29)	$\phi 0.1969^{+0.0007}_{0}$ ($\phi 5^{+0.018}_{0}$)	$\phi 0.2500^{+0.0009}_{0}$ ($\phi 6.35^{+0.022}_{0}$)	44 (5.0)	0.67 (19)	0.055 (1.0×10^{-6})	0.0059 (0.15)	1°	$+0.0315$ 0 $\left(^{+0.8}_{0}\right)$
MCL2005F05				$\phi 0.3125^{+0.0009}_{0}$ ($\phi 7.938^{+0.022}_{0}$)						
MCL30F04F05			$\phi 0.2500^{+0.0009}_{0}$ ($\phi 6.35^{+0.022}_{0}$)	$\phi 0.3125^{+0.0009}_{0}$ ($\phi 7.938^{+0.022}_{0}$)						
MCL30F05F05	1.18 (30)	1.71 (43.5)	$\phi 0.3125^{+0.0009}_{0}$ ($\phi 7.938^{+0.022}_{0}$)	$\phi 0.3125^{+0.0009}_{0}$ ($\phi 7.938^{+0.022}_{0}$)	110 (12.5)	2.3 (66)	0.45 (8.3×10^{-6})	0.0079 (0.2)	1°	$+0.0394$ 0 $\left(^{+1.0}_{0}\right)$
MCL30F05F06				$\phi 0.3750^{+0.0009}_{0}$ ($\phi 9.525^{+0.022}_{0}$)						
MCL40F06F08			$\phi 0.3750^{+0.0009}_{0}$ ($\phi 9.525^{+0.022}_{0}$)	$\phi 0.5000^{+0.0011}_{0}$ ($\phi 12.7^{+0.027}_{0}$)						
MCL40F08F08	1.57 (40)	2.52 (64)	$\phi 0.5000^{+0.0011}_{0}$ ($\phi 12.7^{+0.027}_{0}$)	$\phi 0.5000^{+0.0011}_{0}$ ($\phi 12.7^{+0.027}_{0}$)	220 (25.0)	5.3 (150)	1.97 (3.6×10^{-5})	0.0079 (0.2)	1°	$+0.0472$ 0 $\left(^{+1.2}_{0}\right)$
MCL40F08F10				$\phi 0.6250^{+0.0011}_{0}$ ($\phi 15.875^{+0.027}_{0}$)						

■ Dimensions Scale 1/2, Unit = inch (mm)

MCL20

Clamp Screw M2.5 −2 Places
1.14 (29)
0.39 (10) 0.39 (10)
0.2 (5) 0.20 (5)
0.26 (6.5)
Set Screw M3 −2 Places
φd2 φd1 0.79 (φ20)
0.02 (0.5) 0.31 (8) 0.02 (0.5)

MCL30

1.71 (43.5)
0.63 (16) 0.63 (16)
0.39 (10)
0.31 (8) 0.31 (8)
Clamp Screw M4−2 Places
Set Screw M4−2 Places
φd2 φd1 φ1.18 (φ30)
0.03 (0.75) 0.39 (10) 0.03 (0.75)
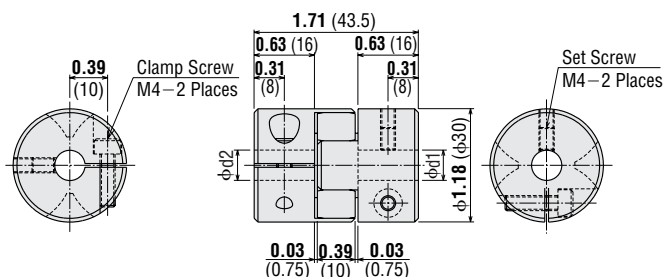
MCL40F06F08
MCL40F08F08
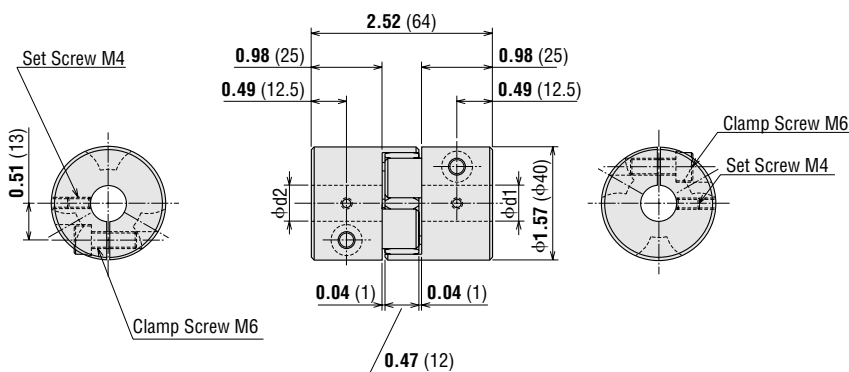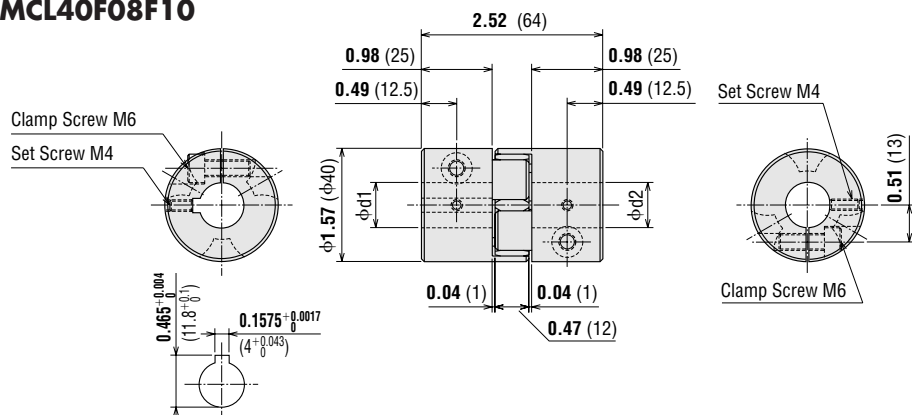
Set Screw M4
2.52 (64)
0.98 (25) 0.98 (25)
0.49 (12.5) 0.49 (12.5)
0.51 (13)
Clamp Screw M6
Set Screw M4
φd2 φd1 φ1.57 (φ40)
Clamp Screw M6
0.04 (1) 0.04 (1)
0.47 (12)

MCL40F08F10

Clamp Screw M6
Set Screw M4
2.52 (64)
0.98 (25) 0.98 (25)
0.49 (12.5) 0.49 (12.5)
Set Screw M4
φ1.57 (φ40) φd1 φd2 0.51 (13)
Clamp Screw M6
0.04 (1) 0.04 (1)
0.47 (12)
0.465$^{+0.004}_{0}$ (11.8$^{+0.1}_{0}$)
0.1575$^{+0.0017}_{0}$ (4$^{+0.043}_{0}$)

■ Mounting to a Shaft

Clamp couplings use the binding force of the screw to compress the shaft hole diameter and thereby fasten the coupling to the shaft. This does not damage the shaft and is easy to mount and remove. The following table shows the screw binding torque. We recommend use of a torque wrench to fasten the coupling.
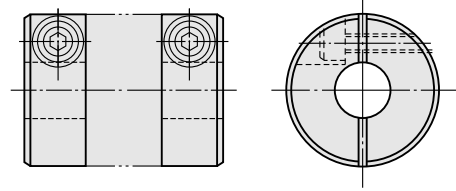
		MC12-C	MC16-C MC20-C MCL20	MC25-C	MC32-C MCL30	MC40-C	MC50-C	MCL40
Tightening Torque	oz-in	71	142	210	350	560	1130	1700
	(N·m)	(0.5)	(1)	(1.5)	(2.5)	(4)	(8)	(12)
Tightening Torque of key press screw for **MCL** coupling	oz-in	—	99	—	280	—	—	2400
	(N·m)		(0.7)		(1.7)			(17)

■ Alignment Adjustment

Flexible couplings tolerate misalignment of the axis center and transfer rotational angle and torque, but produce vibration when the permissible value for misalignment is exceeded. This can dramatically shorten the coupling's service life. This requires alignment adjustment. Misalignment of the axis center includes eccentricity (parallel error of both centers), declination (angular error of both centers) and end play (shaft movement in the axial direction). To keep misalignment within the permissible value, always check and adjust the alignment. To increase the service life of the coupling, we recommend keeping misalignment to below 1/3 of the permissible value.
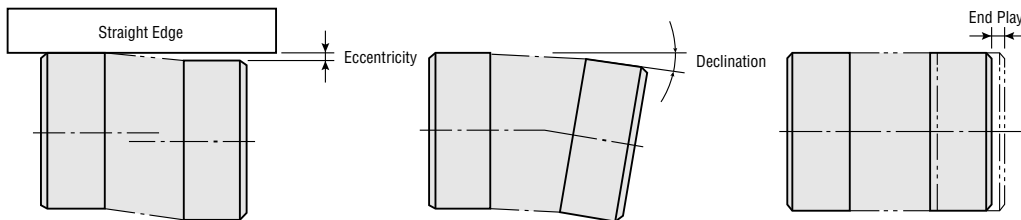
Notes:
- When misalignment exceeds the permissible value or excessive torque is applied, the coupling's shape will deform, and service life is shortened.
- When the coupling emits a metallic sound during operation, stop operation immediately and ensure there is no misalignment, axis interference or loose screws.
- When load changes are large, paint the coupling set screw with an adhesive to prevent the coupling screw from loosening or substitute a coupling one size larger.

Clean Dampers

Mechanical dampers suppress stepping motor vibration and improve high-speed performance. An inertial body and silicon gel are hermetically sealed in a plastic case. This offers the following advantages over conventional magnetic dampers.
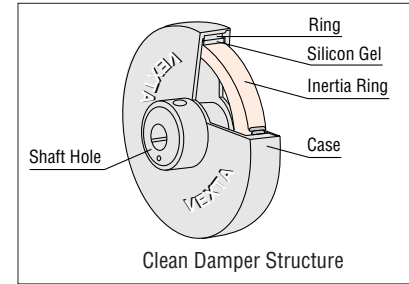

Clean Damper Structure

■ Features

- Since there is no frictional dust as in conventional magnetic dampers, it can be used in environments where higher degrees of cleanness is needed.
- Excellent vibration absorption
- The doughnut-shaped internal inertia body and silicon gel absorb vibration. This feature enables a stable damping effect.
- High reliability
- It holds up well in harsh environments and changes little with age because the silicon gel and plastic case used are heat resistant.
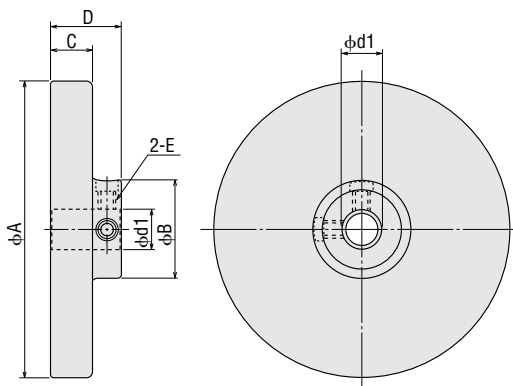
■ Installation of the Clean Damper
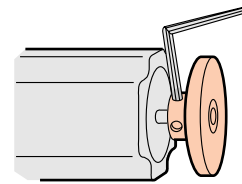
Point the mounting screws of the clean damper toward the motor case, fasten to the shaft and tighten the damper's mounting screws (2 places) with a hexagonal wrench to secure it to the shaft.

Notes:
- There are mounting screws with hexagonal holes in two damper locations, so tighten them both before running the motor.
- The damper rotates at the same speed as the motor shaft, so do not touch it while the motor is running.

■ Product Line

Model	Inertia oz-in^2 (kg·m^2)	Weight lb. (g)	Compatible Motors	
			5-Phase	2-Phase
D4CL-5.0F	0.186 (34×10^{-7})	0.053 (24)	RK54□, RK54□-T, RK54□-N, RK54□-H CFK53□, CFK54□ CSK54□, CSK543-TG□ PMC3□, PMC33-MG□, PMC33-HG□	UMK24□, UMK24□M CSK24□, CSK24□M, CSK243-SG□ PK22□P PK23□P PK24□P PK24□, PK24□M PK223-SG□, PK243-SG□ UMK26□
D6CL-6.3F	0.77 (140×10^{-7})	0.14 (62)		UMK26□M CSK26□ CSK26□M CSK264-SG□ PK26□ PK26□M PK264-SG□ PV264, 266, 267
D6CL-8.0F	0.77 (140×10^{-7})	0.13 (61)	RK56□, RK56□-T, RK56□-N, RK56□-H CFK56□, CFK56□H	
D9CL-12.7F	4.8 (870×10^{-7})	0.23 (105)	CFK59□, CFK59□H CSK59□	CSK29□ PK29□, PK296-SG
D9CL-14F	4.8 (870×10^{-7})	0.23 (105)	RK59□ RK59□-T RK59□-N RK59□-H	

Ambient Temperature: −4°F～+176°F (−20°C～+80°C)
✽ Insert the motor case length into the □ of the model name. The character of **A**, **B** and **M** which show the shaft type and electromagnetic brake type are omitted.

■ Dimensions → page C-294

■ **Dimensions** Unit = **inch** (mm)

Model	d1	A	B	C	D	E
D4CL-5.0F	$0.1969\ ^{+0.0007}_{0}$ $\left(5\ ^{+0.018}_{0}\right)$	$\phi1.42\ \pm0.02$ $(\phi36\ \pm0.5)$	$\phi0.51\ \pm0.02$ $(\phi13\ \pm0.5)$	$0.354\ \pm0.012$ $(9\ \pm0.3)$	$0.591\ \pm0.012$ $(15\ \pm0.5)$	M3 2 Places
D6CL-6.3F	$0.2500\ ^{+0.0009}_{0}$ $\left(6.35\ ^{+0.022}_{0}\right)$	$\phi1.75\ \pm0.02$ $(\phi44.5\ \pm0.5)$	$\phi0.79\ \pm0.02$ $(\phi20\ \pm0.5)$	$0.591\ \pm0.012$ $(15\ \pm0.3)$	$0.87\ \pm0.02$ $(22\ \pm0.5)$	M4 2 Places
D6CL-8.0F	$0.3150\ ^{+0.0009}_{0}$ $\left(8\ ^{+0.022}_{0}\right)$					
D9CL-12.7F	$0.500\ ^{+0.0011}_{0}$ $\left(12.7\ ^{+0.027}_{0}\right)$	$\phi3.13\ \pm0.02$ $(\phi79.5\ \pm0.5)$	$\phi1.02\ \pm0.02$ $(\phi26\ \pm0.5)$	$0.433\ \pm0.012$ $(11\ \pm0.3)$	$0.75\ \pm0.02$ $(19\ \pm0.5)$	M4 2 Places
D9CL-14F	$0.5512\ ^{+0.0011}_{0}$ $\left(14\ ^{+0.027}_{0}\right)$					

Mounting Brackets for Stepping Motors

Mounting brackets are convenient for installing maintaining proper alignment between the motor shaft and the load.

■ Product Line

There are 10 types of mounting brackets for stepping motors.

● **Standard Type, Standard P Type, High-Speed Type, High-Resolution Type, High Inertia Type (PV Series)**

Material: Aluminum die cast

Mounting Bracket Models	Applicable Motor Type			
	αSTEP	5-Phase Stepping Motors	2-Phase Stepping Motors	Low-Speed Synchronous Motors
PAL0PA	—	CSK54☐ CFK54☐	UMK24☐, UMK24☐M CSK24☐, CSK24☐M PK24☐, PK24☐M	
PAF0P	AS46A, AS46M ASC46AK, ASC46MK	RK54☐	PK24☐P	SMK014A-A SMK014MA-A
PAL2P-5A	AS66A, AS69A AS66M, AS69M ASC66AK, ASC66MK	RK56☐ CSK56☐ CFK56☐, CFK56☐H	—	—
PAL2P-2	—	—	UMK26☐, UMK26☐M CSK26☐, CSK26☐M PK26☐, PK26☐M PV26☐	SMK237A-A
PAL4P-5A	AS98A, AS98M AS911A	RK59☐ CSK59☐, CFK59☐H	—	—
PAL4P-2	—	—	CSK29☐ PK29☐	SMK5100A-AA SMK5160A-AA

● Insert the motor case length in the ☐ of the model name.
  The character of **A** and **B** which show the shaft type are omitted (except for Low Speed Synchronous Motor).
● The mounting bracket base is built with holes large enough to allow for alignment adjustments in the horizontal direction.
  (Adjustable range: Approximately 0.24 inch [6 mm])
● These mounting brackets can be perfectly fitted to the pilot of the stepping motors. (except for **PAL0PA**)
Notes:
● These mounting brackets are for stepping motors only. They cannot be used with compact AC motors.
● They cannot be used with geared stepping motors.

● Geared Type

Material: Aluminum die cast

| Mounting Bracket Models	Applicable Motor Type			
	αSTEP	5-Phase Stepping Motors	2-Phase Stepping Motors	SMK
SOL0A-A	—	—	CSK243-SG☐ PK243-SG☐	SMK0A-☐
SOL0B-A	AS46-T☐ ASC46-T☐	RK543-T☐ CSK543-T☐	—	—
SOL2A-A	AS66-T☐ ASC66-T☐	RK564-T☐ CSK564-T☐	CSK264-SG☐ PK264-SG☐	—
SOL5B-A	AS98-T☐	RK596-T☐	PK296-SG☐	—

● Insert the gear ratio in the ☐ of the model name.
  The character of **A** and **B** which show the shaft type and the length of the motor case are partly omitted.
● The mounting bracket base is built with holes large enough to allow for alignment adjustments in the horizontal direction.
● When mounting, use the screws included with the geared motor. (except for αSTEP)
Note:
● These mounting brackets are for geared stepping motors only. They cannot be used with compact AC motors or stepping motors with gearheads.
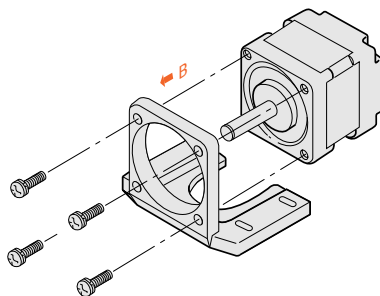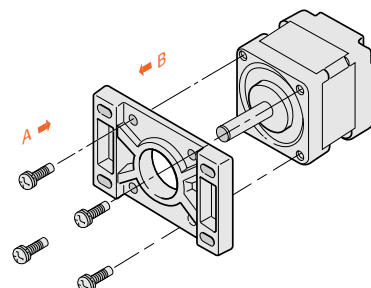
■ Mounting the Motor

1 PAL2P-□, PAL4P-□

2 PAL0PA
SOL0□, SOL2□, SOL5□

3 PAF0P
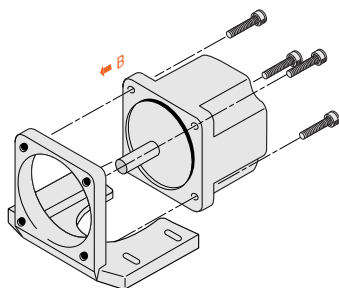
① Use the screws provided to secure the motor to the mounting bracket.
② Attach the motor from the direction shown by the arrow (B).

① Use the screws provided to secure the motor to **PAL0PA**.
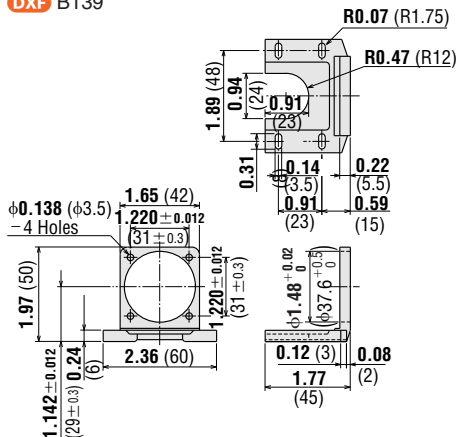② Attach the motor from the direction shown by the arrow (B).

① Use the screws provided to secure the motor to **PAF0P**.
② Motor can be attached from either side (A, B).

■ Dimensions Unit = **inch** (mm)
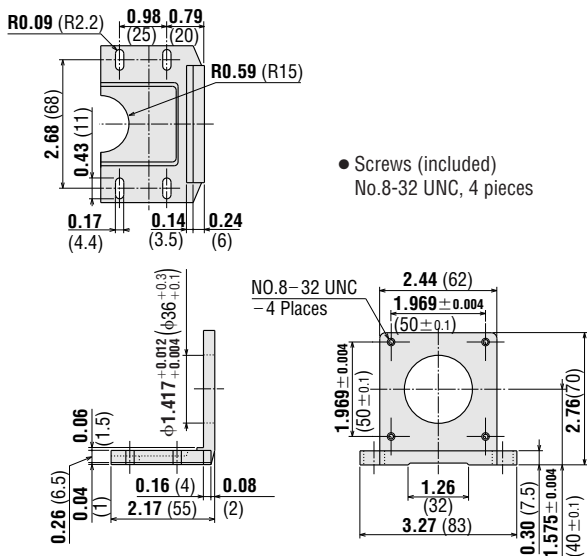
PAL0PA
Weight: 1.24 oz. (35 g)
DXF B139

R0.07 (R1.75)
R0.47 (R12)
1.89 (48)
0.94 (24)
0.91 (23)
0.31
0.14 (3.5)
0.22 (5.5)
0.91 (23)
0.59 (15)
φ0.138 (φ3.5) −4 Holes
1.65 (42)
1.220±0.012 (31±0.3)
1.97 (50)
1.220±0.012 (31±0.3)
φ1.48 +0.02 0 (φ37.6 +0.5 0)
1.142±0.012 (29±0.3)
0.24 (6)
2.36 (60)
0.12 (3)
0.08 (2)
1.77 (45)

● Screws (included)
  No.4-40 UNC, 4 pieces

PAL2P-5A
Weight: 3.9 oz. (110 g)
DXF B143

R0.09 (R2.2)
0.98 (25)
0.79 (20)
R0.59 (R15)
2.68 (68)
0.43 (11)
0.17 (4.4)
0.14 (3.5)
0.24 (6)

● Screws (included)
  No.8-32 UNC, 4 pieces

NO.8−32 UNC −4 Places
2.44 (62)
1.969±0.004 (50±0.1)
φ1.417 +0.012 +0.004 (φ36 +0.3 +0.1)
1.969±0.004 (50±0.1)
2.76 (70)
0.06 (1.5)
0.26 (6.5)
0.04 (1)
0.16 (4)
2.17 (55)
0.08 (2)
1.26 (32)
3.27 (83)
0.30 (7.5)
1.575±0.004 (40±0.1)

PAF0P
Weight: 1.06 oz. (30 g)
DXF B140

2.6 (66)
2.13 (54)
1.22±0.012 (31±0.3)
A
0.14 (3.5)
1.22±0.012 (31±0.3)
1.65 (42)
φ0.87 +0.02 0 (φ22 +0.5 0)
0.28 (7)
R0.07 (1.75)
0.31 (8)
A'
φ0.138 (φ3.5) −4 Holes
Cross Section AA'
0.12 (3)
0.28 (7)
0.02 (0.5)
0.47 (12)
1.65 (42)
0.47 (12)
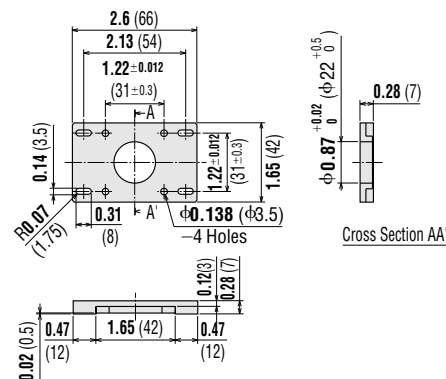
● Screws (included)
  M3 P0.5, 0.28 inch (7 mm) length, 4 pieces

PAL2P-2
Weight: 3.9 oz. (110 g)
DXF B144

0.43 (11)
0.98 (25)
0.79 (20)
0.24 (6)
0.17 (4.4)
0.14 (3.5)
R0.59 (R15)
2.68 (68)
R0.09 (R2.2)
φ1.500 +0.012 +0.004 (φ38.1 +0.3 +0.1)

M4 P0.7 −4 Places

0.26
0.06 (1.5)
0.04 (1)
6.5
0.16 (4)
2.17 (55)
0.08 (2)
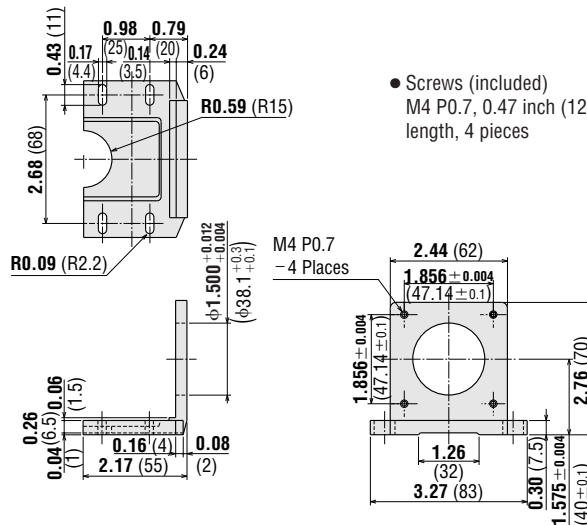
● Screws (included)
  M4 P0.7, 0.47 inch (12 mm) length, 4 pieces

M4 P0.7 −4 Places
2.44 (62)
1.856±0.004 (47.14±0.1)
1.856±0.004 (47.14±0.1)
2.76 (70)
1.26 (32)
3.27 (83)
0.30 (7.5)
1.575±0.004 (40±0.1)

PAL4P-5A

Weight: 8.8 oz. (250 g)

DXF B145

● Screws (included)
No.10-24 UNC, 4 pieces

NO.10−24 UNC −4 Places
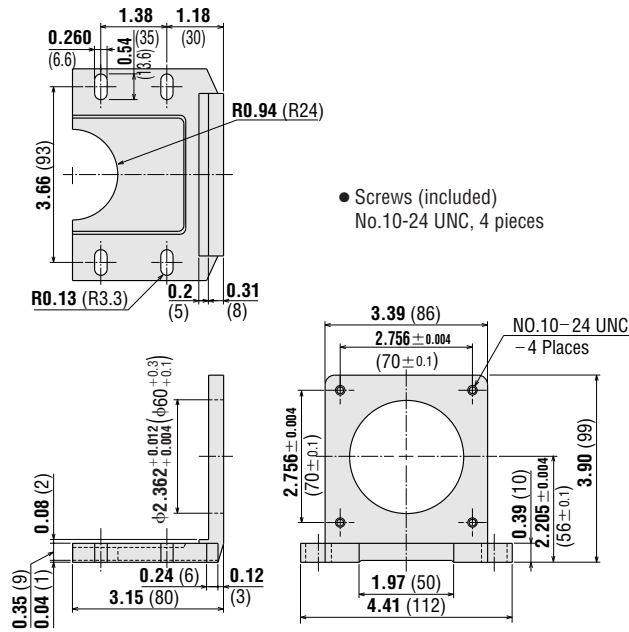
PAL4P-2

Weight: 8.8 oz. (250 g)

DXF B146

● Screws (included)
M5 P0.8, 0.63 inch (16 mm) length, 4 pieces

M5 P0.8 −4 Places
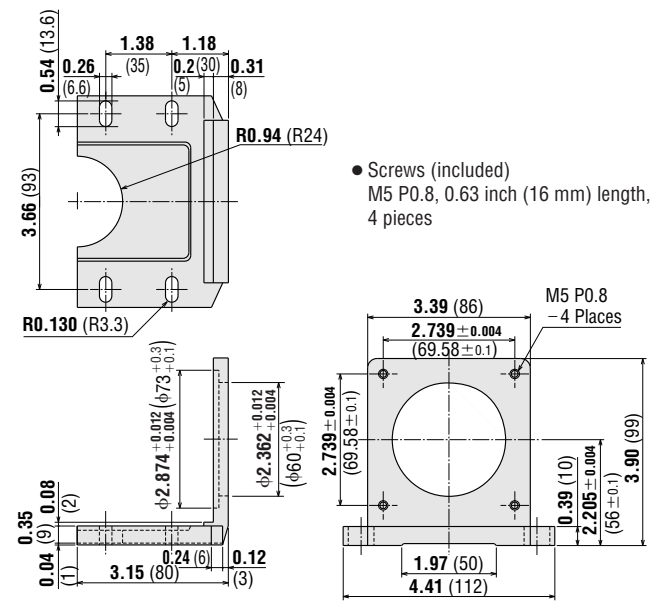
SOL0A-A

Weight: 2.8 oz. (80 g)

DXF B266

SOL0B-A

Weight: 2.8 oz. (80 g)

DXF B267

SOL0A-A: φ0.138 (φ3.5) −4 Holes
SOL0B-A: φ0.177 (φ4.5) −4 Holes

SOL2A-A

Weight: 4.2 oz. (120 g)

DXF B268

φ0.177 (φ4.5) −4 Holes

Stepping Motors

Introduction

AS

AS PLUS

ASC

RK

CKⅡ

CSK

PMC

UMK

CSK

PK/PV

PK

UI2120G

EMP401 EMP402 SG8030J

SMK

Accessories

Before Using a Stepping Motor

Closed Loop αSTEP

AC Input

DC Input

Motor & Driver Packages

5-Phase Microstep

AC Input

DC Input

5-Phase Full/Half

DC Input

2-Phase Full/Half

AC Input

DC Input

2-Phase Stepping Motors

without Encoder

with Encoder

Driver with Indexer

Controllers

Low-Speed Synchronous Motors

SOL5B-A
Weight: 9.5 oz. (270 g)
DXF B271

1.69 (43)
5.04 (128)
1.97 (50)
0.25 (6.4)
0.37 (9.4)
1.57 (40)
0.67 (17)
φ**0.335** (φ8.5) −4 Holes
0.43 (11)
0.06 (1.5)

4.41 (112)
3.62 (92)
0.35 (9) 1.02 (26)
0.12 (3)
φ4.004±0.002
(φ104±0.3)
φ3.27 (φ83)
φ3.15 (φ80)
2.89 (73.5)
4.41 (112)
2.60±0.02 (66±0.5)
5.75 (146)
0.04 (1)
0.35 (9)
2.56 (65)

DIN Rail Mounting Plate

This installation plate is convenient for installing the driver on DIN rails with ease. The required installation screws come with this installation plate.

● Model: **PADP01**
   Applicable Product: *αSTEP* **AS** Series driver

DIN Rail Mounting Plate

■ **Dimensions** Unit = **inch** (mm)
Weight: 0.71 oz. (20 g)
● Screws (included)
   M3 P0.5, 0.31 inch (8 mm) length, 3 pieces

0.43(11)
1.34(34)
0.71(18)
0.31(8)
0.18 (4.5)
1.93(49)
3.50(89)
4.72(120)
5.73(145.5)
DIN Rail Center
0.66 (16.8)