# Oriental motor

(RoHS) RoHS-Compliant

5-Phase Stepping Motor and Driver Package

CRK Series

24 VDC Photocoupler Input   1-Pulse/2-Pulse Input Specifications

- ●**High-Resolution Type**
- ●**Standard Type**
- ●**PN Geared Type**
- ●**High-Torque Type**
- ●**TH Geared Type**
- ●**Harmonic Geared Type**

The **CRK** Series is a motor/driver package consisting of a high-performance 5-phase stepping motor and a compact, low-vibration microstep driver offering the Smooth Drive Function. The compact high-torque type of stepping motor together with the high performance geared types of motors open a new realm of application possibilities for this DC input 5-phase stepping motor and driver package.
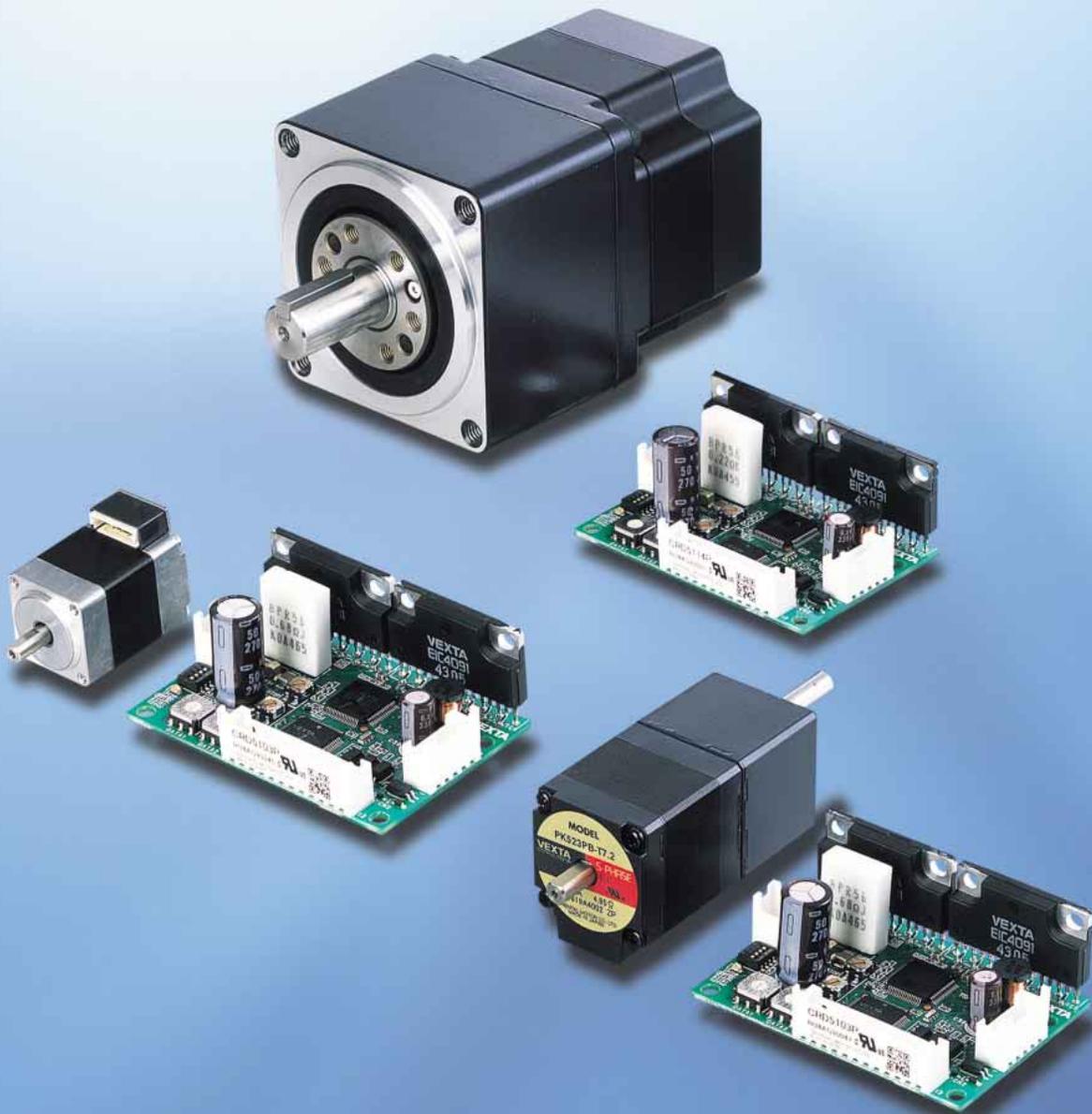
(RoHS) RoHS-Compliant

5-Phase Stepping Motor and Driver Package

CRK Series

The **CRK** Series is a motor/driver unit combining a high-performance, 5-phase stepping motor with a compact, low-vibration microstep driver offering the Smooth Drive Function. Four frame sizes of 20 mm (0.79 in.), 28 mm (1.10 in.), 42 mm (1.65 in.) and 60 mm (2.36 in.) are available, and there are models fitted with various geared motors.
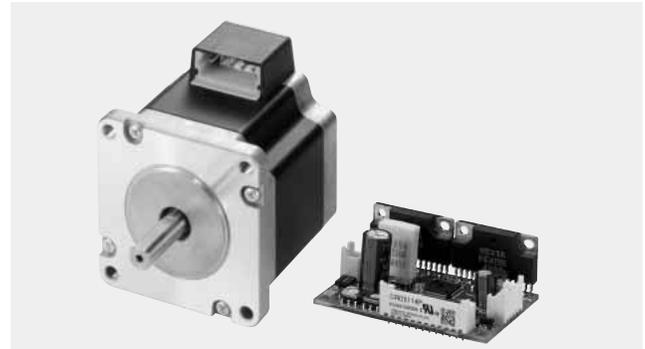
■Features

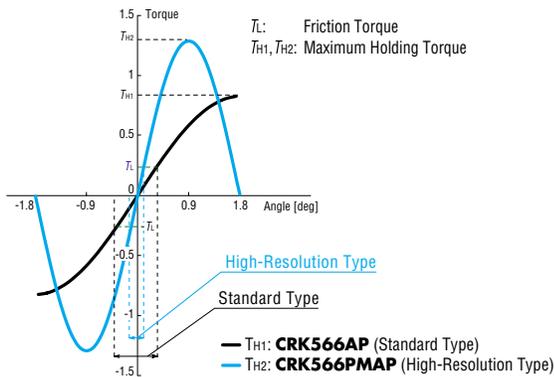### ●Newly Designed Motors
◇High-Resolution Motor
· Improved Stopping Accuracy

The basic step angle of the high-resolution type is 0.36˚/step, which is half the basic step angle of the standard type.

The positioning accuracy of stepping motors is affected by frictional load.

The **CRK**'s high-resolution type, having a smaller basic step angle and capable of generating approx. 1.5 times the torque of the standard type, ensures quick torque rise, thereby minimizing the effect of frictional load.

Comparison of Angle-Torque Characteristics

T_L: Friction Torque
T_{H1}, T_{H2}: Maximum Holding Torque

High-Resolution Type
Standard Type
T_{H1}: **CRK566AP** (Standard Type)
T_{H2}: **CRK566PMAP** (High-Resolution Type)

· Static Angle Error of 2 Arc Minutes (No Load)

The high-resolution type is designed with a static angle error of 2 arc minutes (0.034˚) [standard type: 3 arc minutes (0.05˚)]. The reduced error helps improve the positioning accuracy of your equipment.

Static Angle Characteristics

Power Supply Voltage: 24 VDC
Resolution 1 (0.36˚/step)

CRK566PMBP
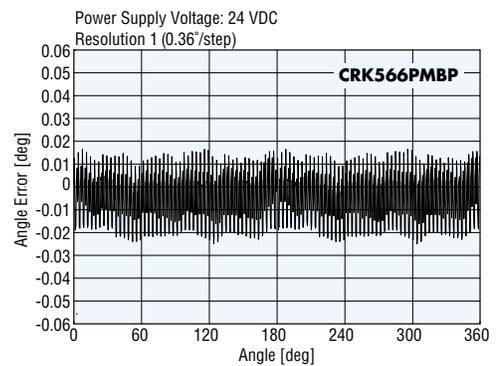
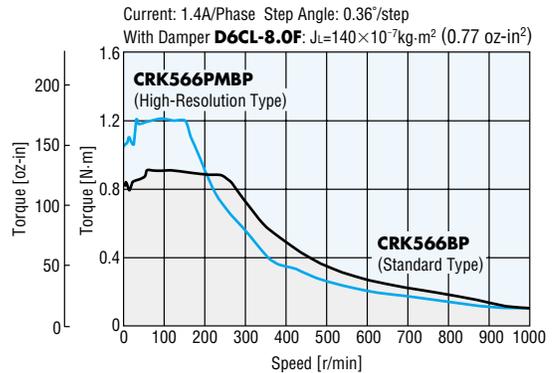### ◇High-Torque Motor

The high-resolution type and high-torque type adopt a newly designed high-torque motor that widens the range of applications.
●The smaller motor allows for compact equipment design.
●The motor current is reduced to suppress heat generation.
Example) Avoidance of temperature rise in precision equipment or machinery

Comparison of Speed vs. Torque Characteristics

Current: 1.4A/Phase Step Angle: 0.36˚/step
With Damper **D6CL-8.0F**: $J_L = 140 \times 10^{-7} kg \cdot m^2$ (0.77 oz-in^2)

CRK566PMBP
(High-Resolution Type)

CRK566BP
(Standard Type)

◇Connector Coupling Design

The high-resolution type and high-torque type adopt a connector-coupled motor to ensure greater ease of handling. There is no need to cut lead wires or pressure-bond the connector. You can also select a cable of desired length and type. The connector coupling design also makes maintenance easy.

✱The **CRK** package comes with a motor leadwire/connector assembly [0.6 m (2 ft.)].
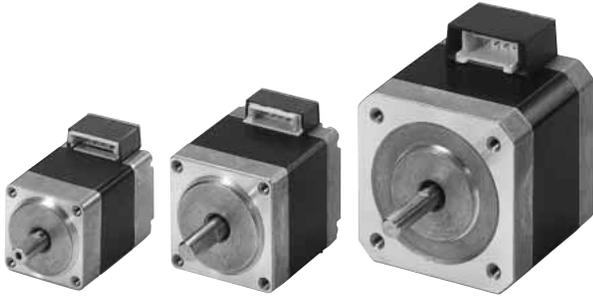
●Wide Range of Motor Variations

The **CRK** Series offers models of the high-resolution type, high-torque type and standard type, as well as various geared types. You can find a product meeting your specific torque, resolution or other needs from a total of 98 different specifications.

●Compact, Lightweight Microstep Driver

The driver in the **CRK** Series achieves microstep drive in a compact, lightweight body.

A new IC allows the driver to provide various functions, including the following:

● Smooth Drive Function
● 1-pulse/2-pulse input mode switching
● 25 preset step angles
● Power LED
● Photocoupler input

Mass: 40 g (0.088 lb.)

25 mm (0.98 in.)
45 mm (1.77 in.)
65 mm (2.56 in.)
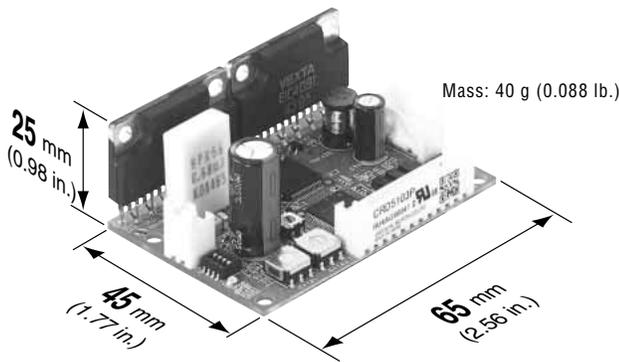
◇Lower Vibration and Noise Achieved by Microstep Drive
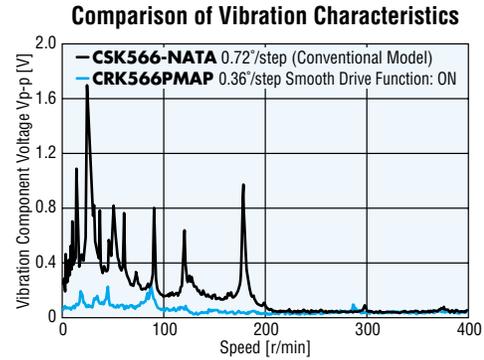
The basic step angle of the motor can be divided into a maximum of 250 microstep angles without using any mechanical element such as a reduction gear.
As a result, vibration and noise are further reduced.

◇Improved 5-Phase Performance can Usually be Easily Integrated into an Existing 2-Phase System

The basic step angle can be adjusted to match a 2-phase stepping motor's step angles, so a switchover from the 2-phase microstep mode can be easily made, without having to change input pulses.

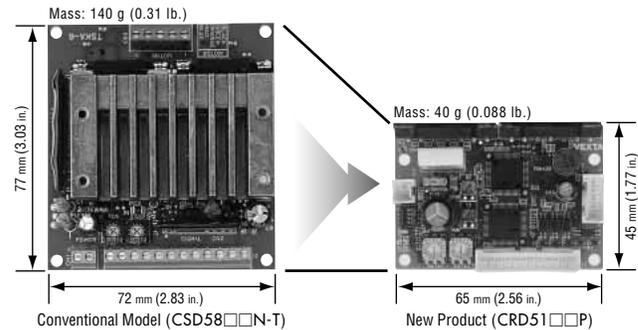## ◇Smooth Drive Function for Enhanced Ease of Use

The Smooth Drive Function automatically controls operations via microstep drive at the same travel distance and speed used in the full-step mode, without requiring the operator to change the pulse input settings.

This function is particularly useful when the **CRK** Series is used in the full-step or half-step mode.

Comparison of Vibration Characteristics

— **CSK566-NATA** 0.72°/step (Conventional Model)
— **CRK566PMAP** 0.36°/step Smooth Drive Function: ON

Vibration Component Voltage Vp-p [V] (vertical axis: 0, 0.4, 0.8, 1.2, 1.6, 2.0)
Speed [r/min] (horizontal axis: 0, 100, 200, 300, 400)

◇Compact Size

The compact, lightweight driver in the **CRK** Series is approx. 45% smaller than a conventional full-step driver.

Comparison of Driver Size and Weights

Mass: 140 g (0.31 lb.)
77 mm (3.03 in.)
72 mm (2.83 in.)
Conventional Model (CSD58□□N-T)

Mass: 40 g (0.088 lb.)
45 mm (1.77 in.)
65 mm (2.56 in.)
New Product (CRD51□□P)

●Conforming to International Safety Standards

The **CRK** Series is UL-recognized and CSA-certified.
It also bears the CE Mark as a proof of conformance to the EMC Directives.
Safe operation is ensured anywhere in the world.

● (RoHS) RoHS-Compliant

The **CRK** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.

RoHS (Restriction of Hazardous Substances) Directive:
Directive on restriction of the use of certain hazardous substances in electrical and electronic equipment (2002/95/EC).
The RoHs Directive prohibits the use of six chemical substances in electrical and electronic products sold in the EU member states. The six controlled substances are: lead, hexavalent chromium, cadmium, mercury and two specific brominated flame-retardants (PBB and PBDE).

■Wide Variety

The **CRK** Series comes in four frame sizes of 20 to 60 mm (0.79 to 2.36 in.), as well as three geared types. You can choose from as many as 98 different specifications to suit your specific needs.

Type		Features	□20 mm (□0.79 in.)	□28 mm (□1.10 in.)	□42 mm (□1.65 in.)	□60 mm (□2.36 in.)	Driver
High-Resolution Type		A high-torque motor offering higher positioning accuracy with the basic step angle set to 0.36°/step, or half the basic step angle of the standard type.					
High-Torque Type		A high-torque motor generating high torque of approx. 1.3 to 1.5 times the level achieved by the standard type.					
Standard Type		The basic model in the **CRK** Series offering an optimal balance of torque, low vibration and low noise.					
Low Backlash Type	**TH** Geared Type	A geared motor achieving both low backlash and low cost.					
Non-Backlash Type	**PN** Geared Type	A high-accuracy geared motor achieving a backlash of 3 arc minutes or less. It also provides high strength and wide gear ratios.					
	Harmonic Geared Type	A high-accuracy, backlash-free geared motor adopting a newly developed harmonic gear. It ensures high strength in a compact body.					

4

■Characteristics Comparison for Geared Motors

	Geared Type	Features	Permissible Torque/Maximum Torque [N·m (lb-in)]		Backlash [arc min]	Basic Resolution [deg/step]	Output Shaft Speed [r/min]
Low Backlash Type	**TH** Geared (Parallel Shaft)	· A wide variety of low gear ratios for high-speed operation · Gear ratios: 1:3.6, 1:7.2, 1:10, 1:20, 1:30	4 (35)		60	0.024	500
Non-Backlash Type	**PN** Geared (Planetary Gear)	· High speed (low gear ratio), high positioning precision · High permissible/maximum torque · A wide variety of gear ratios for selecting the desired step angle · Centered output shaft · Gear ratios: 1:5, 1:7.2, 1:10, 1:25, 1:36, 1:50	Permissible Torque 8 (70)	Maximum Torque 20 (177)	3	0.0144	600
Non-Backlash Type	Harmonic Geared (Harmonic Drive)	· High positioning precision · High permissible/maximum torque · High gear ratio, high resolution · Centered output shaft · Gear ratios: 1:50, 1:100	Permissible Torque 8 (70)	Maximum Torque 28 (240)	0	0.0072	70

Note:
- The values shown above must be used as reference.
  The actual values vary depending on the motor frame size and gear ratio.

■Safety Standards and CE Marking

Product			Applicable Standards[*3]	Certification Body	Standards File No.	CE Marking
Motor	High-Resolution Type		UL 60950-1 CSA C22.2 No.60950-1	UL	E208200	EMC Directive[*4]
	High-Torque Type		UL 60950 CSA C22.2 No.60950	UL		
	Standard Type **TH** Geared Type **PN** Geared Type Harmonic Geared Type	□20 mm (□0.79 in.)[*1] □28 mm (□1.10 in.)[*2]	UL 60950 CSA C22.2 No.60950	UL	E208200	
		□42 mm (□1.65 in.)	UL 1004, UL 2111	UL	E64199	
		□60 mm (□2.36 in.)	UL 1004, UL 2111 CSA C22.2 No.77 CSA C22.2 No.100	UL		
Driver			UL 60950-1 CSA C22.2 No.60950-1	UL	E208200	

✳1 Harmonic geared type only
✳2 **TH** geared type and **PN** geared type only
✳3 Approval conditions for UL 60950, UL 60950-1: Class Ⅲ equipment, SELV circuit, Pollution degree 2
✳4 Oriental Motor declares compliance with the EMC Directive based on motor and driver combinations.
- When the system is approved under various safety standards, the model names in the motor and driver nameplates are the approved model names.
- The EMC value changes according to the wiring and layout. Therefore, the final EMC level must be checked with the motor/driver incorporated in the user's equipment.

■System Configuration

An example of a system configuration with the **SG8030** Series controller.

Motor Mounting Brackets (Accessories)

A motor of the high-resolution type [excluding □28 mm (□1.10 in.) motors], high-torque type [excluding □20/28 mm (□0.79/1.10 in.) motors], standard type or geared type [excluding □28 mm (□1.10 in.) **TH** geared, **PN** geared motors or harmonic geared motors] can be installed easily. (➔ Page 33)

Flexible Couplings (Accessories)

Non-backlash coupling for precise positioning (➔ Page 36)

Clean Dampers (Accessories)

Effective to suppress stepping motor vibration and improve high-speed performance [excluding □20 mm (□0.79 in.) motors]. (➔ Page 39)

Driver Leadwire Set (Accessories)

The driver leadwire set includes three sets of leadwires, for connection between the driver and motor, power supply and I/O signal. A connector for one-touch connection with **CRK** Series driver is assembled at one end of the leadwire. (➔ Page 40)

Motor

Driver

CRK Series

Controller (Sold separately) (➔ Page 32)

Programmable Controller

(Not supplied)

24 VDC Power Supply

(Not supplied)

●**Example of System Configuration**

(Body)

◎: Required under this system.
◯: Optional accessory offered by Oriental Motor.

(Sold separately)

CRK Series
CRK566PMBP

+

Controller	Motor Mounting Bracket	Flexible Coupling	Clean Damper	Driver Leadwire Set [0.6 m (2 ft.)]
SG8030J-U	PAL2P-5	MCS300808	D6CL-8.0F	LCS04SD5
◎	◯	◯	◯	◯

●The system configuration shown above is an example. Other combinations are available.

Product Number Code

●High-Resolution Type/High-Torque Type/Standard Type

CRK 5 4 4 P M A P
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Series	**CRK**: CRK Series
②	**5**: 5-Phase	
③	Motor Frame Size	**1**: 20 mm (0.79 in.)　**2**: 28 mm (1.10 in.)　**4**: 42 mm (1.65 in.)　**6**: 60 mm (2.36 in.)
④	Motor Case Length	
⑤	Motor Type	
⑥	Resolution　**M**: High-Resolution	
⑦	Motor Shaft Type　**A**: Single Shaft　**B**: Double Shaft	
⑧	Signal I/O Mode of Driver　**P**: Photocoupler	

●Geared Type

CRK 5 2 3 P A P-N 7.2
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①	Series	**CRK**: CRK Series
②	**5**: 5-Phase	
③	Motor Frame Size	**2**: 28 mm (1.10 in.)　**4**: 42 mm (1.65 in.)　**6**: 60 mm (2.36 in.)
④	Motor Case Length	
⑤	Motor Type	
⑥	Motor Shaft Type　**A**: Single Shaft　**B**: Double Shaft	
⑦	Signal I/O Mode of Driver　**P**: Photocoupler	
⑧	Gearhead Type　**T**: TH Geared Type　**N**: PN Geared Type　**H**: Harmonic Geared Type	
⑨	Gear Ratio	

Product Line

●High-Resolution Type

Model (Single Shaft)	Model (Double Shaft)
CRK523PMAP	CRK523PMBP
CRK524PMAP	CRK524PMBP
CRK525PMAP	CRK525PMBP
CRK544PMAP	CRK544PMBP
CRK546PMAP	CRK546PMBP
CRK564PMAP	CRK564PMBP
CRK566PMAP	CRK566PMBP
CRK569PMAP	CRK569PMBP

●High-Torque Type

Model (Single Shaft)	Model (Double Shaft)
CRK513PAP	CRK513PBP
CRK523PAP	CRK523PBP
CRK525PAP	CRK525PBP
CRK544PAP	CRK544PBP
CRK546PAP	CRK546PBP

●Standard Type

Model (Single Shaft)	Model (Double Shaft)
CRK543AP	CRK543BP
CRK544AP	CRK544BP
CRK545AP	CRK545BP
CRK564AP	CRK564BP
CRK566AP	CRK566BP
CRK569AP	CRK569BP

●TH Geared Type

Model (Single Shaft)	Model (Double Shaft)
CRK523PAP-T7.2	CRK523PBP-T7.2
CRK523PAP-T10	CRK523PBP-T10
CRK523PAP-T20	CRK523PBP-T20
CRK523PAP-T30	CRK523PBP-T30
CRK543AP-T3.6	CRK543BP-T3.6
CRK543AP-T7.2	CRK543BP-T7.2
CRK543AP-T10	CRK543BP-T10
CRK543AP-T20	CRK543BP-T20
CRK543AP-T30	CRK543BP-T30
CRK564AP-T3.6	CRK564BP-T3.6
CRK564AP-T7.2	CRK564BP-T7.2
CRK564AP-T10	CRK564BP-T10
CRK564AP-T20	CRK564BP-T20
CRK564AP-T30	CRK564BP-T30

●PN Geared Type

Model (Single Shaft)	Model (Double Shaft)
CRK523PAP-N5	CRK523PBP-N5
CRK523PAP-N7.2	CRK523PBP-N7.2
CRK523PAP-N10	CRK523PBP-N10
CRK544AP-N5	CRK544BP-N5
CRK544AP-N7.2	CRK544BP-N7.2
CRK544AP-N10	CRK544BP-N10
CRK566AP-N5	CRK566BP-N5
CRK566AP-N7.2	CRK566BP-N7.2
CRK566AP-N10	CRK566BP-N10
CRK564AP-N25	CRK564BP-N25
CRK564AP-N36	CRK564BP-N36
CRK564AP-N50	CRK564BP-N50

●Harmonic Geared Type

Model (Single Shaft)	Model (Double Shaft)
CRK543AP-H50	CRK543BP-H50
CRK543AP-H100	CRK543BP-H100
CRK564AP-H50	CRK564BP-H50
CRK564AP-H100	CRK564BP-H100

High-Resolution Type Motor Frame Size 28 mm (1.10 in.), 42 mm (1.65 in.)
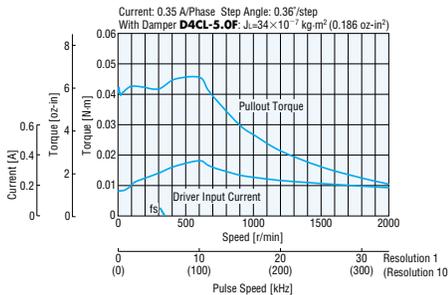
■Specifications (RoHS)

c🆄us CE

Model	Single Shaft	CRK523PMAP∗	CRK524PMAP∗	CRK525PMAP∗	CRK544PMAP∗	CRK546PMAP∗
	Double Shaft	CRK523PMBP∗	CRK524PMBP∗	CRK525PMBP∗	CRK544PMBP∗	CRK546PMBP∗
Maximum Holding Torque	N·m (oz-in)	0.042 (5.9)	0.061 (8.6)	0.09 (12.7)	0.24 (34)	0.42 (59)
Rotor Inertia	J: kg·m^2 (oz-in^2)	9×10^{-7} (0.049)	13×10^{-7} (0.071)	19×10^{-7} (0.104)	60×10^{-7} (0.33)	121×10^{-7} (0.66)
Rated Current	A/Phase	0.35			0.75	
Basic Step Angle		0.36˚				
Power Source		24 VDC±10%　0.7 A			24 VDC±10%　1.4 A	
Excitation Mode		Microstep				
Mass	Motor　kg (lb.)	0.11 (0.24)	0.15 (0.33)	0.2 (0.44)	0.3 (0.66)	0.5 (1.1)
	Driver　kg (lb.)	0.04 (0.088)				
Dimension No.	Motor	②			③	
	Driver	⑮				

How to Read Specifications Table → See the following descriptions.

∗Motor leadwire/connector assembly [0.6 m (2 ft.)] is included with connector type package.

■Speed – Torque Characteristics fs: Maximum Starting Frequency
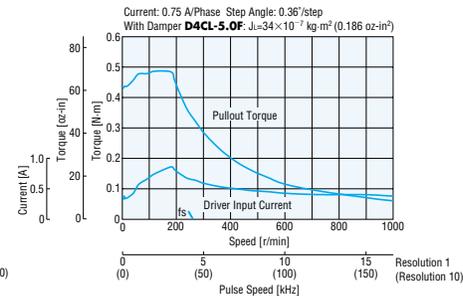
CRK523PMAP/CRK523PMBP
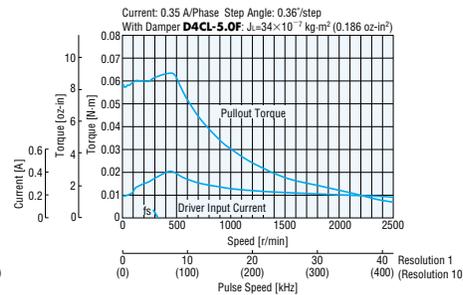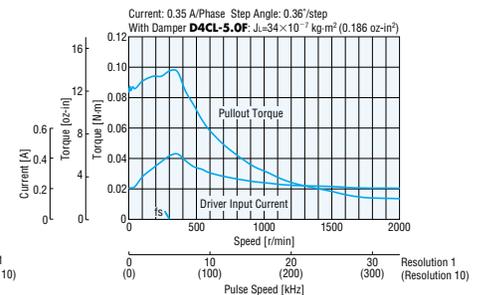
Current: 0.35 A/Phase Step Angle: 0.36˚/step
With Damper **D4CL-5.0F**: J$_L$=34×10^{-7} kg·m^2 (0.186 oz-in^2)

CRK524PMAP/CRK524PMBP

Current: 0.35 A/Phase Step Angle: 0.36˚/step
With Damper **D4CL-5.0F**: J$_L$=34×10^{-7} kg·m^2 (0.186 oz-in^2)

CRK525PMAP/CRK525PMBP

Current: 0.35 A/Phase Step Angle: 0.36˚/step
With Damper **D4CL-5.0F**: J$_L$=34×10^{-7} kg·m^2 (0.186 oz-in^2)

CRK544PMAP/CRK544PMBP

Current: 0.75 A/Phase Step Angle: 0.36˚/step
With Damper **D4CL-5.0F**: J$_L$=34×10^{-7} kg·m^2 (0.186 oz-in^2)

CRK546PMAP/CRK546PMBP

Current: 0.75 A/Phase Step Angle: 0.36˚/step
With Damper **D4CL-5.0F**: J$_L$=34×10^{-7} kg·m^2 (0.186 oz-in^2)

●The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:

●Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
　Be sure to keep the temperature of the motor case under 100˚C (212˚F).
　[Under 75˚C (167˚F) is required to comply with UL or CSA standards.]

●When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

■How to Read Specifications Table Please read the following information before examining the specifications on pages 8 to 18.

Maximum Holding Torque:	The holding torque (5-Phase: 5-Phase Excitation) is the maximum holding power (torque) the stepping motor has when power (rated current) is being supplied but the motor is not rotating (with consideration given to the permissible strength of the gear when applicable). At motor standstill, the driver's "Automatic Current Cutback" function reduces the maximum holding torque by approximately 50%.
Permissible Torque:	The permissible torque represents the torque value limited by the mechanical strength of the gear when operated at a constant speed. For the types excluding **PN** and harmonic geared type, the total torque including acceleration/deceleration torque should not exceed this value.
Maximum Torque:	This is the maximum torque that can be used instantaneously (for a short time). During acceleration/deceleration, the motor can be operated up to this value. (**PN** geared, harmonic geared type only)
Angle Error:	Difference between the theoretical angle of rotation of the output shaft as calculated from the input pulses, and the actual angle of rotation. (**PN** geared type only)

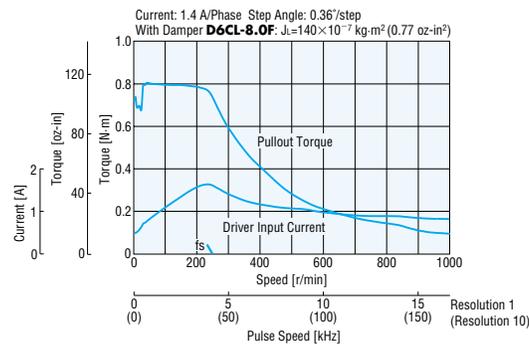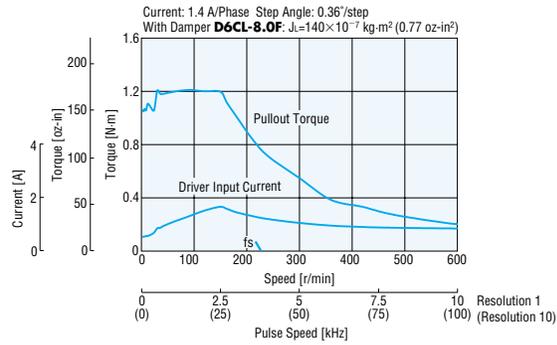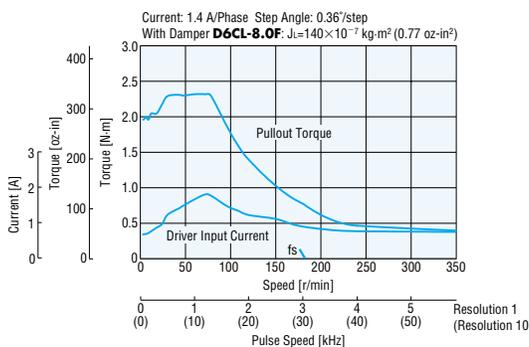# High-Resolution Type Motor Frame Size 60 mm (2.36 in.)

■Specifications (RoHS)

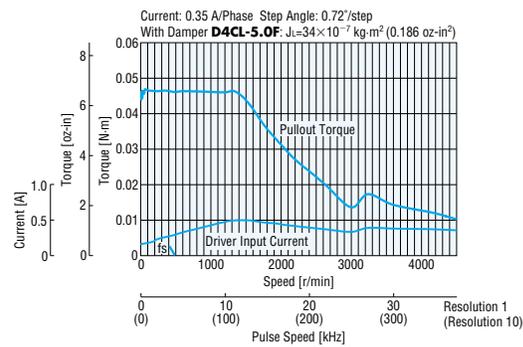| Model		CRK564PMAP∗	CRK566PMAP∗	CRK569PMAP∗
	Single Shaft	CRK564PMAP∗	CRK566PMAP∗	CRK569PMAP∗
	Double Shaft	CRK564PMBP∗	CRK566PMBP∗	CRK569PMBP∗
Maximum Holding Torque	N·m (oz-in)	0.78 (110)	1.3 (184)	2.3 (320)
Rotor Inertia	J: kg·m² (oz-in²)	$310{\times}10^{-7}$ (1.7)	$490{\times}10^{-7}$ (2.7)	$970{\times}10^{-7}$ (5.3)
Rated Current	A/Phase	1.4		
Basic Step Angle		0.36˚		
Power Source		24 VDC±10% 2.5 A		
Excitation Mode		Microstep		
Mass	Motor kg (lb.)	0.65 (1.43)	0.87 (1.91)	1.5 (3.3)
	Driver kg (lb.)	0.04 (0.088)		
Dimension No.	Motor	4		
	Driver	15		

How to Read Specifications Table → Page 8

∗Motor leadwire/connector assembly [0.6 m (2 ft.)] is included with connector type package.

■Speed – Torque Characteristics fs: Maximum Starting Frequency

CRK564PMAP/CRK564PMBP

Current: 1.4 A/Phase Step Angle: 0.36˚/step
With Damper **D6CL-8.0F**: J_L=140$\times10^{-7}$ kg·m² (0.77 oz-in²)

CRK566PMAP/CRK566PMBP

Current: 1.4 A/Phase Step Angle: 0.36˚/step
With Damper **D6CL-8.0F**: J_L=140$\times10^{-7}$ kg·m² (0.77 oz-in²)

CRK569PMAP/CRK569PMBP

Current: 1.4 A/Phase Step Angle: 0.36˚/step
With Damper **D6CL-8.0F**: J_L=140$\times10^{-7}$ kg·m² (0.77 oz-in²)

●The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:

●Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
Be sure to keep the temperature of the motor case under 100˚C (212˚F).
[Under 75˚C (167˚F) is required to comply with UL or CSA standards.]

●When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

High-Torque Type Motor Frame Size 20 mm (0.79 in.), 28 mm (1.10 in.)
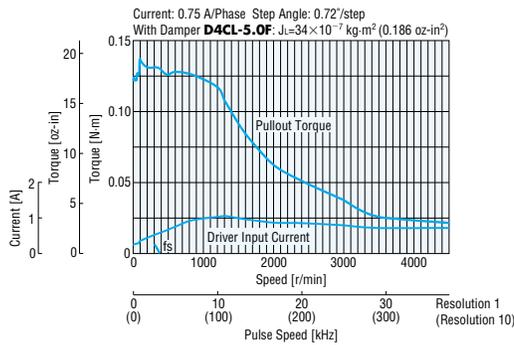
■Specifications (RoHS)

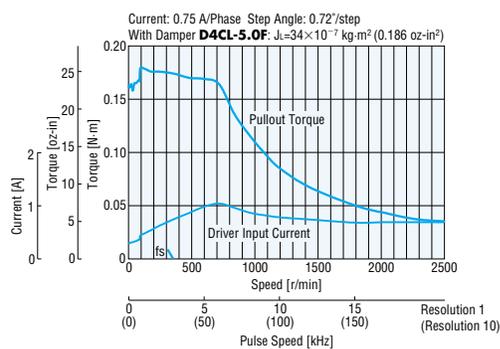| Model		CRK513PAP∗	CRK523PAP∗	CRK525PAP∗
	Single Shaft	**CRK513PAP∗**	**CRK523PAP∗**	**CRK525PAP∗**
	Double Shaft	**CRK513PBP∗**	**CRK523PBP∗**	**CRK525PBP∗**
Maximum Holding Torque	N·m (oz-in)	0.0231 (3.2)	0.048 (6.8)	0.078 (11)
Rotor Inertia	J: kg·m^2 (oz-in^2)	2.6×10^{-7} (0.0142)	9×10^{-7} (0.049)	18×10^{-7} (0.098)
Rated Current	A/Phase	0.35		
Basic Step Angle		0.72˚		
Power Source		24 VDC±10% 0.7 A		
Excitation Mode		Microstep		
Mass	Motor kg (lb.)	0.05 (0.11)	0.11 (0.24)	0.2 (0.44)
	Driver kg (lb.)	0.04 (0.088)		
Dimension No.	Motor	1	2	
	Driver	15		

How to Read Specifications Table → Page 8

∗Motor leadwire/connector assembly [0.6 m (2 ft.)] is included with connector type package.

■Speed – Torque Characteristics   fs: Maximum Starting Frequency
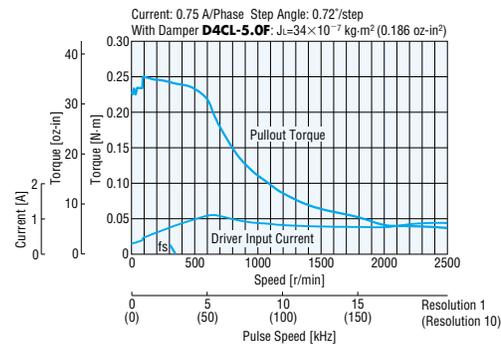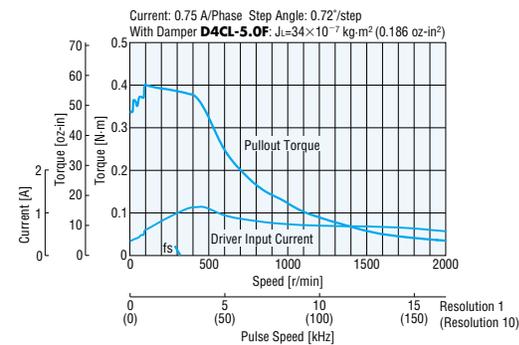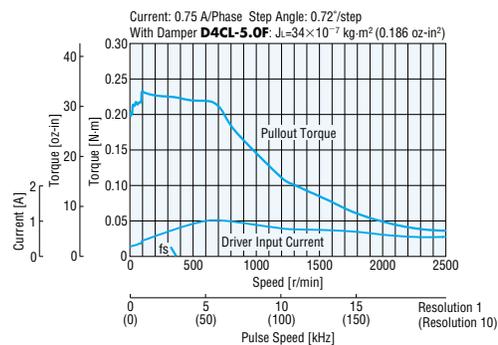
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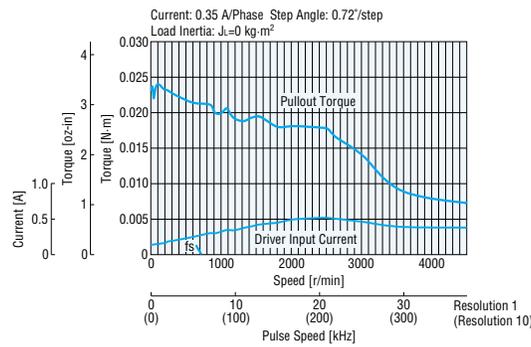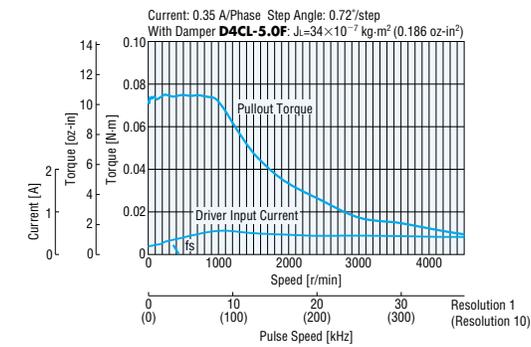
CRK523PAP/CRK523PBP

CRK525PAP/CRK525PBP

●The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:

●Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
　Be sure to keep the temperature of the motor case under 100˚C (212˚F).
　[Under 75˚C (167˚F) is required to comply with UL or CSA standards.]
●When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

Standard/High-Torque Type Motor Frame Size 42 mm (1.65 in.)

■ Specifications (RoHS)

cᵁᴸus CE

Model		CRK543AP	CRK544AP	CRK545AP	CRK544PAP*	CRK546PAP*
	Single Shaft	CRK543AP	CRK544AP	CRK545AP	CRK544PAP*	CRK546PAP*
	Double Shaft	CRK543BP	CRK544BP	CRK545BP	CRK544PBP*	CRK546PBP*
Maximum Holding Torque N·m (oz-in)		0.13 (18.4)	0.18 (25)	0.24 (34)	0.24 (34)	0.42 (59)
Rotor Inertia J: kg·m² (oz-in²)		35×10^{-7} (0.191)	54×10^{-7} (0.3)	68×10^{-7} (0.37)	57×10^{-7} (0.31)	114×10^{-7} (0.62)
Rated Current A/Phase		0.75				
Basic Step Angle		0.72°				
Power Source		24 VDC±10% 1.4 A				
Excitation Mode		Microstep				
Mass	Motor kg (lb.)	0.21 (0.46)	0.27 (0.59)	0.35 (0.77)	0.3 (0.66)	0.5 (1.1)
	Driver kg (lb.)	0.04 (0.088)				
Dimension No.	Motor		⑤		③	
	Driver	⑮				

How to Read Specifications Table → Page 8

∗Motor leadwire/connector assembly [0.6 m (2 ft.)] is included with connector type package.

■ Speed – Torque Characteristics fs: Maximum Starting Frequency

CRK543AP/CRK543BP

Current: 0.75 A/Phase Step Angle: 0.72°/step
With Damper **D4CL-5.0F**: JL=34×10⁻⁷ kg·m² (0.186 oz-in²)

CRK544AP/CRK544BP

Current: 0.75 A/Phase Step Angle: 0.72°/step
With Damper **D4CL-5.0F**: JL=34×10⁻⁷ kg·m² (0.186 oz-in²)

CRK545AP/CRK545BP

Current: 0.75 A/Phase Step Angle: 0.72°/step
With Damper **D4CL-5.0F**: JL=34×10⁻⁷ kg·m² (0.186 oz-in²)

CRK544PAP/CRK544PBP

Current: 0.75 A/Phase Step Angle: 0.72°/step
With Damper **D4CL-5.0F**: JL=34×10⁻⁷ kg·m² (0.186 oz-in²)

CRK546PAP/CRK546PBP

Current: 0.75 A/Phase Step Angle: 0.72°/step
With Damper **D4CL-5.0F**: JL=34×10⁻⁷ kg·m² (0.186 oz-in²)

●The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:

●Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
  Be sure to keep the temperature of the motor case under 100°C (212°F).
  [Under 75°C (167°F) is required to comply with UL or CSA standards.]
●When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

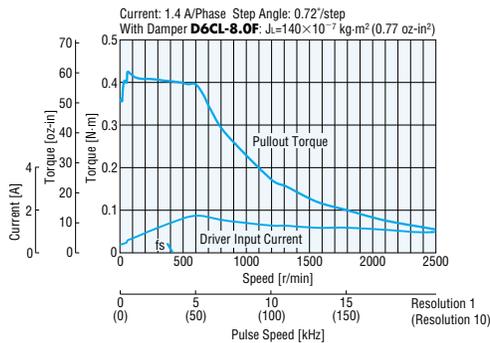# Standard Type Motor Frame Size 60 mm (2.36 in.)

■Specifications (RoHS)

Model		Single Shaft	CRK564AP	CRK566AP	CRK569AP
		Double Shaft	CRK564BP	CRK566BP	CRK569BP
Maximum Holding Torque	N·m (oz-in)		0.42 (59)	0.83 (117)	1.66 (230)
Rotor Inertia	J: kg·m² (oz-in²)		175×10^{-7} (0.96)	280×10^{-7} (1.53)	560×10^{-7} (3.1)
Rated Current	A/Phase		1.4		
Basic Step Angle			0.72°		
Power Source			24 VDC±10% 2.5 A		
Excitation Mode			Microstep		
Mass	Motor	kg (lb.)	0.6 (1.32)	0.8 (1.76)	1.3 (2.9)
	Driver	kg (lb.)	0.04 (0.088)		
Dimension No.	Motor		6		
	Driver		15		

How to Read Specifications Table → Page 8

■Speed – Torque Characteristics   fs: Maximum Starting Frequency

CRK564AP/CRK564BP
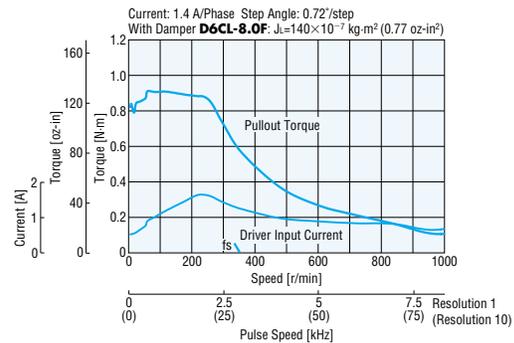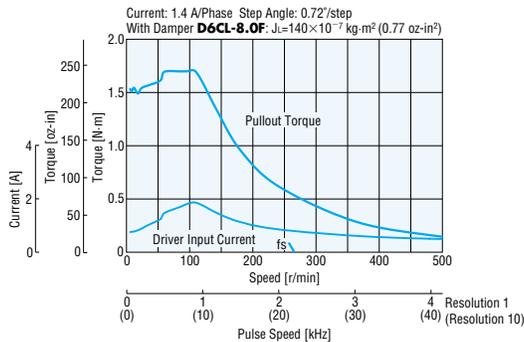
Current: 1.4 A/Phase Step Angle: 0.72°/step
With Damper **D6CL-8.0F**: JL=140×10⁻⁷ kg·m² (0.77 oz-in²)

CRK566AP/CRK566BP

Current: 1.4 A/Phase Step Angle: 0.72°/step
With Damper **D6CL-8.0F**: JL=140×10⁻⁷ kg·m² (0.77 oz-in²)

CRK569AP/CRK569BP

Current: 1.4 A/Phase Step Angle: 0.72°/step
With Damper **D6CL-8.0F**: JL=140×10⁻⁷ kg·m² (0.77 oz-in²)

● The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:

● Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
  Be sure to keep the temperature of the motor case under 100˚C (212˚F).
  [Under 75˚C (167˚F) is required to comply with UL or CSA standards.]

● When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

TH Geared Type Motor Frame Size 28 mm (1.10 in.)

■Specifications (RoHS)

Model	Single Shaft	CRK523PAP-T7.2*	CRK523PAP-T10*	CRK523PAP-T20*	CRK523PAP-T30*
	Double Shaft	CRK523PBP-T7.2*	CRK523PBP-T10*	CRK523PBP-T20*	CRK523PBP-T30*
Maximum Holding Torque	N·m (oz-in)	0.2 (28)	0.3 (42)	0.4 (56)	0.5 (71)
Rotor Inertia	J: kg·m² (oz-in²)	9×10^{-7} (0.049)			
Rated Current	A/Phase	0.35			
Basic Step Angle		0.1°	0.072°	0.036°	0.024°
Gear Ratio		1 : 7.2	1 : 10	1 : 20	1 : 30
Permissible Torque	N·m (oz-in)	0.2 (28)	0.3 (42)	0.4 (56)	0.5 (71)
Backlash	arc minute (degrees)	60 (1°)			
Permissible Speed Range	r/min	0～416	0～300	0～150	0～100
Power Source		24 VDC±10%　0.7 A			
Excitation Mode		Microstep			
Mass	Motor　kg (lb.)	0.17 (0.37)			
	Driver　kg (lb.)	0.04 (0.088)			
Dimension No.	Motor	7			
	Driver	15			

How to Read Specifications Table → Page 8

＊Motor leadwire/connector assembly [0.6 m (2 ft.)] is included with connector type package.
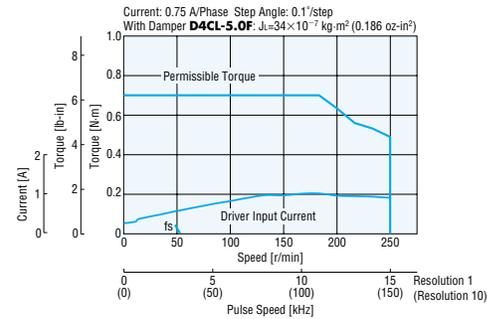
Note:

●Direction of rotation of the motor and that of the gear output shaft are the opposite for the gear ratios 1:7.2 and 1:10. It is the same for 1:20 and 1:30 gear ratio.

■Speed – Torque Characteristics fs: Maximum Starting Frequency

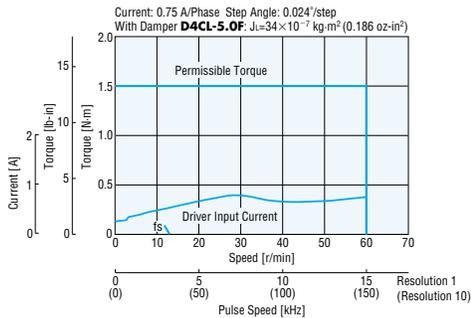### CRK523PAP-T7.2/CRK523PBP-T7.2
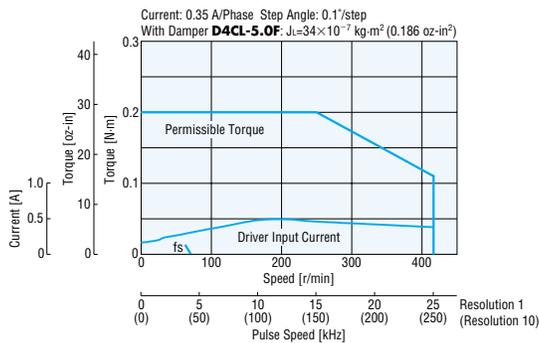
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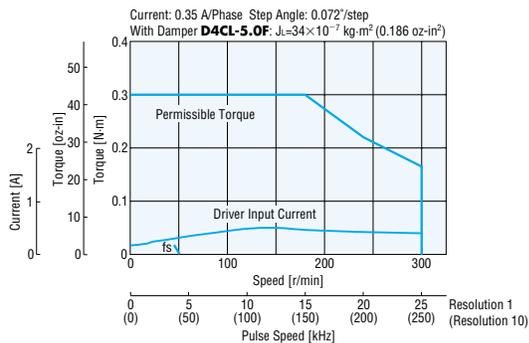
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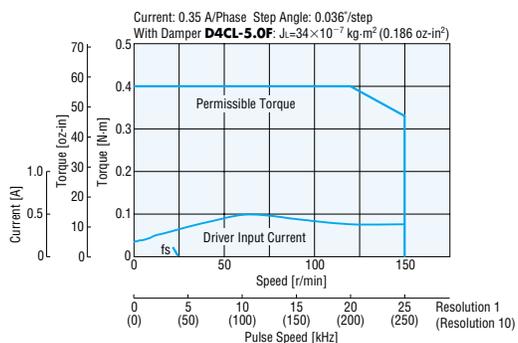
CRK523PAP-T30/CRK523PBP-T30

●The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:

●Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
Be sure to keep the temperature of the motor case under 100℃ (212℉).
[Under 75℃ (167℉) is required to comply with UL or CSA standards.]

●When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

TH Geared Type Motor Frame Size 42 mm (1.65 in.)

■Specifications (RoHS)

c℞Ｕus CE

| Model		CRK543AP-T3.6	CRK543AP-T7.2	CRK543AP-T10	CRK543AP-T20	CRK543AP-T30
	Single Shaft	CRK543AP-T3.6	CRK543AP-T7.2	CRK543AP-T10	CRK543AP-T20	CRK543AP-T30
	Double Shaft	CRK543BP-T3.6	CRK543BP-T7.2	CRK543BP-T10	CRK543BP-T20	CRK543BP-T30
Maximum Holding Torque	N·m (lb-in)	0.35 (3)	0.7 (6.1)	1 (8.8)	1.5 (13.2)	
Rotor Inertia	J: kg·m^2 (oz-in^2)	35×10^{-7} (0.191)				
Rated Current	A/Phase	0.75				
Basic Step Angle		0.2˚	0.1˚	0.072˚	0.036˚	0.024˚
Gear Ratio		1 : 3.6	1 : 7.2	1 : 10	1 : 20	1 : 30
Permissible Torque	N·m (lb-in)	0.35 (3)	0.7 (6.1)	1 (8.8)	1.5 (13.2)	
Backlash	arc minute (degrees)	45 (0.75˚)	25 (0.417˚)		15 (0.25˚)	
Permissible Speed Range	r/min	0～500	0～250	0～180	0～90	0～60
Power Source		24 VDC±10%　1.4 A				
Excitation Mode		Microstep				
Mass	Motor kg (lb.)	0.35 (0.77)				
	Driver kg (lb.)	0.04 (0.088)				
Dimension No.	Motor	⑧				
	Driver	⑮				

How to Read Specifications Table → Page 8

Note:
● Direction of rotation of the motor and that of the gear output shaft are the same for the gear ratios 1:3.6, 1:7.2 and 1:10. It is the opposite for 1:20 and 1:30 gear ratio.

■Speed – Torque Characteristics　fs: Maximum Starting Frequency

CRK543AP-T3.6/CRK543BP-T3.6
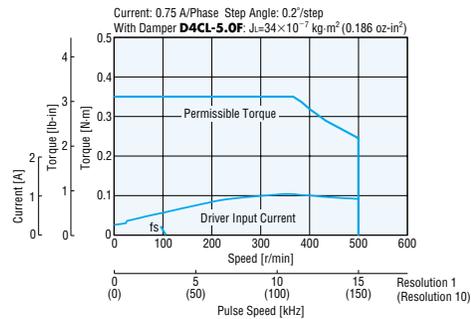
CRK543AP-T7.2/CRK543BP-T7.2

CRK543AP-T10/CRK543BP-T10
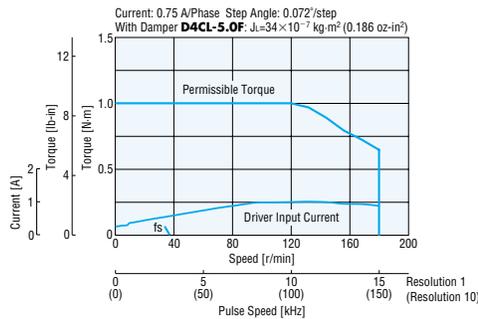
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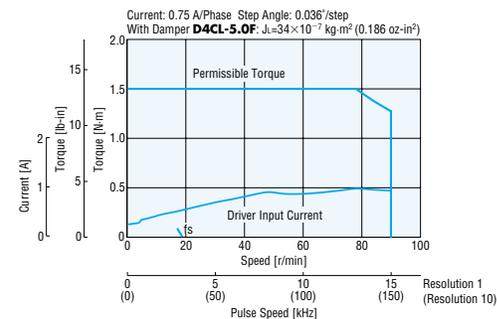
CRK543AP-T30/CRK543BP-T30

● The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:
● Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
　Be sure to keep the temperature of the motor case under 100˚C (212˚F).
　[Under 75˚C (167˚F) is required to comply with UL or CSA standards.]
● When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

TH Geared Type Motor Frame Size 60 mm (2.36 in.)

■Specifications (RoHS)

Model	Single Shaft	CRK564AP-T3.6	CRK564AP-T7.2	CRK564AP-T10	CRK564AP-T20	CRK564AP-T30
	Double Shaft	CRK564BP-T3.6	CRK564BP-T7.2	CRK564BP-T10	CRK564BP-T20	CRK564BP-T30
Maximum Holding Torque	N·m (lb-in)	1.25 (11)	2.5 (22)	3 (26)	3.5 (30)	4 (35)
Rotor Inertia	J: kg·m² (oz-in²)	175×10^{-7} (0.96)				
Rated Current	A/Phase	1.4				
Basic Step Angle		0.2°	0.1°	0.072°	0.036°	0.024°
Gear Ratio		1 : 3.6	1 : 7.2	1 : 10	1 : 20	1 : 30
Permissible Torque	N·m (lb-in)	1.25 (11)	2.5 (22)	3 (26)	3.5 (30)	4 (35)
Backlash	arc minute (degrees)	35 (0.584°)	15 (0.25°)		10 (0.167°)	
Permissible Speed Range	r/min	0~500	0~250	0~180	0~90	0~60
Power Source		24 VDC±10% 2.5 A				
Excitation Mode		Microstep				
Mass	Motor kg (lb.)	0.95 (2.1)				
	Driver kg (lb.)	0.04 (0.088)				
Dimension No.	Motor	9				
	Driver	15				

How to Read Specifications Table → Page 8

Note:
● Direction of rotation of the motor and that of the gear output shaft are the same for the gear ratios 1:3.6, 1:7.2 and 1:10. It is the opposite for 1:20 and 1:30 gear ratio.

■Speed – Torque Characteristics fs: Maximum Starting Frequency

CRK564AP-T3.6/CRK564BP-T3.6
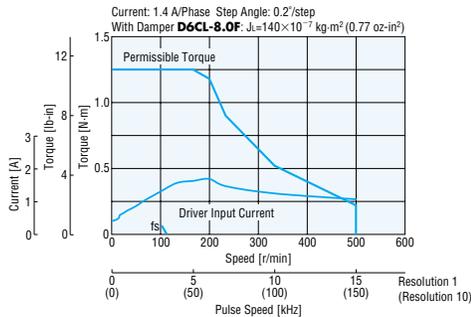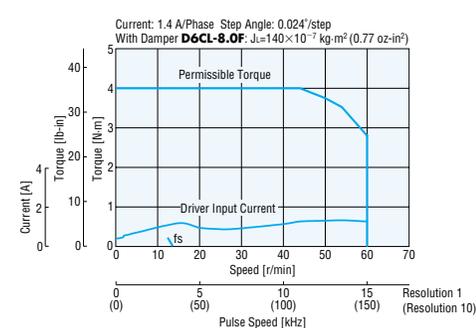

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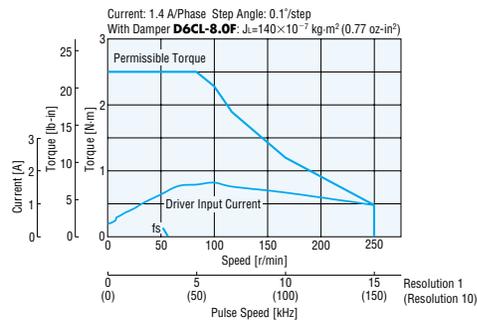
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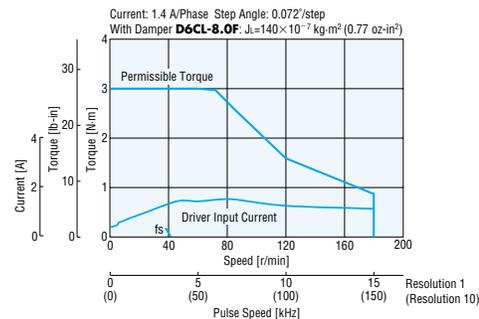
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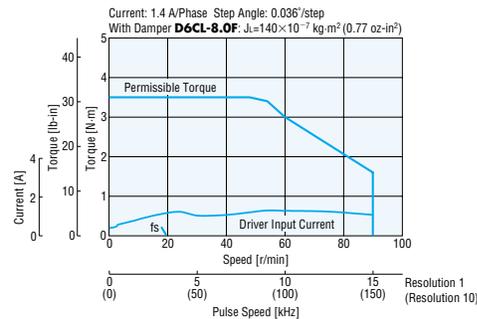
CRK564AP-T30/CRK564BP-T30

● The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:
● Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
  Be sure to keep the temperature of the motor case under 100°C (212°F).
  [Under 75°C (167°F) is required to comply with UL or CSA standards.]
● When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

PN Geared Type Motor Frame Size 28 mm (1.10 in.), 42 mm (1.65 in.)

■Specifications (RoHS)

Model	Single Shaft	CRK523PAP-N5[*1]	CRK523PAP-N7.2[*1]	CRK523PAP-N10[*1]	CRK544AP-N5	CRK544AP-N7.2	CRK544AP-N10
	Double Shaft	CRK523PBP-N5[*1]	CRK523PBP-N7.2[*1]	CRK523PBP-N10[*1]	CRK544BP-N5	CRK544BP-N7.2	CRK544BP-N10
Maximum Holding Torque	N·m (CRK523 : oz-in/CRK544 : lb-in)	0.2 (28)	0.3 (42)	0.4 (56)	0.8 (7)	1.2 (10.6)	1.5 (13.2)
Rotor Inertia	J: kg·m² (oz-in²)	9×10^{-7} (0.049)			54×10^{-7} (0.3)		
Rated Current	A/Phase	0.35			0.75		
Basic Step Angle		0.144°	0.1°	0.072°	0.144°	0.1°	0.072°
Gear Ratio		1 : 5	1 : 7.2	1 : 10	1 : 5	1 : 7.2	1 : 10
Permissible Torque	N·m (CRK523 : oz-in/CRK544 : lb-in)	0.2 (28)	0.3 (42)	0.4 (56)	0.8 (7)	1.2 (10.6)	1.5 (13.2)
Maximum Torque[*2]	N·m (CRK523 : oz-in/CRK544 : lb-in)	0.5 (71)			1.5 (13.2)	2 (17.7)	
Backlash	arc minute (degrees)	3 (0.05°)			2 (0.034°)		
Angle Error	arc minute (degrees)	6 (0.1°)					
Permissible Speed Range	r/min	0～600	0～416	0～300	0～600	0～416	0～300
Power Source		24 VDC±10%　0.7 A			24 VDC±10%　1.4 A		
Excitation Mode		Microstep					
Mass	Motor kg (lb.)	0.25 (0.55)			0.56 (1.23)		
	Driver kg (lb.)	0.04 (0.088)					
Dimension No.	Motor	10			11		
	Driver	15					

How to Read Specifications Table → Page 8

*1 Motor leadwire/connector assembly [0.6 m (2 ft.)] is included with connector type package.

*2 The value of Maximum Torque is for gear. For output torque for geared motor, see the Speed - Torque Characteristics.
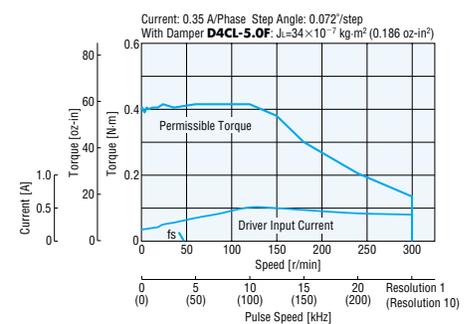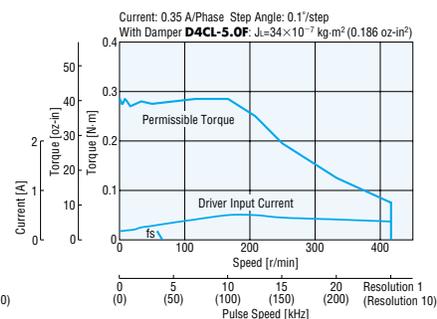
Note:
●Direction of rotation of the motor and that of the gear output shaft are the same.

■Speed – Torque Characteristics　fs: Maximum Starting Frequency
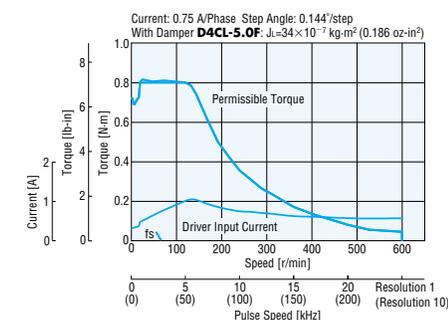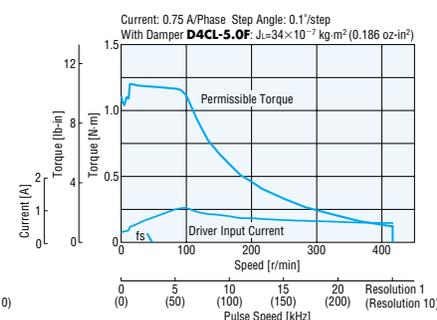
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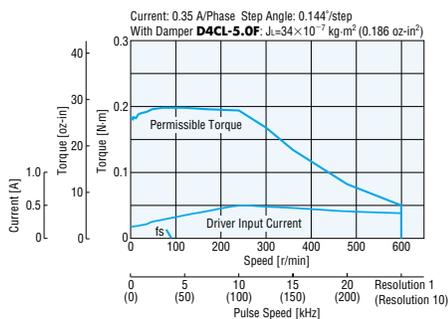
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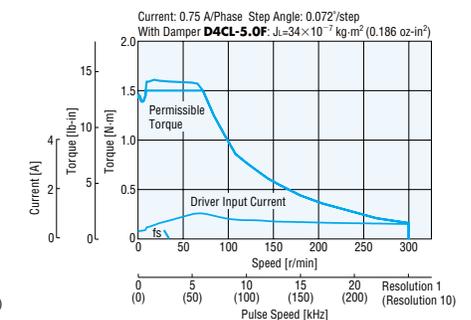

CRK523PAP-N10/CRK523PBP-N10

CRK544AP-N5/CRK544BP-N5

CRK544AP-N7.2/CRK544BP-N7.2

CRK544AP-N10/CRK544BP-N10

●The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:
●Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
Be sure to keep the temperature of the motor case under 100℃ (212°F).
[Under 75℃ (167°F) is required to comply with UL or CSA standards.]
●When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

PN Geared Type Motor Frame Size 60 mm (2.36 in.)

■Specifications (RoHS)

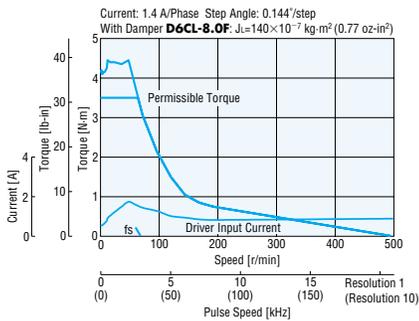| Model		CRK566AP-N5	CRK566AP-N7.2	CRK566AP-N10	CRK564AP-N25	CRK564AP-N36	CRK564AP-N50
	Single Shaft						
	Double Shaft	CRK566BP-N5	CRK566BP-N7.2	CRK566BP-N10	CRK564BP-N25	CRK564BP-N36	CRK564BP-N50
Maximum Holding Torque	N·m (lb-in)	3.5 (30)	4 (35)	5 (44)	8 (70)		
Rotor Inertia	J: kg·m² (oz-in²)	280×10⁻⁷ (1.53)			175×10⁻⁷ (0.96)		
Rated Current	A/Phase	1.4					
Basic Step Angle		0.144˚	0.1˚	0.072˚	0.0288˚	0.02˚	0.0144˚
Gear Ratio		1 : 5	1 : 7.2	1 : 10	1 : 25	1 : 36	1 : 50
Permissible Torque	N·m (lb-in)	3.5 (30)	4 (35)	5 (44)	8 (70)		
Maximum Torque✷	N·m (lb-in)	7 (61)	9 (79)	11 (97)	16 (141)	20 (177)	
Backlash	arc minute (degrees)	2 (0.034˚)			3 (0.05˚)		
Angle Error	arc minute (degrees)	5 (0.084˚)					
Permissible Speed Range	r/min	0~600	0~416	0~300	0~120	0~83	0~60
Power Source		24 VDC±10% 2.5 A					
Excitation Mode		Microstep					
Mass	Motor kg (lb.)	1.5 (3.3)					
	Driver kg (lb.)	0.04 (0.088)					
Dimension No.	Motor	12					
	Driver	15					

How to Read Specifications Table → Page 8

✷The value of Maximum Torque is for gear. For output torque for geared motor, see the Speed - Torque Characteristics.
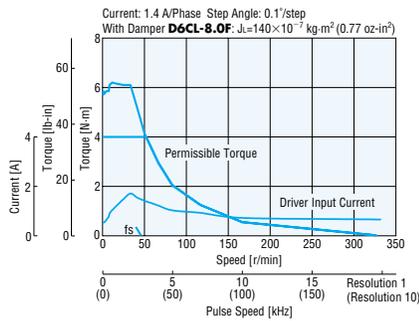
Note:

● Direction of rotation of the motor and that of the gear output shaft are the same.

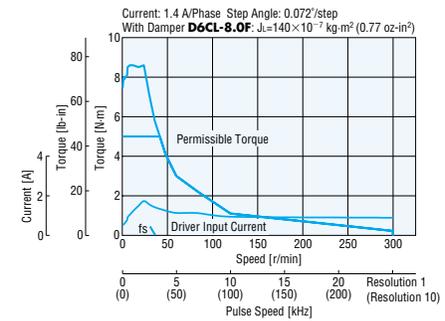## ■Speed – Torque Characteristics   fs: Maximum Starting Frequency
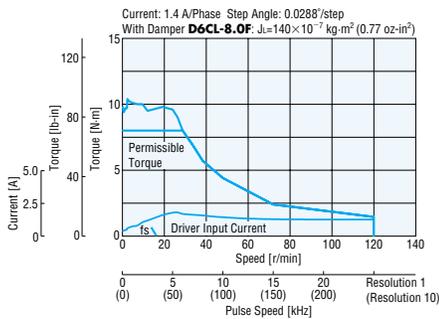
CRK566AP-N5/CRK566BP-N5
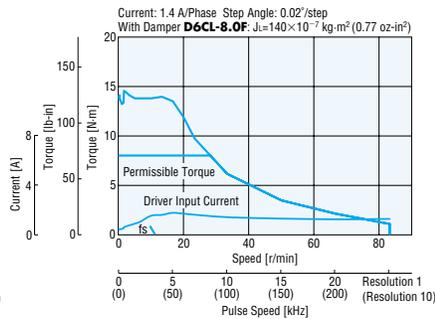

CRK566AP-N7.2/CRK566BP-N7.2
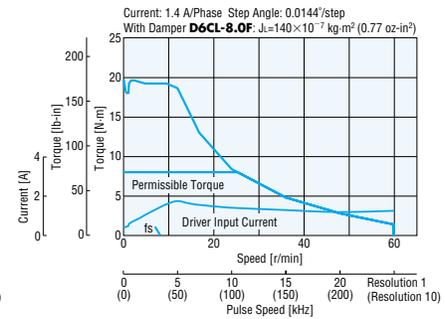

CRK566AP-N10/CRK566BP-N10

CRK564AP-N25/CRK564BP-N25

CRK564AP-N36/CRK564BP-N36

CRK564AP-N50/CRK564BP-N50

● The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:

● Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
  Be sure to keep the temperature of the motor case under 100˚C (212˚F).
  [Under 75˚C (167˚F) is required to comply with UL or CSA standards.]

● When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

Harmonic Geared Type Motor Frame Size 42 mm (1.65 in.), 60 mm (2.36 in.)

■Specifications (RoHS)

_cⓊ_{US} CE

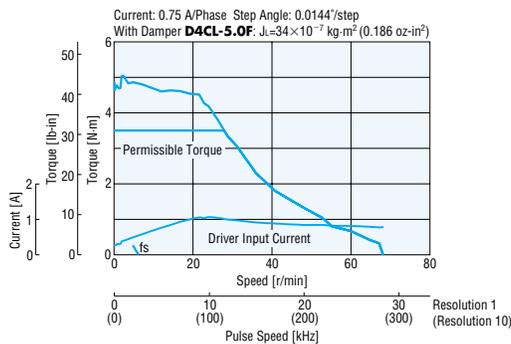| Model		CRK543AP-H50	CRK543AP-H100	CRK564AP-H50	CRK564AP-H100
	Single Shaft	**CRK543AP-H50**	**CRK543AP-H100**	**CRK564AP-H50**	**CRK564AP-H100**
	Double Shaft	**CRK543BP-H50**	**CRK543BP-H100**	**CRK564BP-H50**	**CRK564BP-H100**
Maximum Holding Torque	N·m (lb-in)	3.5 (30)	5 (44)	5.5 (48)	8 (70)
Rotor Inertia	J: kg·m² (oz-in²)	52×10^{-7} (0.28)		210×10^{-7} (1.15)	
Rated Current	A/Phase	0.75		1.4	
Basic Step Angle		0.0144˚	0.0072˚	0.0144˚	0.0072˚
Gear Ratio		1 : 50	1 : 100	1 : 50	1 : 100
Permissible Torque	N·m (lb-in)	3.5 (30)	5 (44)	5.5 (48)	8 (70)
Maximum Torque∗	N·m (lb-in)	8.3 (73)	11 (97)	18 (159)	28 (240)
Lost Motion (Load Torque)	arc minute	1.5 max. (±0.16 N·m)	1.5 max. (±0.2 N·m)	0.7 max. (±0.28 N·m)	0.7 max. (±0.39 N·m)
Permissible Speed Range	r/min	0～70	0～35	0～70	0～35
Power Source		24 VDC±10%　1.4 A		24 VDC±10%　2.5 A	
Excitation Mode		Microstep			
Mass	Motor　kg (lb.)	0.46 (1.01)		1.08 (2.4)	
	Driver　kg (lb.)	0.04 (0.088)			
Dimension No.	Motor	⑬		⑭	
	Driver		⑮		

How to Read Specifications Table → Page 8

∗The value of Maximum Torque is for gear. For output torque for geared motor, see the Speed - Torque Characteristics.
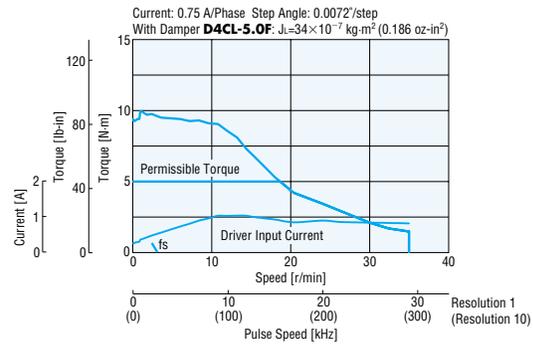
Notes:
●The inertia represents a sum of the inertia of the harmonic gear converted to a motor shaft value, and the rotor inertia.
●Direction of rotation of the motor and that of the gear output shaft are the opposite.

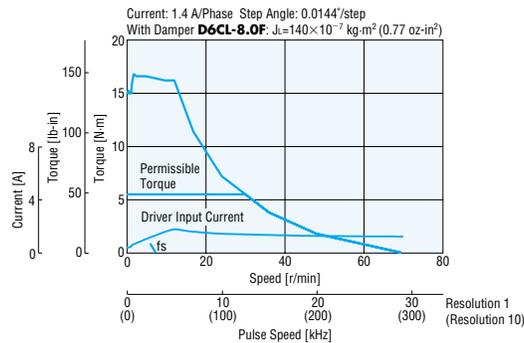## ■Speed – Torque Characteristics　fs: Maximum Starting Frequency
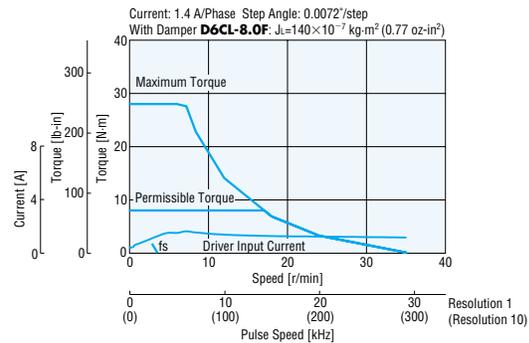
CRK543AP-H50/CRK543BP-H50

Current: 0.75 A/Phase　Step Angle: 0.0144˚/step
With Damper **D4CL-5.0F**: $J_L = 34 \times 10^{-7}$ kg·m² (0.186 oz-in²)

CRK543AP-H100/CRK543BP-H100

Current: 0.75 A/Phase　Step Angle: 0.0072˚/step
With Damper **D4CL-5.0F**: $J_L = 34 \times 10^{-7}$ kg·m² (0.186 oz-in²)

CRK564AP-H50/CRK564BP-H50

Current: 1.4 A/Phase　Step Angle: 0.0144˚/step
With Damper **D6CL-8.0F**: $J_L = 140 \times 10^{-7}$ kg·m² (0.77 oz-in²)

CRK564AP-H100/CRK564BP-H100

Current: 1.4 A/Phase　Step Angle: 0.0072˚/step
With Damper **D6CL-8.0F**: $J_L = 140 \times 10^{-7}$ kg·m² (0.77 oz-in²)

●The pulse input circuit responds to approximately 500 kHz with a pulse duty of 50%.

Notes:
●Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions.
　Be sure to keep the temperature of the motor case under 100˚C (212˚F).
　[Under 75˚C (167˚F) is required to comply with UL or CSA standards.]
●In order to prevent fatigue of the gear grease in harmonic gear, keep the temperature of the gear case under 70˚C (158˚F).
●When using the motor with the dedicated driver, the driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

■Driver Specifications

Input Signal	Input Mode	Photocoupler input, Input resistance: 220 Ω, Input current: 10~20 mA Photocoupler ON: +4.5~5.25 V, Photocoupler OFF: 0~+1 V (Voltage between terminals)
	Pulse Signal (CW Pulse Signal)	Operation command pulse signal (CW direction operation command pulse signal when in 2-pulse input mode) Negative logic pulse input Pulse width: 1 μs minimum; Pulse rise/fall: 2 μs maximum, Pulse duty: 50% and below The motor moves one step when the pulse input is switched from photocoupler ON to OFF. Maximum input pulse frequency: 500 kHz (when the pulse duty is 50%)
	Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal Photocoupler ON: CW, Photocoupler OFF: CCW (CCW direction operation command pulse signal when in 2-pulse input mode) Negative logic pulse input Pulse width: 1 μs minimum; Pulse rise/fall: 2 μs maximum, Pulse duty: 50% and below The motor moves one step when the pulse input is switched from photocoupler ON to OFF. Maximum input pulse frequency: 500 kHz (when the pulse duty is 50%)
	All Windings OFF Signal	When in the "photocoupler ON" state, the output current to the motor is cut off and the motor shaft can be rotated manually. When in the "photocoupler OFF" state, the current is supplied to the motor.
	Step Angle Select Signal	Step angle specified by DATA1 when photocoupler OFF, Step angle specified by DATA2 when photocoupler ON
	Current Cutback Release Signal	When in the "photocoupler ON" state, the automatic current cutback function will not be activated even after the motor stops. When in the "photocoupler OFF" state, the automatic current cutback function will be activated after the motor stops (after approx. 100 ms).
Output Signal	Output Mode	Photocoupler, Open-collector output, External use condition: 24 VDC maximum, 10 mA maximum
	Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0." (Photocoupler: ON) 0.72°/step (Division 1 Resolution): Signal is output every 10 pulses. 0.072°/step (Division 10 Resolution): Signal is output every 100 pulses. [High-Resolution Type] 0.36°/step (Division 1 Resolution): Signal is output every 10 pulses. 0.036°/step (Division 10 Resolution): Signal is output every 100 pulses.
Functions		Automatic Current Cutback, Step Angle Switch, Pulse Input Mode Switch, Smooth Drive, All Windings OFF, Excitation Timing
Cooling Method		Natural ventilation

■General Specifications

Specifications		Motor	Driver
Insulation Class		Class B [130℃ (266℉)], Recognized as Class A [105℃ (221℉)] by UL standard	—
Insulation Resistance		100 MΩ minimum under normal temperature and humidity, when measured by a 500 VDC megger between the windings and the motor casing.	—
Dielectric Strength		Sufficient to withstand 1.5 kV✱, 50 Hz or 60 Hz applied for one minute between the windings and the motor casing, under normal temperature and humidity. ✱1.0 kV for **CRK54□** 0.5 kV for **CRK513P, CRK52□PM, CRK52□P, CRK54□PM, CRK54□P**	—
Operating Environment	Ambient Temperature	−10℃~+50℃ (+14℉~+122℉), nonfreezing: High-resolution type, High-torque type, Standard type, **TH/PN** geared type 0℃~+40℃ (+32℉~+104℉), nonfreezing: Harmonic geared type	0℃~+40℃ (+32℉~+104℉), nonfreezing
	Ambient Humidity	85% or less (noncondensing)	
	Atmosphere	No corrosive gases, dust, water or oil.	
Temperature Rise		Temperature rise of the coil measured by the change resistance method is 80℃ (144℉) or less. (at rated current, at standstill, five phases energized)	—
Static Angle Error✱1		±3 arc minutes (±0.05°), **CRK513P**: ±10 arc minutes (±0.17°) High-resolution type: ±2 arc minutes (±0.034°)	—
Shaft Runout		0.05 mm (0.002 inch) T.I.R.✱4	—
Radial Play✱2		0.025 mm (0.001 inch) maximum of 5 N (1.12 lb.)	—
Axial Play✱3		0.075 mm (0.003 inch) maximum of 10 N (2.2 lb.)	—
Concentricity		0.075 mm (0.003 inch) T.I.R.✱4	—
Perpendicularity		0.075 mm (0.003 inch) T.I.R.✱4	—

✱1 This value is for full step under no load. (The value changes with the size of the load.)

✱2 Radial Play: Displacement in shaft position in the radial direction, when a 5 N (1.12 lb.) load is applied in the vertical direction to the tip of the motor's shaft.

✱3 Axial Play: Displacement in shaft position in the axial direction, when a 10 N (2.2 lb.) load is applied to the motor's shaft in the axial direction.

✱4 T.I.R. (Total Indicator Reading): The total dial gauge reading when the measurement section is rotated one revolution centered on the reference axis center.

Note:

●Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.
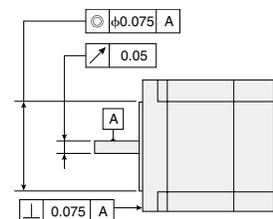
■Permissible Overhung Load and Permissible Thrust Load

Unit = N (lb.)

Type	Model	Overhung Load Distance from Shaft End mm (in.)					Thrust Load
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)	
High-Resolution Type High-Torgue Type Standard Type	CRK513P□P	12 (2.7)	15 (3.3)	–	–	–	The permissible thrust load shall be no greater than the motor mass.
	CRK523PM□P CRK524PM□P CRK525PM□P CRK523P□P CRK525P□P	25 (5.6)	34 (7.6)	52 (11.7)	–	–	
	CRK544PM□P CRK546PM□P CRK544P□P CRK546P□P CRK543□P CRK544□P CRK545□P	20 (4.5)	25 (5.6)	34 (7.6)	52 (11.7)	–	
	CRK564PM□P CRK566PM□P CRK569PM□P	90 (20)	100 (22)	130 (29)	180 (40)	270 (60)	
	CRK564□P CRK566□P CRK569□P	63 (14.1)	75 (16.8)	95 (21)	130 (29)	190 (42)	
TH Geared Type	CRK523P□P-T7.2 CRK523P□P-T10 CRK523P□P-T20 CRK523P□P-T30	15 (3.3)	17 (3.8)	20 (4.5)	23 (5.1)	–	10 (2.2)
	CRK543□P-T3.6 CRK543□P-T7.2 CRK543□P-T10 CRK543□P-T20 CRK543□P-T30	10 (2.2)	14 (3.1)	20 (4.5)	30 (6.7)	–	15 (3.3)
	CRK564□P-T3.6 CRK564□P-T7.2 CRK564□P-T10 CRK564□P-T20 CRK564□P-T30	70 (15.7)	80 (18)	100 (22)	120 (27)	150 (33)	40 (9)
PN Geared Type	CRK523P□P-N5 CRK523P□P-N7.2 CRK523P□P-N10	45 (10.1)	60 (13.5)	80 (18)	100 (22)	–	20 (4.5)
	CRK544□P-N5 CRK544□P-N7.2 CRK544□P-N10	100 (22)	120 (27)	150 (33)	190 (42)	–	100 (22)
	CRK566□P-N5	200 (45)	220 (49)	250 (56)	280 (63)	320 (72)	100 (22)
	CRK566□P-N7.2 CRK566□P-N10	250 (56)	270 (60)	300 (67)	340 (76)	390 (87)	100 (22)
	CRK564□P-N25 CRK564□P-N36 CRK564□P-N50	330 (74)	360 (81)	400 (90)	450 (101)	520 (117)	100 (22)
Harmonic Geared Type	CRK543□P-H50 CRK543□P-H100	180 (40)	220 (49)	270 (60)	360 (81)	510 (114)	220 (49)
	CRK564□P-H50 CRK564□P-H100	320 (72)	370 (83)	440 (99)	550 (123)	720 (162)	450 (101)

●Enter **A** (Single shaft) or **B** (Double shaft) in the box (□) within the model name.

■Dimensions Unit = mm (inch)

●Motor

◇High-Torque Type

1 □20 mm (□0.79 in.)

Model	Motor Model	Mass kg (lb.)	CAD
CRK513PAP	PK513PA	0.05 (0.11)	B316
CRK513PBP	PK513PB		

Each package model comes with a motor leadwire/connector assembly [0.6 m (2 ft.)] UL Style 3265, AWG24.

If you are purchasing only a motor for maintenance purpose, etc., motor leadwire/connector assembly and connector will not be supplied. Optional motor connector sets (sold separately) are available. → Page 40

●Applicable Connector

Connector housing: 51065-0500 (MOLEX)
Contact: 50212-8100 (MOLEX)
Crimp tool: 57176-5000 (MOLEX)
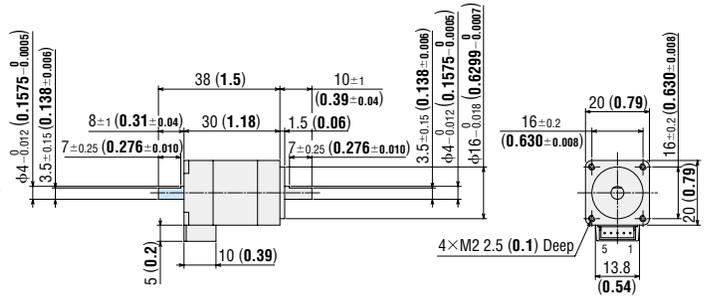
◇High-Resolution Type, High-Torque Type

2 □28 mm (□1.10 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	CAD
CRK523P□AP	PK523P□A	32 (1.26)	–	0.11 (0.24)	B359
CRK523P□BP	PK523P□B		42 (1.65)		
CRK524PMAP	PK524PMA	40 (1.57)	–	0.15 (0.33)	B372
CRK524PMBP	PK524PMB		50 (1.97)		
CRK525P□AP	PK525P□A	51.5 (2.03)	–	0.2 (0.44)	B360
CRK525P□BP	PK525P□B		61.5 (2.42)		

●Enter **M** in the box (□) within the model name in the case of High-Resolution Type.

Each package model comes with a motor leadwire/connector assembly [0.6 m (2 ft.)] UL Style 3265, AWG24.

If you are purchasing only a motor for maintenance purpose, etc., motor leadwire/connector assembly and connector will not be supplied. Optional motor connector sets (sold separately) are available. → Page 40

●Applicable Connector

Connector housing: 51065-0500 (MOLEX)
Contact: 50212-8100 (MOLEX)
Crimp tool: 57176-5000 (MOLEX)
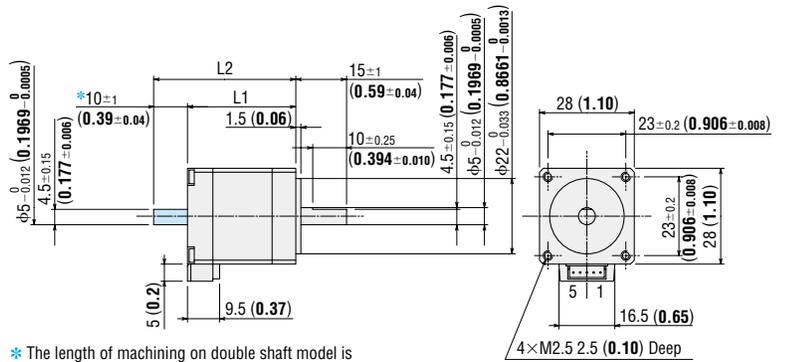
✽ The length of machining on double shaft model is 10±0.25 (**0.394±0.010**).

3 □42 mm (□1.65 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	CAD
CRK544P□AP	PK544P□A	39 (1.54)	–	0.3 (0.66)	B337
CRK544P□BP	PK544P□B		54 (2.13)		
CRK546P□AP	PK546P□A	59 (2.32)	–	0.5 (1.1)	B338
CRK546P□BP	PK546P□B		74 (2.91)		

●Enter **M** in the box (□) within the model name in the case of High-Resolution Type.

Each package model comes with a motor leadwire/connector assembly [0.6 m (2 ft.)] UL Style 3266, AWG22.

If you are purchasing only a motor for maintenance purpose, etc., motor leadwire/connector assembly and connector will not be supplied. Optional motor connector sets (sold separately) are available. → Page 40

●Applicable Connector

Connector housing: 51103-0500 (MOLEX)
Contact: 50351-8100 (MOLEX)
Crimp tool: 57295-5000 (MOLEX)
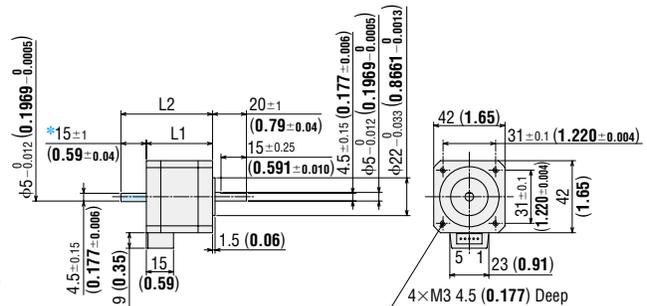
✽ The length of machining on double shaft model is 15±0.25 (**0.591±0.010**).

●These dimensions are for double shaft models. For single shaft models, ignore the blue ▢ areas.

◇High-Resolution Type

4 □60 mm (□2.36 in.)

Model	Motor Model	L1	L2	L3	φD	Mass kg (lb.)	CAD
CRK564PMAP	PK564PMA	46.5 (1.83)	–	7.5±0.15 (0.295 ±0.006)	8 0 −0.015 (0.3150 0 −0.006)	0.65 (1.43)	B373
CRK564PMBP	PK564PMB	46.5 (1.83)	69.5 (2.74)	7.5±0.15 (0.295 ±0.006)	8 0 −0.015 (0.3150 0 −0.006)	0.65 (1.43)	B373
CRK566PMAP	PK566PMA	56 (2.20)	–	7.5±0.15 (0.295 ±0.006)	8 0 −0.015 (0.3150 0 −0.006)	0.87 (1.91)	B374
CRK566PMBP	PK566PMB	56 (2.20)	79 (3.11)	7.5±0.15 (0.295 ±0.006)	8 0 −0.015 (0.3150 0 −0.006)	0.87 (1.91)	B374
CRK569PMAP	PK569PMA	87 (3.43)	–	9.5±0.15 (0.374 ±0.006)	10 0 −0.015 (0.3937 0 −0.006)	1.5 (3.3)	B375
CRK569PMBP	PK569PMB	87 (3.43)	110 (4.33)	9.5±0.15 (0.374 ±0.006)	10 0 −0.015 (0.3937 0 −0.006)	1.5 (3.3)	B375
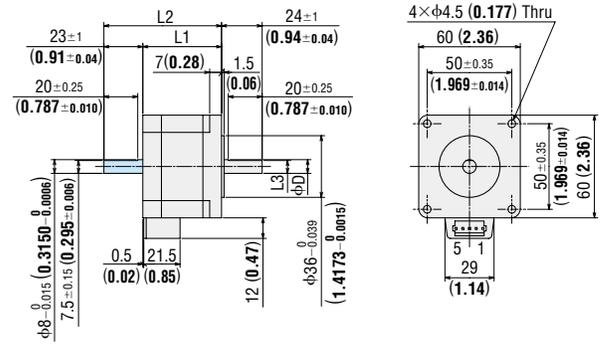
Each package model comes with a motor leadwire/connector assembly [0.6 m (2 ft.)] UL Style 3266, AWG22.

If you are purchasing only a motor for maintenance purpose, etc., motor leadwire/connector assembly and connector will not be supplied. Optional motor connector sets (sold separately) are available. → Page 40

● Applicable Connector
　Connector housing: 51144-0500 (MOLEX)
　Contact: 50539-8100 (MOLEX)
　Crimp tool: 57189-5000 (MOLEX)

## ◇Standard Type

5 □42 mm (□1.65 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	CAD
CRK543AP	PK543NAW	33 (1.30)	–	0.21 (0.46)	B068
CRK543BP	PK543NBW	33 (1.30)	48 (1.89)	0.21 (0.46)	B068
CRK544AP	PK544NAW	39 (1.54)	–	0.27 (0.59)	B069
CRK544BP	PK544NBW	39 (1.54)	54 (2.13)	0.27 (0.59)	B069
CRK545AP	PK545NAW	47 (1.85)	–	0.35 (0.77)	B070
CRK545BP	PK545NBW	47 (1.85)	62 (2.44)	0.35 (0.77)	B070
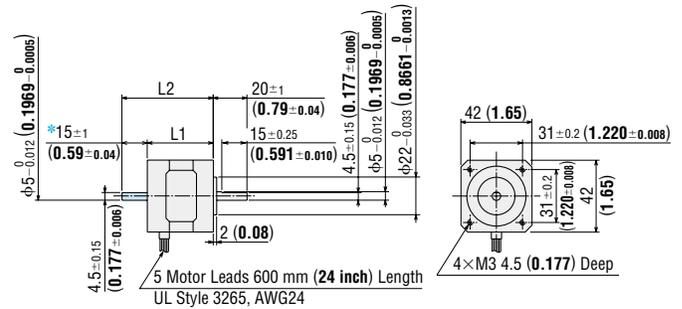
✳ The length of machining on double shaft model is 15±0.25 (0.591 ±0.010).

6 □60 mm (□2.36 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	CAD
CRK564AP	PK564NAW	46.5 (1.83)	–	0.6 (1.32)	B071
CRK564BP	PK564NBW	46.5 (1.83)	69.5 (2.74)	0.6 (1.32)	B071
CRK566AP	PK566NAW	57.5 (2.26)	–	0.8 (1.76)	B072
CRK566BP	PK566NBW	57.5 (2.26)	80.5 (3.17)	0.8 (1.76)	B072
CRK569AP	PK569NAW	87 (3.43)	–	1.3 (2.9)	B073
CRK569BP	PK569NBW	87 (3.43)	110 (4.33)	1.3 (2.9)	B073
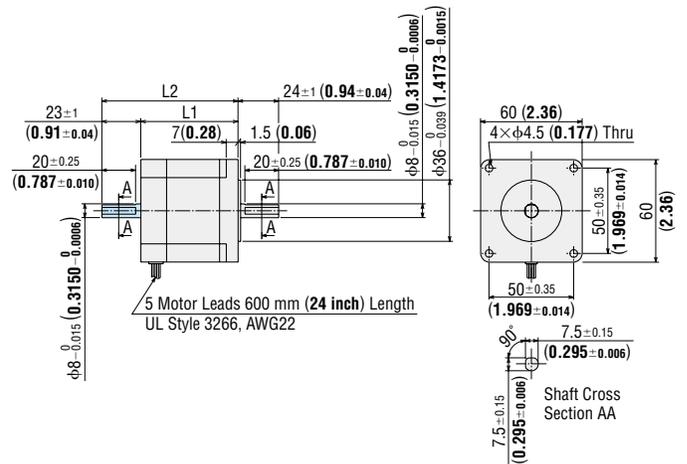
● These dimensions are for double shaft models. For single shaft models, ignore the blue ▭ areas.

7 □28 mm (□1.10 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	CAD
CRK523PAP-T□	PK523PA-T□	**7.2, 10, 20, 30**	0.17 (0.37)	B361
CRK523PBP-T□	PK523PB-T□			

●Enter the gear ratio in the box (□) within the model name.
Each package model comes with a motor leadwire/connector assembly [0.6 m (2 ft.)] UL Style 3265, AWG24.
If you are purchasing only a motor for maintenance purpose, etc., motor leadwire/connector assembly and connector will not be supplied. Optional motor connector sets (sold separately) are available. ➡ Page 40

●Applicable Connector
 Connector housing: 51065-0500 (MOLEX)
 Contact: 50212-8100 (MOLEX)
 Crimp tool: 57176-5000 (MOLEX)

✽ The length of machining on double shaft model is 10±0.25 (**0.394**±**0.010**).
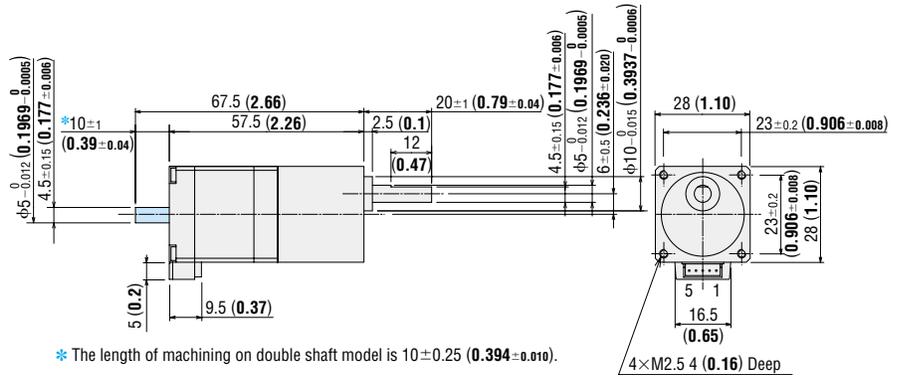
8 □42 mm (□1.65 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	CAD
CRK543AP-T□	PK543AW-T□	**3.6, 7.2, 10, 20, 30**	0.35 (0.77)	B183
CRK543BP-T□	PK543BW-T□			

●Enter the gear ratio in the box (□) within the model name.

✽ The length of machining on double shaft model is 15±0.25 (**0.591**±**0.010**).
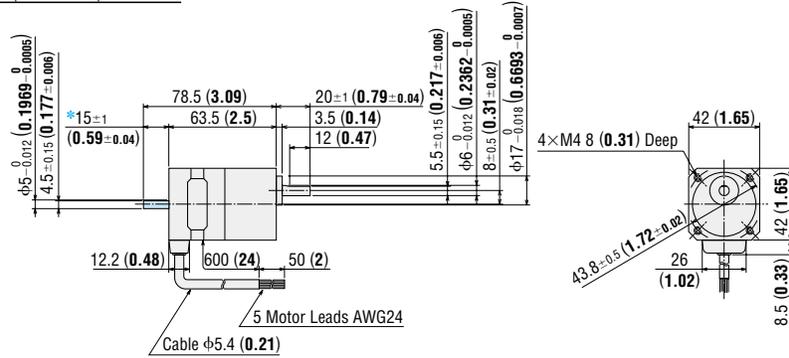
9 □60 mm (□2.36 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	CAD
CRK564AP-T□	PK564AW-T□	**3.6, 7.2, 10, 20, 30**	0.95 (2.1)	B187
CRK564BP-T□	PK564BW-T□			

●Enter the gear ratio in the box (□) within the model name.
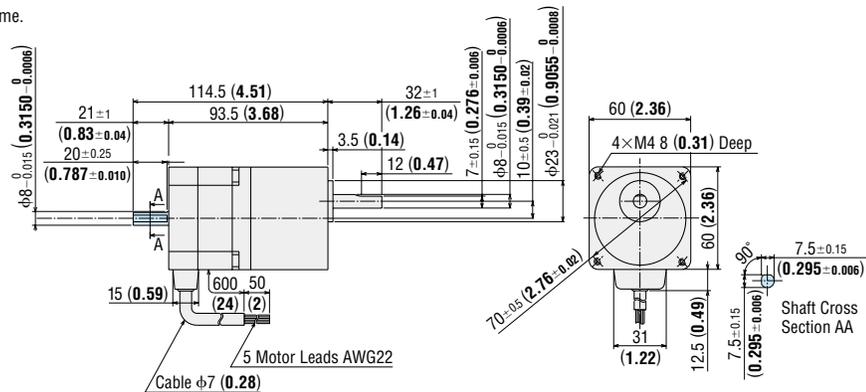
Shaft Cross Section AA

●These dimensions are for double shaft models. For single shaft models, ignore the blue ▢ areas.

◇PN Geared Type

⑩ □28 mm (□1.10 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	CAD
CRK523PAP-N□	PK523PA-N□	5, 7.2, 10	0.25 (0.55)	B362
CRK523PBP-N□	PK523PB-N□			

●Enter the gear ratio in the box (□) within the model name.
Each package model comes with a motor leadwire/connector assembly [0.6 m (2 ft.)] UL Style 3265, AWG24.
If you are purchasing only a motor for maintenance purpose, etc., motor leadwire/connector assembly and connector will not be supplied. Optional motor connector sets (sold separately) are available.
➡ Page 40

●Applicable Connector
Connector housing: 51065-0500 (MOLEX)
Contact: 50212-8100 (MOLEX)
Crimp tool: 57176-5000 (MOLEX)
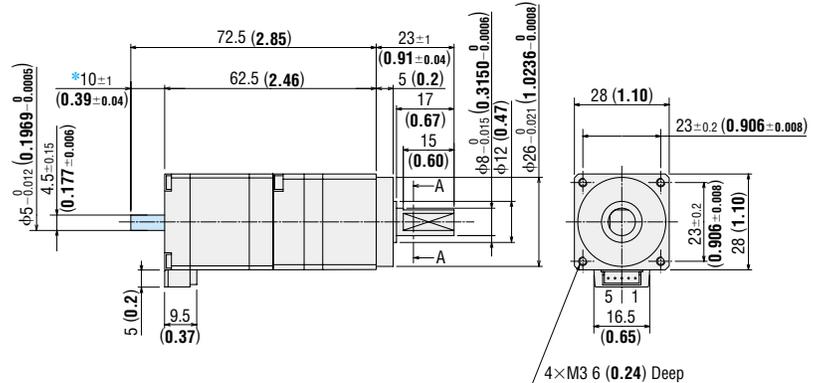
✽The length of machining on double shaft model is 10±0.25 (**0.394±0.010**).

⑪ □42 mm (□1.65 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	CAD
CRK544AP-N□	PK544AW-N□	5, 7.2, 10	0.56 (1.23)	B312
CRK544BP-N□	PK544BW-N□			

●Enter the gear ratio in the box (□) within the model name.
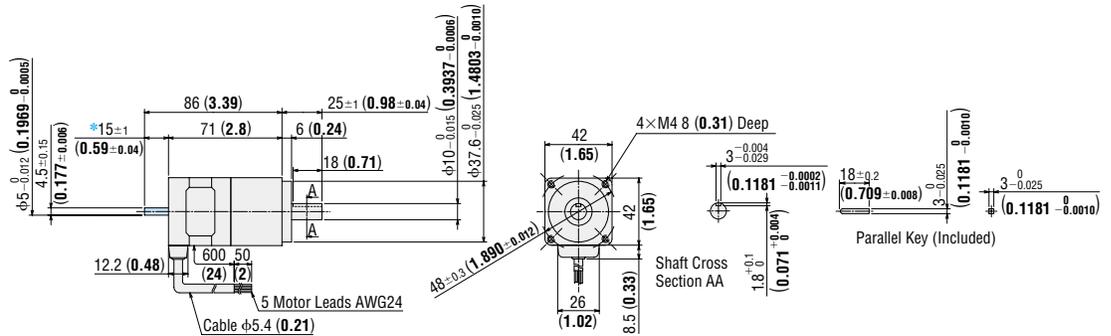
✽The length of machining on double shaft model is 15±0.25 (**0.591±0.010**).

⑫ □60 mm (□2.36 in.)

Model	Motor Model	Gear Ratio	L1	L2	Mass kg (lb.)	CAD
CRK566AP-N□	PK566AW-N□	5, 7.2, 10	103.5 (4.07)	–	1.5 (3.3)	B190
CRK566BP-N□	PK566BW-N□			124.5 (4.90)	1.5 (3.3)	
CRK564AP-N□	PK564AW-N□	25, 36, 50	108.5 (4.27)	–	1.5 (3.3)	B191
CRK564BP-N□	PK564BW-N□			129.5 (5.10)	1.5 (3.3)	

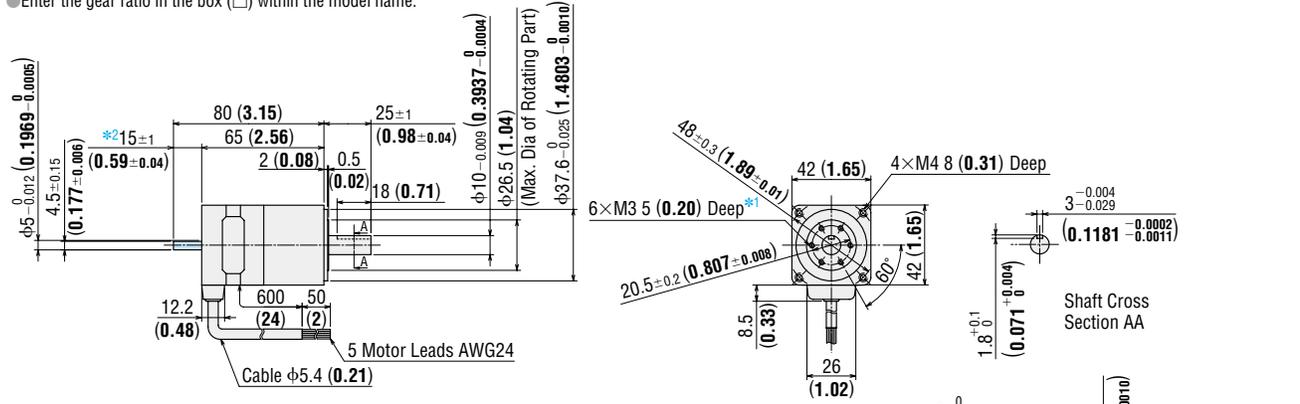●Enter the gear ratio in the box (□) within the model name.
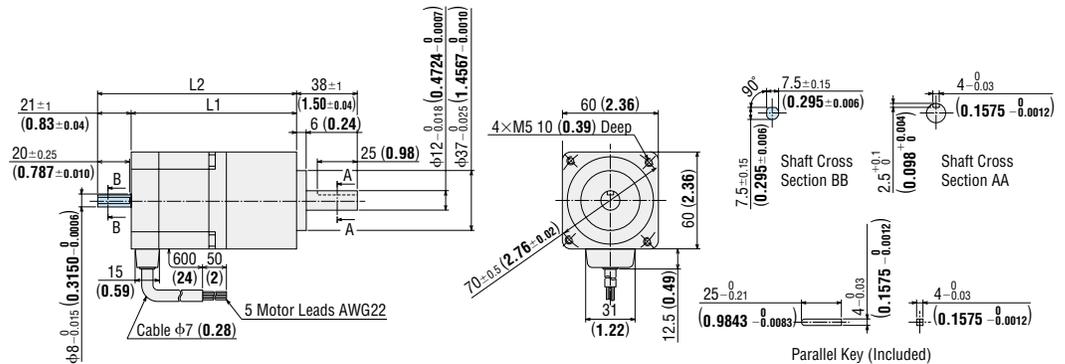
●These dimensions are for double shaft models. For single shaft models, ignore the blue ▢ areas.

◇Harmonic Geared Type

13 □42 mm (□1.65 in.)

| Model	Motor Model	Gear Ratio	Mass kg (lb.)	CAD
CRK543AP-H□	PK543AW-H□S	**50, 100**	0.46 (1.01)	B313
CRK543BP-H□	PK543BW-H□S			

●Enter the gear ratio in the box (□) within the model name.

∗1 The position of the key slot on the output shaft φ10 (φ**0.3937**) relative to the screw holes position on a maximum diameter of φ26.5 (φ**1.04**) on the rotating part is arbitrary.

∗2 The length of machining on double shaft model is 15±0.25 (**0.519±0.010**).

14 □60 mm (□2.36 in.)

Model	Motor Model	Gear Ratio	Mass kg (lb.)	CAD
CRK564AP-H□	PK564AW-H□S	**50, 100**	1.08 (2.4)	B314
CRK564BP-H□	PK564BW-H□S			

●Enter the gear ratio in the box (□) within the model name.
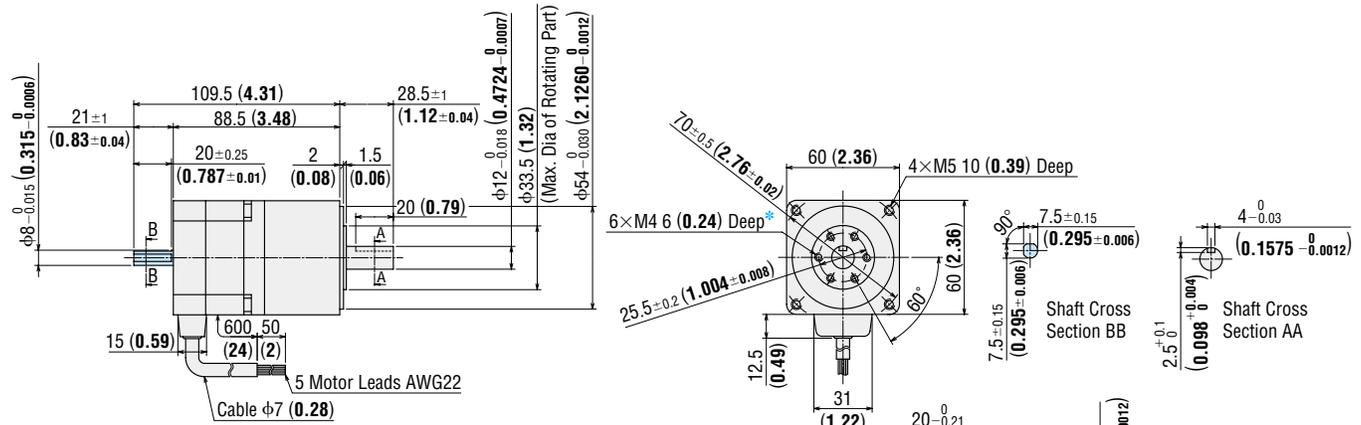
∗ The position of the key slot on the output shaft φ12 (φ**0.4724**) relative to the screw holes position on a maximum diameter of φ33.5 (φ**1.32**) on the rotating part is arbitrary.
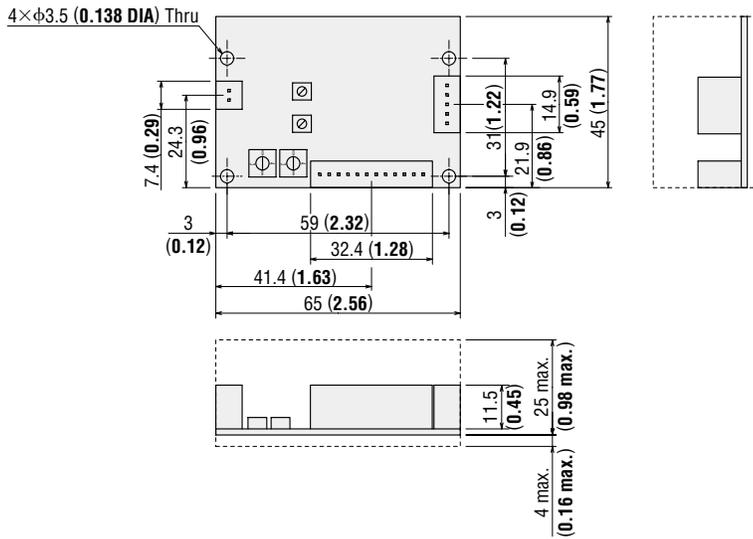
●These dimensions are for double shaft models. For single shaft models, ignore the blue ▭ areas.

25

●Driver

⑮ Driver Model: CRD5103P, CRD5107P, CRD5114P
Mass: 0.04 kg (0.088 lb.) **CAD** B363

4×φ3.5 (**0.138 DIA**) Thru

7.4 (**0.29**)
24.3 (**0.96**)
3 (**0.12**)
59 (**2.32**)
32.4 (**1.28**)
41.4 (**1.63**)
65 (**2.56**)
31 (**1.22**)
14.9 (**0.59**)
21.9 (**0.86**)
45 (**1.77**)
3 (**0.12**)

11.5 (**0.45**)
25 max. (**0.98 max.**)
4 max. (**0.16 max.**)

●Accessories
Connector Housing (Included)
　　51103-0200 (MOLEX)
　　51103-1200 (MOLEX)
　　51103-0500 (MOLEX)

Contact (Included)
　　50351-8100 (MOLEX)

Notes:

●Be sure to use the included connector for signal and motor and power supply. When assembling the connectors, use the hand-operated crimp tool [57295-5000 (MOLEX)].
　The crimp tool is not provided with the package. It must be furnished separately.
●Driver leadwire set crimped with connector (sold separately) are available.
　Driver leadwire set → Page 40

■Connection and Operation

●Names and Functions of Driver Parts

Power input connector

Motor connector
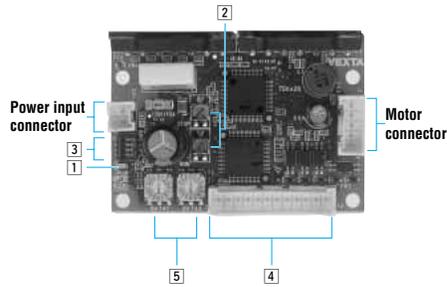
1 Power Input Display

Color	Function	When Activated
Green	Power Supply Indication	Lights when power is on.

2 Current Adjustment Potentiometer

Indication	Name of Potentiometer	Function
RUN	Motor Run Current Potentiometer	For adjusting the motor running current
STOP	Motor Stop Current Potentiometer	For adjusting the motor current at standstill

3 Function Select Switches

Indication	Switch Name	Function
1P/2P	Pulse Input Mode Switch	Switches between 1-pulse input and 2-pulse input.
OFF/SD	Smooth Drive Function Switch	Enables or disables the smooth drive function.
R2/R1	Resolution Select Switch	Switches the base step angle between R1 and R2.

4 Input/Output Signal

| Indication	Input/Output	Pin No.	Signal Name	Function
CN2	Input Signal	1	Pulse Signal (CW Pulse Signal)	Operation command pulse signal. (The motor will rotate in the CW direction when in 2-pulse input mode)
		2		
		3	Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal Photocoupler ON: CW, Photocoupler OFF: CCW. (The motor will rotate in the CCW direction when in 2-pulse input mode)
		4		
		5	All Windings OFF Signal	This signal is used to turn off the output current to the motor so that the motor shaft can be rotated manually.
		6		
		7	Step Angle Select Signal	Switches to step angle set in DATA1 and DATA2.
		8		
		9	Current Cutback Release Signal	This signal is used to disable the automatic current cutback function.
		10		
	Output Signal	11	Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0."
		12		

5 Step Angle Setting Switch

Indication	Signal Name	Function
DATA1	Step Angle Setting Switch	Each switch can be set to the desired step angle from the 16 step angles.
DATA2		

R1				R2			
DATA1 DATA2	Microstep/ Step 1	Resolution 1	Step Angle 1	DATA1 DATA2	Microstep/ Step 2	Resolution 2	Step Angle 2
0	1	500	0.72°	0	×2.5	200	1.8°
1	2	1000	0.36°	1	×1.25	400	0.9°
2	2.5	1250	0.288°	2	1.6	800	0.45°
3	4	2000	0.18°	3	2	1000	0.36°
4	5	2500	0.144	4	3.2	1600	0.225°
5	8	4000	0.09°	5	4	2000	0.18°
6	10	5000	0.072°	6	6.4	3200	0.1125°
7	20	10000	0.036°	7	10	5000	0.072°
8	25	12500	0.0288°	8	12.8	6400	0.05625°
9	40	20000	0.018°	9	20	10000	0.036°
A	50	25000	0.0144°	A	25.6	12800	0.028125°
B	80	40000	0.009°	B	40	20000	0.018°
C	100	50000	0.0072°	C	50	25000	0.0144°
D	125	62500	0.00576°	D	51.2	25600	0.0140625°
E	200	100000	0.0036°	E	100	50000	0.0072°
F	250	125000	0.00288°	F	102.4	51200	0.00703125°

Notes:

● The step angle is calculated by dividing the basic step angle by the number of microstep. The above figures are based on a basic step angle of 0.72˚.

● With the high-resolution type, the basic step angle and resolution are 0.36˚ and 1000 (microstep/step: 1), respectively.

● If you are using a geared type, the step angle divided by the gear ratio becomes the actual step angle.

● The number of microstep that can be switched by the "Step Angle Select" signal are limited to those selected in step angles 1 and 2.

● Do not change the "Step Angle Select" signal input or step angle setting switch while the motor is operating. It may cause the motor to misstep and stop.

## ●Connection Diagrams
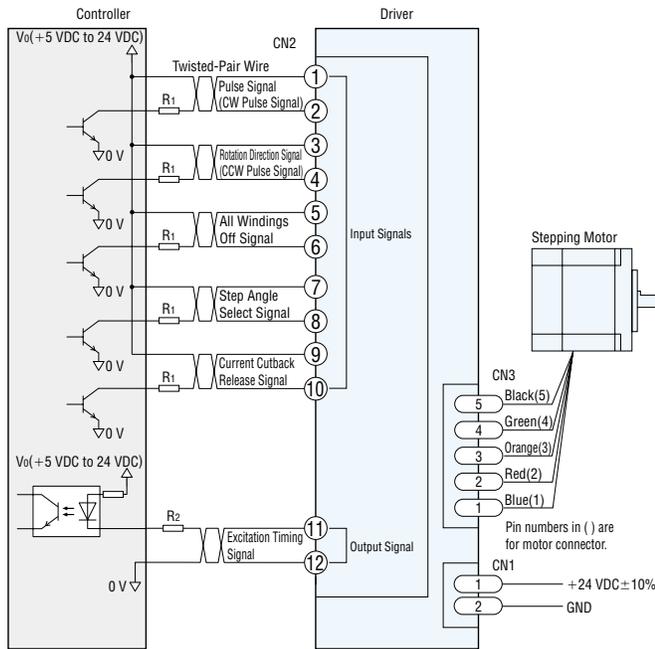
●Description of Input/Output Signals

Indication of Input/Output Signal "ON" "OFF"

Input (Output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (Output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver.
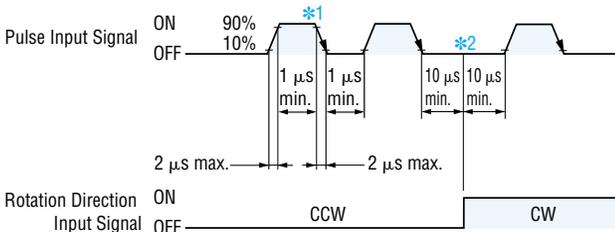The input/output remains "OFF" if nothing is connected.

Photocoupler | OFF | ON

[Pulse (CW) and Rotation Direction (CCW) Pulse Input Signal]

◇Input Circuit and Sample Connection
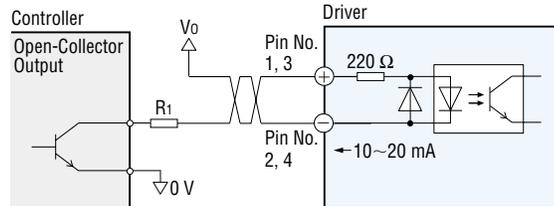
◇Pulse Waveform Characteristics

<1-pulse Input Mode>

<2-pulse Input Mode>

Pulse duty: 50% and below
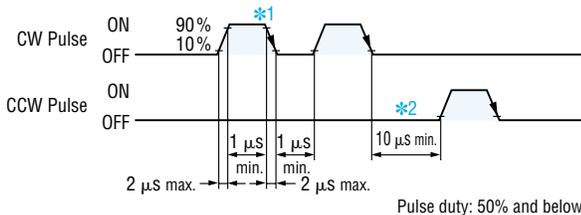
*1 The shaded area indicates when the photocoupler diode is ON. The motor moves when the photocoupler state changes from ON to OFF.

*2 The minimum interval time when changing rotation direction is 20 μs (10 μs in 2-pulse input mode). This value varies greatly depending on the motor type and load inertia.

◇Connecting Input Signal

Keep the input signal voltage to 5 VDC. When the voltage is equal to 5 VDC, the external resistor R_1 is not necessary. When the voltage is above 5 VDC, connect R_1 as shown in the diagram to keep the input current to 10 to 20 mA.
Example) If V_0 is 24 VDC, R_1 must be 1.5 to 2.2 kΩ, 0.5 W or more.

◇Connecting Output Signal

Keep the output signal voltage and current between 5 VDC and 24 VDC and 10 mA or below, respectively. When the current is above 10 mA, connect the external resistor R_2 as shown in the diagram to keep it to 10 mA or below.

◇Power Supply

Use a power supply that can supply sufficient input current. When power supply capacity is insufficient, a decrease in motor output can cause the following malfunctions:
●Motor does not rotate properly at high-speed.
●Slow motor startup and stopping.

◇Notes on Wiring

●Use twisted-pair wires (AWG24 to 22) with a length of 2 m (6.6 ft.) or less for the signal lines.
●Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases.
●Use AWG22 cables for the power supply lines. When assembling the connectors, use the hand-operated crimp tool for contact or the crimped optional cable (sold separately). The crimp tool is not provided with the package. They must be furnished separately.
●Signal lines should be kept at least 2 cm (0.79 in.) away from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
●If noise generated by the motor lead wires causes a problem, insert ferrite cores in the motor lead wires.
●Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning power on.

◇Pulse Signal Characteristics

●Keep the pulse signal at the "photocoupler OFF" state when no pulses are being input.
●In 1-pulse input mode, leave the pulse signal at rest ("photocoupler OFF") when changing rotation directions.
●In 2-pulse input mode, do not input a CW pulse and CCW pulse simultaneously.

[All Windings OFF, Step Angle Select and Current Cutback Release Input Signals]

◇Input Circuit and Sample Connection
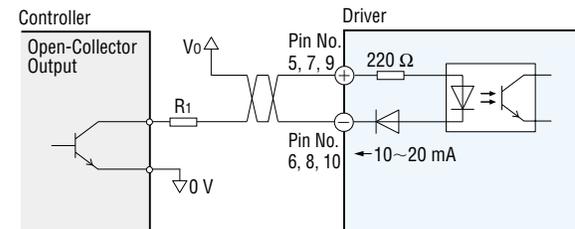
◇All Windings Off Input Signal

●Inputting this signal puts the motor in a non-excitation (free) state.
●This signal is used to move the motor shaft with external force or perform positioning manually. The photocoupler must be "OFF" when the motor is operating.
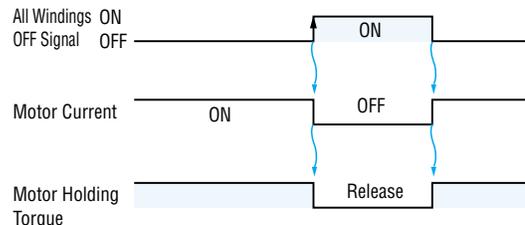
The colored area indicates that the motor provides holding torque in proportion to standstill current set by STOP switch.

●Switching the "All Windings Off" signal from "photocoupler ON" to "photocoupler OFF" does not alter the excitation sequence. When the motor shaft is manually adjusted with the "All Windings Off" signal input, the shaft will shift up to ±3.6˚ (Geared type: ±3.6˚/gear ratio) from the position set after the "All Windings Off" signal is released.

◇**Step Angle Select Input Signal**
● You may select two step angles from 16 available step angles with the step angle select switches DATA1 and DATA2.
● When the signal is at "photocoupler OFF," a step angle set by DATA1 is selected; at "photocoupler ON," DATA2 is selected.

Example:
Changing the step angle from 0.072˚ to 0.72˚.
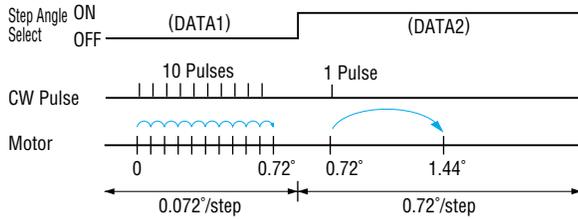
● Be sure to change step angle setting inputs only when the pulse signals are at rest. Switching while moving may cause a positional error of the motor.
● When the step angle is changed by the "Step Angle Select" signal, the "Excitation Timing" signal output may become impossible for some combinations of step angles. When the "Excitation Timing" signal is used, adjust the number of pulses so that the motor can operate with angles that are multiples of 7.2˚.

Example:
After operate 9 pulses with 0.072˚/step setting, change the step angle 0.72˚/step and operate with 1 pulse. In this case, "Excitation Timing" signal will not be output because step "0" position is skipped.
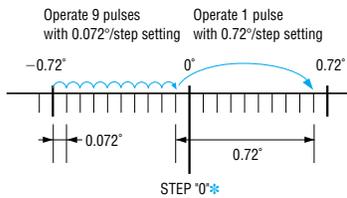
＊"Excitation Timing" signal is only output at step "0" sequence.

● **Timing Chart**

◇**Current Cutback Release Input Signal**
● When this signal is in the "photocoupler ON" state, the automatic current cutback function is disabled. When this signal is in the "photocoupler OFF" state, the automatic current cutback function will be activated after the motor stops (after approx. 100 ms).
● The photocoupler must be "OFF" when the motor is operating.

[Excitation Timing Output Signal]
◇**Output Circuit and Sample Connection**
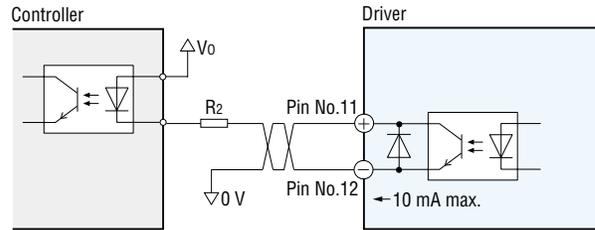
● The "Excitation Timing" signal is output to indicate when the motor excitation (current flowing through the winding) is in the initial stage (step "0" at power up).
● The "Excitation Timing" signal is output simultaneously with a pulse input each time the excitation sequence returns to step "0." The excitation sequence will complete one cycle for every 7.2˚ rotation of the motor output shaft.
　　Microstep/step 1: Signal is output once every 10 pulses.
　　Microstep/step 10: Signal is output once every 100 pulses.

Timing chart at 0.72˚/step (microstep/step 1)
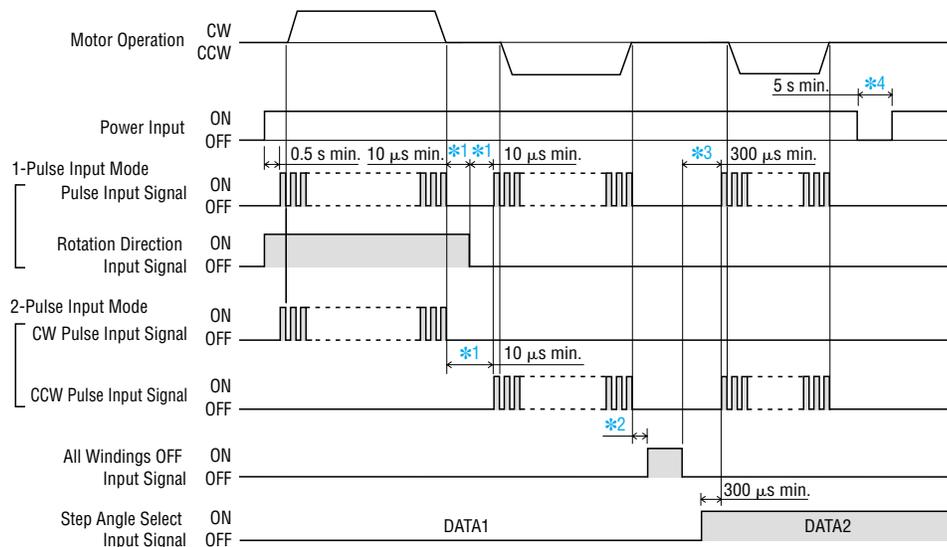＊When connected as shown in the example connection, the signal will be "photocoupler ON" at step "0."
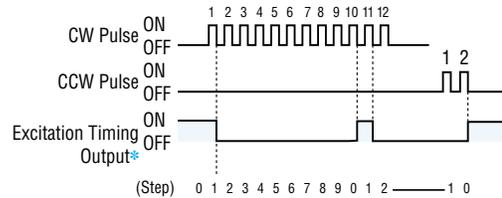
Note:
● When power is turned ON, the excitation sequence is reset to step "0" and the "TIMING" signal is output.

The [ ] section indicates that the photocoupler diode is emitting light.

＊1 Switching time to change direction (1-pulse input mode), and switching time to change CW, CCW pulse (2-pulse input mode) 10 μs is shown as a response time of circuit. The motor may need more time.
＊2 Depends on load inertia, load torque, and starting frequency.
＊3 Never input a step pulse signal immediately after switching the "All Windings Off" signal to the "photocoupler OFF" state. The motor may not start.
＊4 Wait at least 5 seconds before turning on the power again.

■Adjusting the Current

●Adjusting the Motor Current

Use the "RUN" potentiometer to decrease the current and suppress the temperature rise in the motor/driver, or when there is sufficient motor torque and you want to suppress vibration by lowering the current.

Use the "STOP" potentiometer to readjust the current at motor standstill in relation to the holding-brake force of the motor.

Factory settings
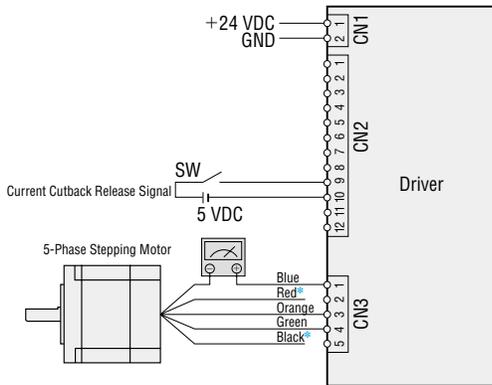Running current: Rated current
Current at motor standstill: Approx. 50% of rated current
Follow the procedure below to adjust the motor current.

◇Connecting an Ammeter

Connect a DC ammeter as illustrated below.

Connect a DC ammeter in series to the blue motor lead wire and motor connector pin No. 1. Set all driver input signals to the "photocoupler OFF" state.

Do not connect the red motor lead wire to connector pin No. 2, and black motor lead wire to connector pin No. 5.

Note:
●Do not input pulse signals.
✻Electric shock may result if the red and black motor lead wires contact each other. Insulate these motor lead wires to prevent electric shock.

◇Adjusting the Motor Running Current

To adjust the motor running current, follow the procedure below:

1. Set the current cutback release signal to the "photocoupler ON" state. Keep other signals in the "photocoupler OFF" state.
2. Turn on the power to the driver.
3. Use the "RUN" potentiometer to adjust the motor's running current.
4. When the power is turned on, the value measured by the ammeter represents the total current in two phases through the blue motor lead wire. The current for one phase is equivalent to one-half the ammeter value. (Example: To set the current to 1.0 A/phase, adjust the current level until the ammeter reads 2.0 A.)
5. When the running current has been adjusted, set the current cutback release signal to the "photocoupler OFF" state.

Notes:
●Be sure to use the motor at the rated current or below.
●Adjusting the running current will also change the current at standstill.

◇Adjusting the Current at Motor Standstill

To adjust the current at motor standstill, follow the procedure below:

1. Set the current cutback release signal to the "photocoupler OFF" state. Keep other signals in the "photocoupler OFF" state.
2. Turn on the power to the driver.
3. Use the "STOP" potentiometer to adjust the motor current at standstill.
4. When the power is turned on, the value measured by the ammeter represents the total current in two phases through the blue motor lead wire. The current for one phase is equivalent to one-half the ammeter value. (Example: To set the current to 1.0 A/phase, adjust the current level until the ammeter reads 2.0 A.)

$$\text{Holding Torque [N·m (oz-in)]} = \frac{\text{Maximum Holding Torque [N·m (oz-in)]} \times \text{Current at Standstill [A]}}{\text{Motor Rated Current [A]}}$$

Notes:
●Always set the running current first, turn off the driver power and turn it back on, and then set the current at standstill. Setting the running current after current at standstill may change the current setting at standstill.
●Setting the current at motor standstill too low may affect the starting of the motor or the position-holding action.

■List of Motor and Driver Combinations

Model names for motor and driver combinations are shown below.

Type	Model	Motor Model	Driver Model
High-Resolution Type	CRK523PMAP	PK523PMA*	CRD5103P
	CRK523PMBP	PK523PMB*	
	CRK524PMAP	PK524PMA*	
	CRK524PMBP	PK524PMB*	
	CRK525PMAP	PK525PMA*	
	CRK525PMBP	PK525PMB*	
	CRK544PMAP	PK544PMA*	CRD5107P
	CRK544PMBP	PK544PMB*	
	CRK546PMAP	PK546PMA*	
	CRK546PMBP	PK546PMB*	
	CRK564PMAP	PK564PMA*	CRD5114P
	CRK564PMBP	PK564PMB*	
	CRK566PMAP	PK566PMA*	
	CRK566PMBP	PK566PMB*	
	CRK569PMAP	PK569PMA*	
	CRK569PMBP	PK569PMB*	
High-Torque Type	CRK513PAP	PK513PA*	CRD5103P
	CRK513PBP	PK513PB*	
	CRK523PAP	PK523PA*	
	CRK523PBP	PK523PB*	
	CRK525PAP	PK525PA*	
	CRK525PBP	PK525PB*	
	CRK544PAP	PK544PA*	CRD5107P
	CRK544PBP	PK544PB*	
	CRK546PAP	PK546PA*	
	CRK546PBP	PK546PB*	
Standard Type	CRK543AP	PK543NAW	CRD5107P
	CRK543BP	PK543NBW	
	CRK544AP	PK544NAW	
	CRK544BP	PK544NBW	
	CRK545AP	PK545NAW	
	CRK545BP	PK545NBW	
	CRK564AP	PK564NAW	CRD5114P
	CRK564BP	PK564NBW	
	CRK566AP	PK566NAW	
	CRK566BP	PK566NBW	
	CRK569AP	PK569NAW	
	CRK569BP	PK569NBW	
TH Geared Type	CRK523PAP-T7.2	PK523PA-T7.2*	CRD5103P
	CRK523PBP-T7.2	PK523PB-T7.2*	
	CRK523PAP-T10	PK523PA-T10*	
	CRK523PBP-T10	PK523PB-T10*	
	CRK523PAP-T20	PK523PA-T20*	
	CRK523PBP-T20	PK523PB-T20*	
	CRK523PAP-T30	PK523PA-T30*	
	CRK523PBP-T30	PK523PB-T30*	
	CRK543AP-T3.6	PK543AW-T3.6	CRD5107P
	CRK543BP-T3.6	PK543BW-T3.6	
	CRK543AP-T7.2	PK543AW-T7.2	
	CRK543BP-T7.2	PK543BW-T7.2	
	CRK543AP-T10	PK543AW-T10	
	CRK543BP-T10	PK543BW-T10	
	CRK543AP-T20	PK543AW-T20	
	CRK543BP-T20	PK543BW-T20	
	CRK543AP-T30	PK543AW-T30	
	CRK543BP-T30	PK543BW-T30	
	CRK564AP-T3.6	PK564AW-T3.6	CRD5114P
	CRK564BP-T3.6	PK564BW-T3.6	
	CRK564AP-T7.2	PK564AW-T7.2	
	CRK564BP-T7.2	PK564BW-T7.2	
	CRK564AP-T10	PK564AW-T10	
	CRK564BP-T10	PK564BW-T10	
	CRK564AP-T20	PK564AW-T20	
	CRK564BP-T20	PK564BW-T20	
	CRK564AP-T30	PK564AW-T30	
	CRK564BP-T30	PK564BW-T30	

Type	Model	Motor Model	Driver Model
PN Geared Type	CRK523PAP-N5	PK523PA-N5*	CRD5103P
	CRK523PBP-N5	PK523PB-N5*	
	CRK523PAP-N7.2	PK523PA-N7.2*	
	CRK523PBP-N7.2	PK523PB-N7.2*	
	CRK523PAP-N10	PK523PA-N10*	
	CRK523PBP-N10	PK523PB-N10*	
	CRK544AP-N5	PK544AW-N5	CRD5107P
	CRK544BP-N5	PK544BW-N5	
	CRK544AP-N7.2	PK544AW-N7.2	
	CRK544BP-N7.2	PK544BW-N7.2	
	CRK544AP-N10	PK544AW-N10	
	CRK544BP-N10	PK544BW-N10	
	CRK566AP-N5	PK566AW-N5	CRD5114P
	CRK566BP-N5	PK566BW-N5	
	CRK566AP-N7.2	PK566AW-N7.2	
	CRK566BP-N7.2	PK566BW-N7.2	
	CRK566AP-N10	PK566AW-N10	
	CRK566BP-N10	PK566BW-N10	
	CRK564AP-N25	PK564AW-N25	
	CRK564BP-N25	PK564BW-N25	
	CRK564AP-N36	PK564AW-N36	
	CRK564BP-N36	PK564BW-N36	
	CRK564AP-N50	PK564AW-N50	
	CRK564BP-N50	PK564BW-N50	
Harmonic Geared Type	CRK543AP-H50	PK543AW-H50S	CRD5107P
	CRK543BP-H50	PK543BW-H50S	
	CRK543AP-H100	PK543AW-H100S	
	CRK543BP-H100	PK543BW-H100S	
	CRK564AP-H50	PK564AW-H50S	CRD5114P
	CRK564BP-H50	PK564BW-H50S	
	CRK564AP-H100	PK564AW-H100S	
	CRK564BP-H100	PK564BW-H100S	

*If you are purchasing only a motor for maintenance purpose, etc., motor leadwire/connector assembly will not be supplied. They must be furnished separately. They are available as optional parts.

Motor leadwire/connector assembly → Page 40

31

Controllers (RoHS)

Controller for Stepping Motor
SG8030J

■Features

All operations including data setting can easily be performed using the four touch-screen buttons on the top panel. In addition, the number of signal lines is reduced to a minimum for easy connection.

● Jerk limit control function to suppress vibration during motor operation
● Supporting step sequential positioning operation and external signal operation
● Maximum oscillation frequency: 200 kHz
● 1-pulse/2-pulse output mode switching

DIN Rail Mounting Model   Recessed Mounting Model

■Product Line

Type	Model
DIN Rail Mounting Model	**SG8030J-D**
Recessed Mounting Model	**SG8030J-U**

Step No.1   Step No.2   Step No.3   Step No.4
<Sequential Positioning>

Stored Program Controller
EMP400 Series

■Features

In addition to the superior oscillation function reflecting Oriental Motor's wealth of expertise in motor design and manufacturing, the **EMP400** Series also provides the I/O control function and the sequence function that allows for programming of a series of operations.

● 32 different sequence programs can be input.
● Various operation patterns
● Teaching function
   When the optional operator interface unit **OP300** is used, you can adjust the travel via teaching or monitor the current position.
● No special software is necessary.

Single Axis   Dual Axis   Operator Interface Unit
(Sold separately)

■Product Line

Type	Number of Axes	Connector
EMP401-1	Single axis	Without connectors
EMP401-2		With connectors
EMP402-1	Dual axis	Without connectors
EMP402-2		With connectors

● **Operator Interface Unit   OP300**

■Sample Program

Positioning operation   0 pulse   11000 pulses

[1]VS1 500   ;Starting speed   500 Hz
[2]V1 1000   ;Operating speed   1000 Hz
[3]T1 30.0   ;Acceleration/deceleration rate   30.0 ms/kHz
[4]D1 +11000   ;Travel amount   11000 pulses
[5]INC1   ;Execute relative positioning operation

Motor Mounting Brackets ⓇoHS

Motor mounting brackets are convenient for installation and securing a stepping motor.

■Product Line

●High-Resolution Type, High-Torque Type and Standard Type

Material: Aluminum die cast

Mounting Bracket Models	Applicable Motor
PAF0P	**CRK54☐▢P** **CRK54☐P▢P** **CRK54☐PM▢P**
PAL0P	**CRK54☐▢P** **CRK54☐P▢P** **CRK54☐PM▢P**
PAL2P-5A	**CRK56☐▢P** **CRK56☐PM▢P**

● Enter the motor case length in the box (☐) within the model name.
  Enter **A** (Single shaft) or **B** (Double shaft) in the box (▢) within the model name.
● The mounting bracket base is built with holes large enough to allow for alignment adjustments in the horizontal direction.
● These mounting brackets can be perfectly fitted to the pilot of the stepping motors. (except for **PAL0P**)

Note:
● They cannot be used with geared stepping motors.

●Geared Type

Material: Aluminum die cast

Mounting Bracket Models	Applicable Motor
SOL0B-A	**CRK543☐P-T▢**
SOL2A-A	**CRK564☐P-T▢**

● Enter **A** (Single shaft) or **B** (Double shaft) in the box (☐) within the model name.
  Enter the gear ratio in the box (▢) within the model name.
● The mounting bracket base is built with holes large enough to allow for alignment adjustments in the horizontal direction.
● No screws are supplied for installing. Provide appropriate screws separately.

■Motor Installation Direction

The motor cable comes out at right angles to the motor. Orient the motor so that the cable faces either upward or sideways.

Cable facing upward　　　Cable facing sideways
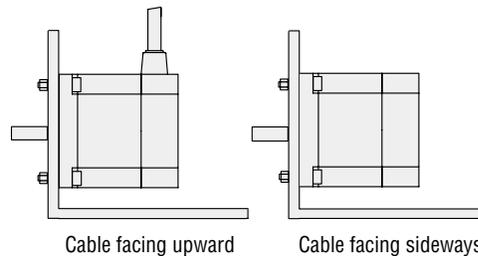
■Mounting the Motor
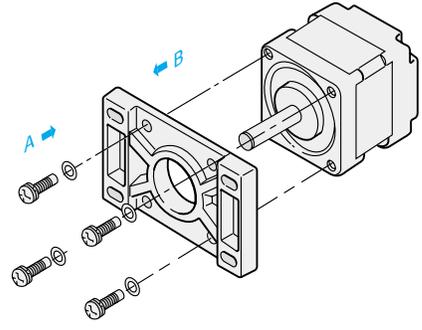
① PAL2P-5A

② PAL0P, SOL0B-A, SOL2A-A

③ PAF0P
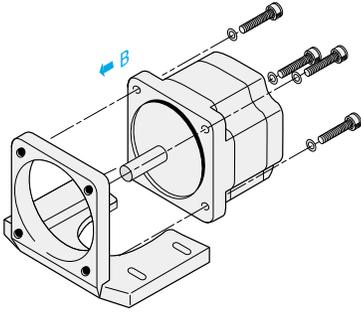
①Use the screws provided to secure the motor to the mounting bracket.
②Attach the motor from the direction shown by the arrow (B).
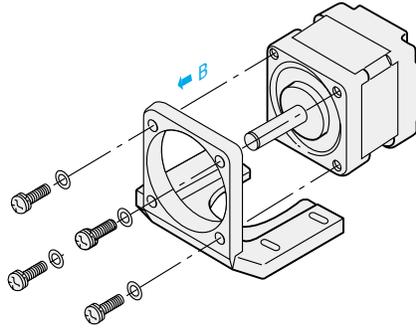
①Use the screws provided to secure the motor to the mounting bracket.
(No screws are supplied for **SOL0B-A** and **SOL2A-A**. Provide appropriate screws separately.)
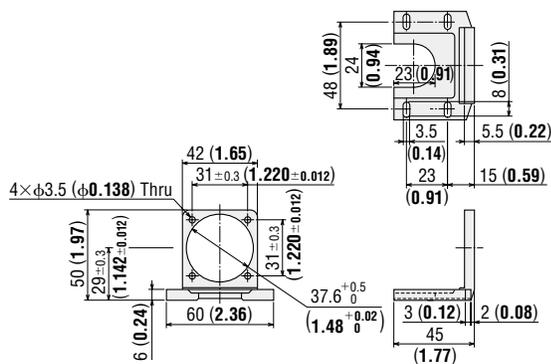②Attach the motor from the direction shown by the arrow (B).

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

■Dimensions Unit = mm (inch)

PAL0P
Mass: 35 g (1.24 oz.)
CAD B139

●Screws (Included)
 M3P0.5 Length 10 mm (0.39 inch) ··· 4 Pieces

PAF0P
Mass: 30 g (1.06 oz.)
CAD B140
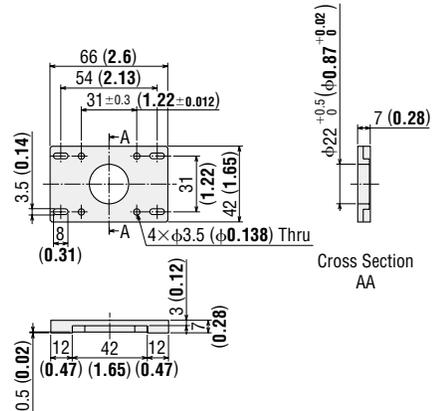
●Screws (Included)
 M3P0.5 Length 7 mm (0.28 inch) ··· 4 Pieces

PAL2P-5A
Mass: 110 g (3.9 oz.)
CAD B143
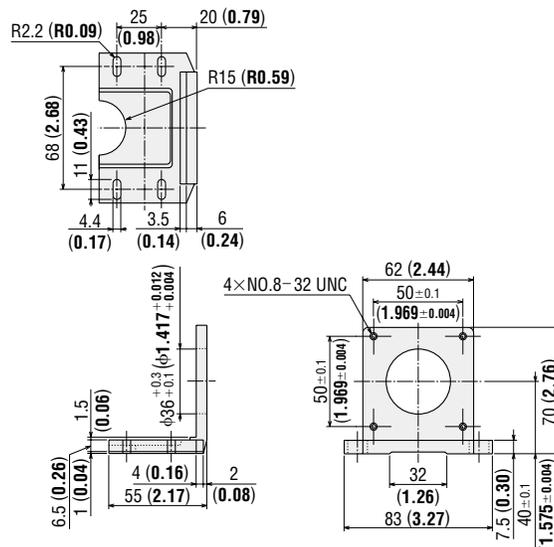
●Screws (Included)
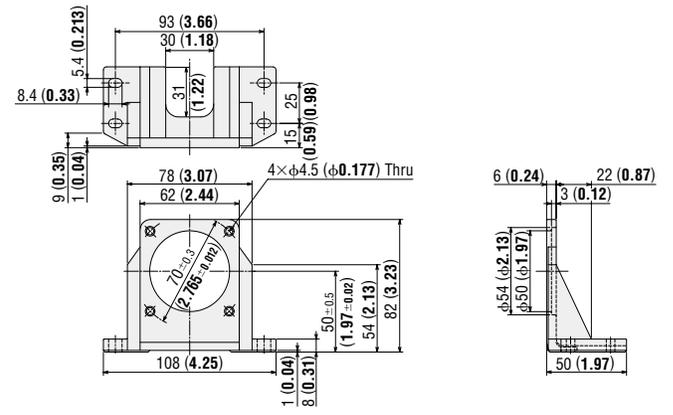 No.8-32 UNC ··· 4 Pieces

SOL0B-A
Mass: 85 g (3 oz.)
CAD B267
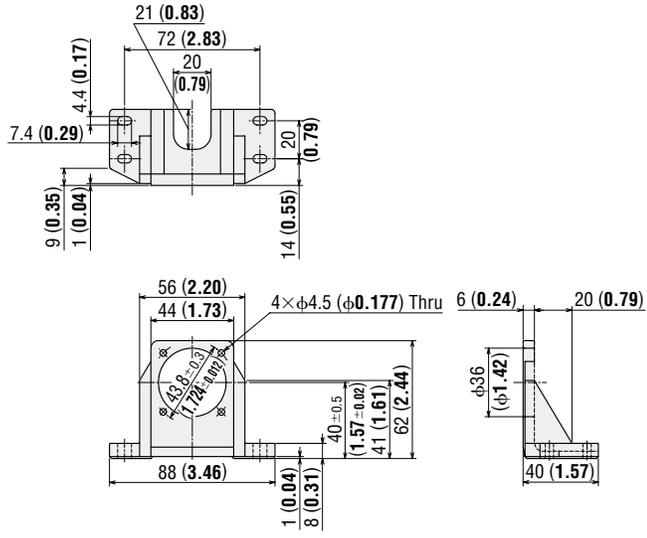
SOL2A-A
Mass: 120 g (4.2 oz.)
CAD B268

35

Flexible Couplings (RoHS)

A flexible coupling ideal for your motor is available. Once you have decided on a motor and/or gear, you can select the recommended coupling easily. All motor shaft diameters of stepping motor packages are available (including geared motors).

■Features of **MCS** Couplings

This three-piece coupling adopts an aluminum alloy hub and a resin spider. The simple construction ensures that the high torque generated by a geared motor can be transmitted reliably. The proper elasticity of the spider suppresses motor vibration.

● High strength (usable for geared motor) has been realized.
● A spider (material: polyurethane) controls the vibration generated by the motor.
● No backlash.

■Product Number Code

MCS 30 08 12
　　①　②　③　④

①	**MCS** Couplings
②	Outer Diameter of Coupling
③	Inner Diameter d1 (Smaller Side) [**FO4** represents φ6.35 mm (φ0.25 in.)]
④	Inner Diameter d2 (Larger Side) [**FO4** represents φ6.35 mm (φ0.25 in.)]

■Coupling Selection Table

Package Model	Gear Ratio	Outer Diameter of Shaft mm (in.)	Type	Driven Shaft Diameter mm (in.)									
				φ4 (φ0.1575)	φ5 (φ0.1969)	φ6 (φ0.2362)	φ6.35 (φ0.2500)	φ8 (φ0.3150)	φ10 (φ0.3937)	φ12 (φ0.4724)	φ14 (φ0.5512)	φ15 (φ0.5906)	φ16 (φ0.6299)
CRK513P□P	−	φ4 (φ0.1575)	MCS14	●	●	●							
CRK52□P□P													
CRK52□PM□P													
CRK54□□P	−	φ5 (φ0.1969)	MCS14	●	●	●							
CRK54□P□P													
CRK54□PM□P													
CRK523P□P-T□	7.2, 10, 20, 30												
CRK543□P-T3.6	−	φ6 (φ0.2362)		●	●	●							
CRK543□P-T□	7.2, 10	φ6 (φ0.2362)	MCS20		●	●	●	●	●				
CRK564□P													
CRK566□P	−	φ8 (φ0.3150)			●	●	●	●	●				
CRK523P□P-N□	5, 7.2, 10												
CRK544□P-N□	5, 7.2	φ10 (φ0.3937)				●	●	●	●				
CRK543□P-T□	20, 30	φ6 (φ0.2362)	MCS30			●	●	●	●				
CRK56□□P													
CRK564PM□P	−	φ8 (φ0.3150)				●	●	●	●	●			
CRK566PM□P													
CRK564□P-T□	3.6, 7.2												
CRK569PM□P	−	φ10 (φ0.3937)				●	●	●	●	●	●		
CRK544□P-N10													
CRK564□P-T□	10, 20, 30	φ8 (φ0.3150)	MCS40						●	●	●	●	
CRK543□P-H□	50, 100	φ10 (φ0.3937)							●	●	●	●	
CRK566□P-N□	5, 7.2	φ12 (φ0.4724)							●	●	●	●	
CRK566□P-N10	−												
CRK564□P-N□	25, 36, 50	φ12 (φ0.4724)	MCS55							●	●	●	●
CRK564□P-H□	50, 100												

● Enter the motor case length in the box (□) within the model name.
Enter **A** (Single shaft) or **B** (Double shaft) in the box (□) within the model name.
Enter the gear ratio in the box (■) within the model name.

■Specifications

| Model	Dimensions					L mm (in.)	Screw Used M	Normal Torque N·m (lb-in)	Mass g (oz.)	Inertia kg·m² (oz-in²)	Static Torsion Spring Constant N·m/rad (lb-in/rad)	Permissible Eccentricity mm (in.)	Permissible Declination deg	Permissible End Play mm (in.)
	Outer Diameter φA mm (in.)	Length W mm (in.)	Axis Hole Diameter d1 H7 mm (in.)	Axis Hole Diameter d2 H7 mm (in.)	Key Slot Tolerance b/t mm (in.)									
MCS140404	14 (0.55)	22 (0.87)	4 (0.1575)	4 (0.1575)	–	7	M2	2.0 (17.7)	6.7 (0.23)	0.184×10^{-6} (0.01)	22.9 (200)	0.06 (0.0024)	0.9	$+0.6$ / 0 ($+0.024$ / 0)
MCS140405			4 (0.1575)	5 (0.1969)										
MCS140406			4 (0.1575)	6 (0.2362)										
MCS140505			5 (0.1969)	5 (0.1969)										
MCS140506			5 (0.1969)	6 (0.2362)										
MCS140606			6 (0.2362)	6 (0.2362)										
MCS200506	20 (0.79)	30 (1.18)	5 (0.1969)	6 (0.2362)	–	10	M2.5	5.0 (44)	19.8 (0.69)	1.059×10^{-6} (0.06)	51.6 (450)	0.08 (0.0031)	0.9	$+0.8$ / 0 ($+0.031$ / 0)
MCS200508			5 (0.1969)	8 (0.3150)										
MCS200606			6 (0.2362)	6 (0.2362)										
MCS2006F04			6 (0.2362)	6.35 (0.2500)										
MCS200608			6 (0.2362)	8 (0.3150)										
MCS200610			6 (0.2362)	10 (0.3937)										
MCS20F0408			6.35 (0.2500)	8 (0.3150)										
MCS20F0410			6.35 (0.2500)	10 (0.3937)										
MCS200808			8 (0.3150)	8 (0.3150)										
MCS200810			8 (0.3150)	10 (0.3937)										
MCS201010			10 (0.3937)	10 (0.3937)										
MCS300606	30 (1.18)	35 (1.38)	6 (0.2362)	6 (0.2362)	–	11	M3	12.5 (110)	44.6 (1.57)	6.057×10^{-6} (0.33)	171.9 (1520)	0.09 (0.0035)	0.9	$+1.0$ / 0 ($+0.039$ / 0)
MCS3006F04			6 (0.2362)	6.35 (0.2500)										
MCS300608			6 (0.2362)	8 (0.3150)										
MCS300610			6 (0.2362)	10 (0.3937)										
MCS30F0408			6.35 (0.2500)	8 (0.3150)										
MCS30F0410			6.35 (0.2500)	10 (0.3937)										
MCS300808			8 (0.3150)	8 (0.3150)										
MCS300810			8 (0.3150)	10 (0.3937)										
MCS300812			8 (0.3150)	12 (0.4724)										
MCS301010			10 (0.3937)	10 (0.3937)										
MCS301012			10 (0.3937)	12 (0.4724)										
MCS301014			10 (0.3937)	14 (0.5512)										
MCS400808	40 (1.57)	66 (2.60)	8 (0.3150)	8 (0.3150)	φ8 (φ0.3150) b : 2±0.0125 (0.0787±0.0005) t : $1^{+0.1}_{0}$ (0.039 $^{+0.0039}_{0}$); φ10 (φ0.3937) b : 3±0.0125 (0.1181±0.0005) t : $1.4^{+0.1}_{0}$ (0.055 $^{+0.0039}_{0}$); φ12 (φ0.4724) b : 4±0.015 (0.1575±0.0006) t : $1.8^{+0.1}_{0}$ (0.071 $^{+0.0039}_{0}$); φ14 (φ0.5512) b : 5±0.015 (0.1969±0.0006) t : $2.3^{+0.1}_{0}$ (0.091 $^{+0.0039}_{0}$); φ15 (φ0.5906) b : 5±0.015 (0.1969±0.0006) t : $2.3^{+0.1}_{0}$ (0.091 $^{+0.0039}_{0}$); φ16 (φ0.6299) b : 5±0.015 (0.1969±0.0006) t : $2.3^{+0.1}_{0}$ (0.091 $^{+0.0039}_{0}$)	25	M6	17.0 (150)	139 (4.9)	42.29×10^{-6} (2.3)	859.5 (7600)	0.06 (0.0024)	0.9	$+1.2$ / 0 ($+0.047$ / 0)
MCS400810			8 (0.3150)	10 (0.3937)										
MCS400812			8 (0.3150)	12 (0.4724)										
MCS400815			8 (0.3150)	15 (0.5906)										
MCS401010			10 (0.3937)	10 (0.3937)										
MCS401012			10 (0.3937)	12 (0.4724)										
MCS401015			10 (0.3937)	15 (0.5906)										
MCS401212			12 (0.4724)	12 (0.4724)										
MCS401215			12 (0.4724)	15 (0.5906)										
MCS551212	55 (2.17)	78 (3.07)	12 (0.4724)	12 (0.4724)		30	M6	60.0 (530)	282 (10)	109.1×10^{-6} (6)	2063 (18200)	0.10 (0.0039)	0.9	$+1.4$ / 0 ($+0.055$ / 0)
MCS551214			12 (0.4724)	14 (0.5512)										
MCS551215			12 (0.4724)	15 (0.5906)										
MCS551216			12 (0.4724)	16 (0.6299)										

■Dimensions

MCS14　Mass: 6.7 g (0.23 oz.)
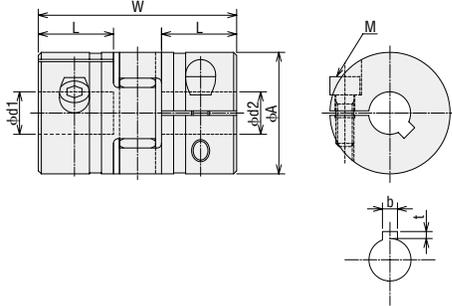**MCS20**　Mass: 19.8 g (0.69 oz.)
MCS30　Mass: 44.6 g (1.57 oz.)
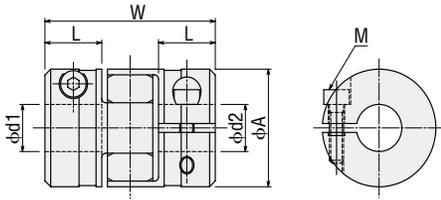
MCS55　　Mass: 282 g (10 oz.)
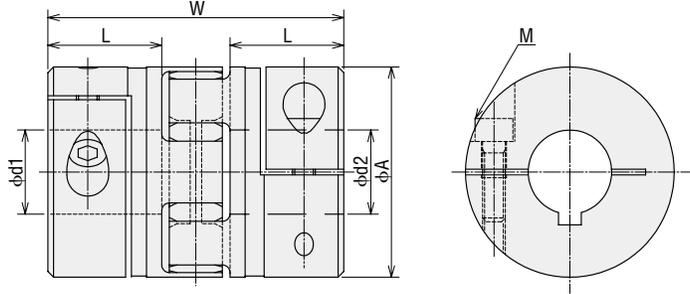
MCS40　　Mass: 139 g (4.9 oz.)

■Mounting to a Shaft

●Clamp Type

Clamp couplings use the tightening 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 tightening torque. We recommend use of a torque wrench to fasten the coupling.
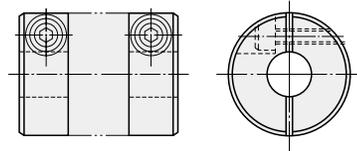
Type		MCS14	MCS20	MCS30	MCS40	MCS55
Tightening Torque	N·m (oz-in)	0.37 (52)	0.76 (107)	1.34 (190)	10.5 (1490)	10.5 (1490)

■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.

Straight Edge　Eccentricity　Declination　End Play
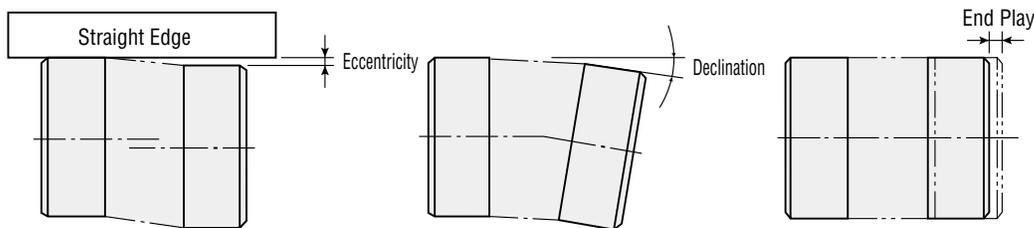
Notes:
●When misalignment exceeds the permissible value or excessive torque is applied, the coupling's shape will deform, and service life is shortened.
●When the coupling emits a metallic sound during operation, stop operation immediately and ensure there is no misalignment, axis interference or loose screws.
●When load changes are large, paint the coupling set screw with an adhesive to prevent the coupling screw from loosening.

Clean Dampers (RoHS)

Mechanical dampers suppress stepping motor vibration and improve high-speed performance. An inertia body and silicon gel are hermetically sealed in a plastic case.

■Features

● Excellent vibration absorption
  The doughnut-shaped internal inertia body and silicon gel absorb vibration. This feature enables a stable damping effect.
● Since there is no frictional dust as in conventional magnetic dampers, it can be used in environments where higher degrees of cleanness is needed.
● 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.
● Machine part is sealed hermetically in a plastic case.
  This ensures safety and doesn't generate noise.

<Clean Damper Structure>
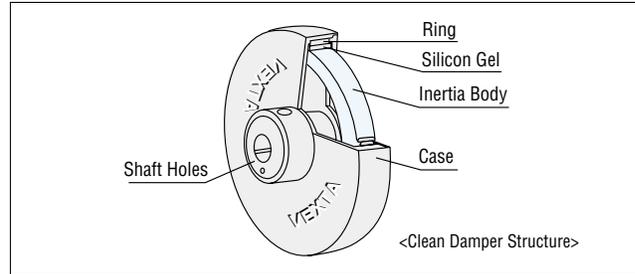
■Product Line

Model	Inertia kg·m^2 (oz-in^2)	Mass g (lb.)	Applicable Motor
D4CL-5.0F	34×10^{-7} (0.186)	24 (0.053)	**CRK52**□**PBP** **CRK52**□**PMBP** **CRK523PBP-T**□ **CRK523PBP-N**□ **CRK54**□**BP** **CRK54**□**PBP** **CRK54**□**PMBP** **CRK543BP-T**□ **CRK544BP-N**□ **CRK543BP-H**□
D6CL-8.0F	140×10^{-7} (0.77)	61 (0.13)	**CRK56**□**BP** **CRK56**□**PMBP** **CRK564BP-T**□ **CRK56**□**BP-N**□ **CRK564BP-H**□

Ambient Temperature: $-20°C\sim+80°C$ ($-4°F\sim+176°F$)

● Enter the motor case length in the box (□) within the model name.
  Enter the gear ratio in the box (□) within the model name.

## ■Installation of the Clean Damper
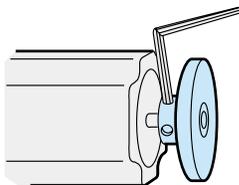
Point the mounting screws of the clean damper toward the motor case, fasten to the shaft and tighten the damper's mounting screws (2 places) with a hexagonal wrench to secure it to the shaft.

Type		**D4CL-5.0F**	**D6CL-8.0F**
Tightening Torque	N·m (oz-in)	0.4 (56)	1.5 (210)

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.

■Dimensions Unit = mm (inch)
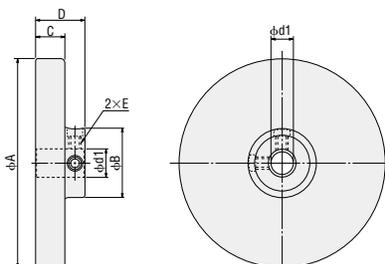
Model	φd1	φA	φB	C	D	E
D4CL-5.0F	$\phi 5^{+0.018}_{0}$ ($\phi 0.1969^{+0.0007}_{0}$)	φ36±0.5 (φ1.42±0.02)	φ13±0.5 (φ0.51±0.02)	9±0.3 (0.354±0.012)	15±0.5 (φ0.591±0.012)	M3
D6CL-8.0F	$\phi 8^{+0.022}_{0}$ ($\phi 0.3150^{+0.0009}_{0}$)	φ44.5±0.5 (φ1.75±0.02)	φ20±0.5 (φ0.79±0.02)	15±0.3 (φ0.591±0.012)	22±0.5 (φ0.87±0.02)	M4

Cables

Driver Leadwire Set (RoHS)

As an option for DC input drivers, leadwires with a connector are available.
Crimping is not necessary, and the connection with the motor, power supply, input/output signal is also easy. The driver leadwire set includes three sets of leadwire/connector assembly (for motor, power supply and input/output signal).

■Product Line

Model	Applicable Driver	Length m (ft.)
LCS04SD5	CRD5103P CRD5107P CRD5114P	0.6 (2)

Motor Leadwire/Connector Assembly (RoHS)

These leadwires with connectors are available for connection with the motor, eliminating the need for assembling a connector. A motor cable of 0.6 m (2 ft.) is included with the connector type packages.

■Product Line

Model	Package Model	Motor Model	Length m (ft.)
LC5N06A	**CRK513P□P** **CRK52□P□P**	PK513P□ PK52□P□	0.6 (2)
LC5N10A	**CRK52□PM□P** **CRK523P□P-T□** **CRK523P□P-N■**	PK52□PM□ PK523P□-T□ PK523P□-N■	1 (3.3)
LC5N06B	**CRK54□P□P**	PK54□P□	0.6 (2)
LC5N10B	**CRK54□PM□P**	PK54□PM□	1 (3.3)
LC5N06C	**CRK56□PM□P**	PK56□PM□	0.6 (2)
LC5N10C			1 (3.3)

● Enter the motor case length in the box (□) within the model name.
   Enter **A** (Single shaft) or **B** (Double shaft) in the box (□) within the model name.
   Enter the gear ratio in the box (■) within the model name.

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