

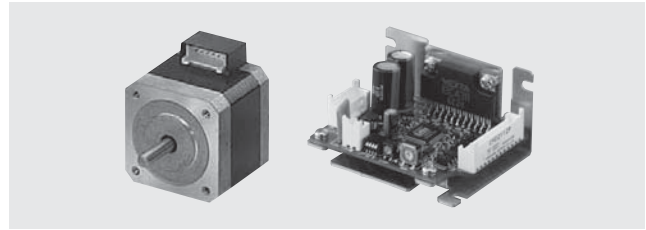
**RoHS** RoHS-Compliant

2-Phase Stepping Motor and Driver Package

# CMK Series

● Additional Information ●  
Technical reference → Page F-1

The **CMK** Series is a motor and driver package consisting of a 2-phase stepping motor and 24 VDC input micro step driver, allowing for a reduction in the size of your equipment and in vibration.



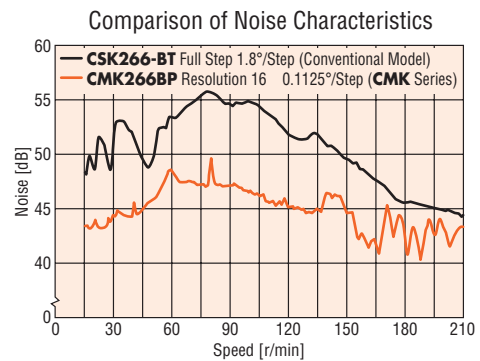
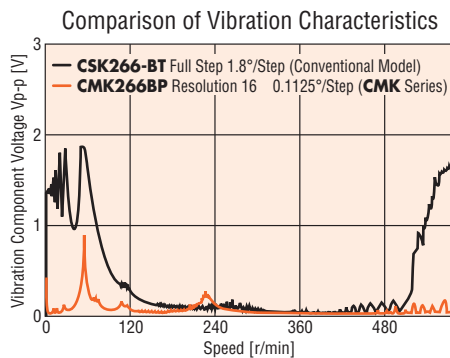
## Features

### ● Achieving Low Vibration and Noise in the Microstep Drive

The newly designed compact DC board-level driver achieves microstep drive in a compact, lightweight body. The 2-phase stepping motor's basic step angle (1.8°/step) is divided by a maximum of 16 resolutions (0.1125°/step) without the use of a reduction mechanism or other mechanical elements, which contributes to the reduction in noise and vibration of your equipment.

Microstep/Step	Resolution	Step Angle
1	200	1.8°
2	400	0.9°
4	800	0.45°
8	1600	0.225°
16	3200	0.1125°

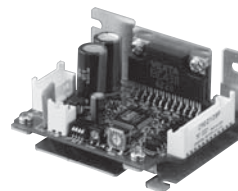
(At basic step angle 1.8°/step)



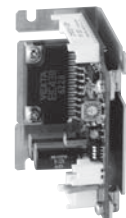
### ● Full Range of Driver Functions

- Five preset step angles
- Operating current can easily be set with a digital switch
- 1-pulse/2-pulse input mode switching
- Power LED
- Connector with lock (by MOLEX)

### ◇ Easy-to-Install Heat Sink Shape



Horizontal Installation



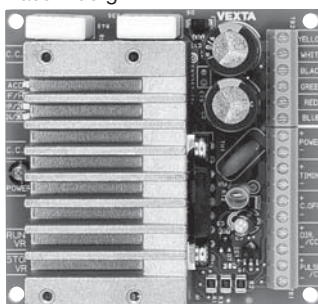
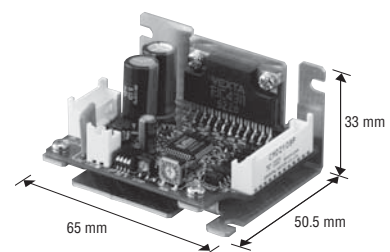
Vertical Installation

### ● One of the Smallest Drivers in the Industry Adopting a Microstep Driver

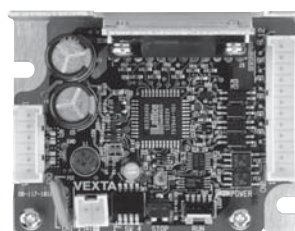
The driver of the **CMK** Series is one of the smallest, lightest drivers in the industry adopting a microstep driver. The driver is 62% lighter and has 41% less install area (based on horizontal installation) compared to our conventional model. This product contributes to downsizing of your equipment.

Mass: 130 g

Mass: 50 g



Conventional Model (CSD2120-T)







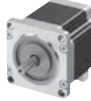

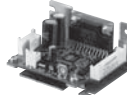





New Product (CMD21□□P)

### Comparison with a conventional driver

- ◇ Mass: **62%** less
- ◇ Install area: **41%** less (based on horizontal installation)
- ◇ Volume: **41%** less (the conventional driver includes a 5 mm spacer for installation.)

## Wide Variety

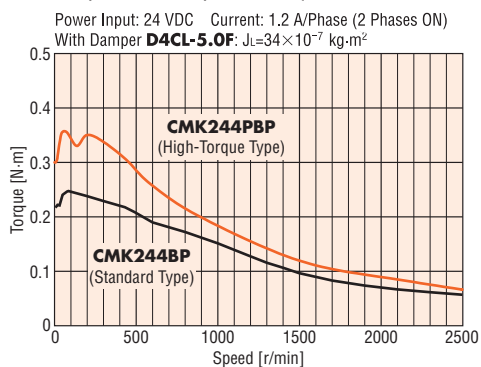
The **CMK** Series motor and driver package comes in five frame sizes of 28 to 60 mm as well as four motor types.

Type	Features	□28 mm	□35 mm	□42 mm	□50 mm	□56.4/60 mm	Driver
High-Torque Type	The high-torque motor realized higher torque of approx. 1.5 times compared with the conventional standard type motor.						
Standard Type	The basic model offering a good balance of torque and low vibration/noise characteristics.						
High-Resolution Type	High-torque motor offering higher positioning accuracy with the basic step angle set to 0.9°/step, which is just half the basic step angle of the standard type motor.						
<b>SH</b> Geared Type	These geared types are effective for reduction, increasing torque, higher resolution and suppressing vibration. Eight gear ratios are available.						

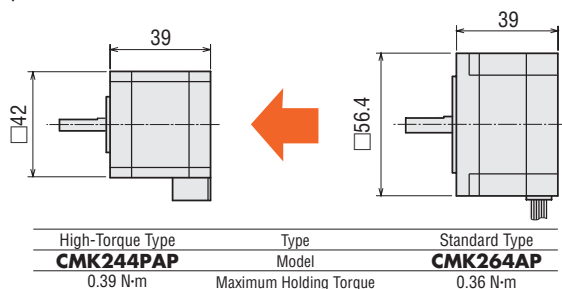
## High-Torque Type

The high-torque type adopts new technology and design. This motor produces higher torque of approximately 1.5 times the level achieved by a conventional standard type motor.

### Comparison of Speed–Torque Characteristics



Providing torque equivalent to a motor of the next larger frame size, the high-torque type allows for a reduction in the size of your equipment.



The motor also adopts a connector coupling system for easy installation.

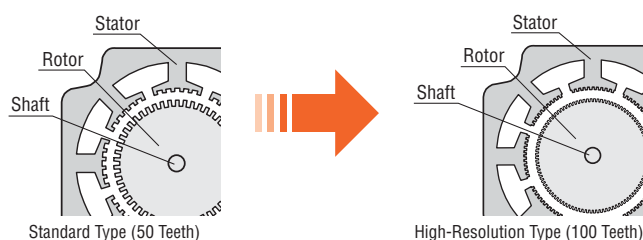
## RoHS Compliant

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

● Details of RoHS Directive → Page G-23

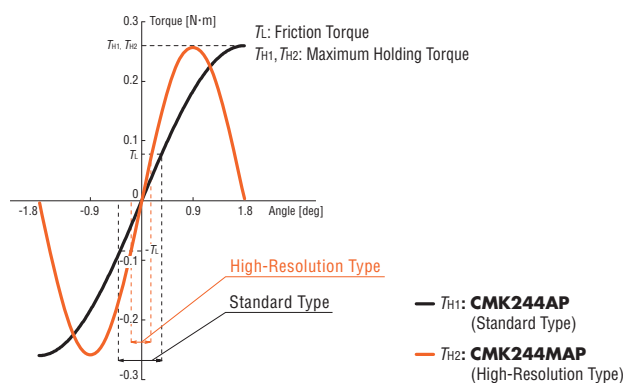
## High-Resolution Type

The basic step angle is 0.9°, which is half that of the standard type. 400 steps per rotation is possible. This motor achieves high resolution, low vibration and improved stopping accuracy.



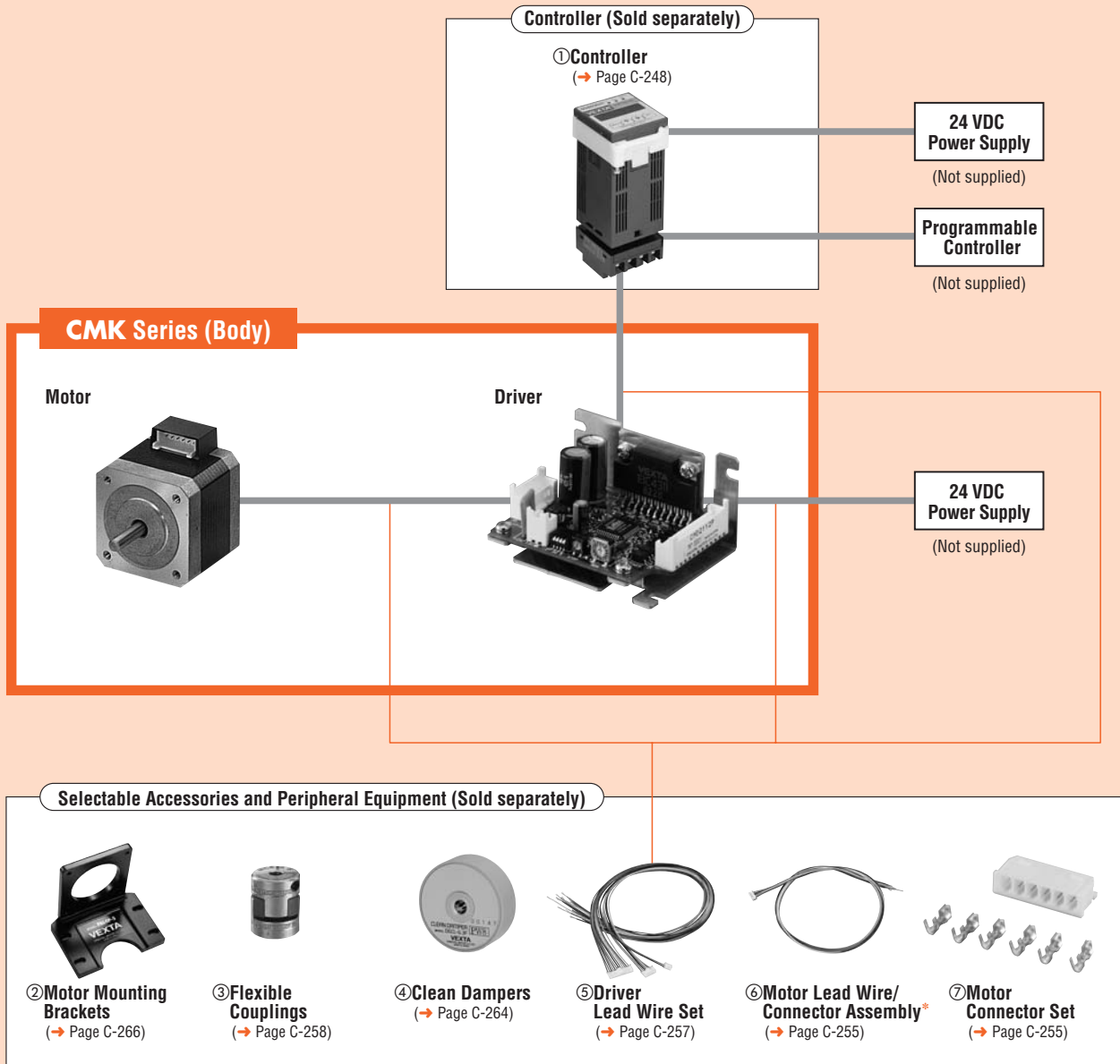
The small basic step angle allows the torque to pick up quickly while minimizing the negative effect of friction load.

### Comparison of Angle–Torque Characteristics



## System Configuration

An example of a system configuration with the **SG8030JY** controller.



\*Motor lead wire/connector assembly of 0.6 m is included with the motor and driver package of connector-coupled type.

No.	Product Name	Overview	Page
①	Controller	This controller outputs pulse commands that determine the rotating amount and rotating speed.	C-248
②	Motor Mounting Brackets	Dedicated mounting bracket for the motor.	C-266
③	Flexible Couplings	Coupling that connects the motor shaft to the driven shaft.	C-258
④	Clean Dampers	Dedicated damper for suppressing stepping motor vibration.	C-264
⑤	Driver Lead Wire Set	Cables for connecting the driver and motor, DC power supply or host controller (0.6 m).	C-257
⑥	Motor Lead Wire/Connector Assembly	Lead wire with a connector crimped for connector-coupled motors (0.6 m, 1 m).	C-255
⑦	Motor Connector Set	Set of connector housings and contacts for use with connector-coupled motors (for 30 units).	C-255

### Example of System Configuration

(Body)

(Sold separately)

<b>CMK Series</b>	+	<b>Controller</b>	<b>Motor Mounting Bracket</b>	<b>Flexible Coupling</b>	<b>Clean Damper</b>	<b>Driver Lead Wire Set (0.6 m)</b>
<b>CMK244BPB</b>		<b>SG8030JY-U</b>	<b>PALOP</b>	<b>MCS140506</b>	<b>D4CL-5.0F</b>	<b>LCS01CMK2</b>

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

## Product Number Code

- High-Torque Type, Standard Type, High-Resolution Type

# CMK 2 4 6 P A P

① ② ③ ④ ⑤ ⑥ ⑦

- SH Geared Type

# CMK 2 6 4 A P - SG 10

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Series	<b>CMK: CMK Series</b>		
②	2: 2-Phase			
③	Motor Frame Size	2: 28 mm	3: 35 mm	4: 42 mm 5: 50 mm 6: 56.4 mm
④	Motor Case Length			
⑤	Motor Type	P: High-Torque Type Blank: Standard Type M: High-Resolution Type		
⑥	Shaft Type	A: Single Shaft B: Double Shaft		
⑦	Signal I/O Mode	P: Photocoupler		

①	Series	<b>CMK: CMK Series</b>		
②	2: 2-Phase			
③	Motor Frame Size	2: 28 mm	4: 42 mm	6: 60 mm
④	Motor Case Length			
⑤	Shaft Type	A: Single Shaft B: Double Shaft		
⑥	Signal I/O Mode	P: Photocoupler		
⑦	Gearhead Type	SG: SH Geared Type		
⑧	Gear Ratio			

## Product Line

- High-Torque Type

Model (Single Shaft)	Model (Double Shaft)
<b>CMK223PAP</b>	<b>CMK223PBP</b>
<b>CMK224PAP</b>	<b>CMK224PBP</b>
<b>CMK225PAP</b>	<b>CMK225PBP</b>
<b>CMK233PAP</b>	<b>CMK233PBP</b>
<b>CMK235PAP</b>	<b>CMK235PBP</b>
<b>CMK244PAP</b>	<b>CMK244PBP</b>
<b>CMK246PAP</b>	<b>CMK246PBP</b>

The following items are included in each product.  
Motor, Driver, Driver Connector, Motor Lead Wire/Connector Assembly, Operating Manual

- Standard Type

Model (Single Shaft)	Model (Double Shaft)
<b>CMK243AP</b>	<b>CMK243BP</b>
<b>CMK244AP</b>	<b>CMK244BP</b>
<b>CMK245AP</b>	<b>CMK245BP</b>
<b>CMK256AP</b>	<b>CMK256BP</b>
<b>CMK258AP</b>	<b>CMK258BP</b>
<b>CMK264AP</b>	<b>CMK264BP</b>
<b>CMK266AP</b>	<b>CMK266BP</b>
<b>CMK268AP</b>	<b>CMK268BP</b>

The following items are included in each product.  
Motor, Driver, Driver Connector, Operating Manual

- High-Resolution Type

Model (Single Shaft)	Model (Double Shaft)
<b>CMK243MAP</b>	<b>CMK243MBP</b>
<b>CMK244MAP</b>	<b>CMK244MBP</b>
<b>CMK245MAP</b>	<b>CMK245MBP</b>
<b>CMK264MAP</b>	<b>CMK264MBP</b>
<b>CMK266MAP</b>	<b>CMK266MBP</b>
<b>CMK268MAP</b>	<b>CMK268MBP</b>

The following items are included in each product.  
Motor, Driver, Driver Connector, Motor Lead Wire/Connector Assembly, Operating Manual

- SH Geared Type

Model (Single Shaft)	Model (Double Shaft)
<b>CMK223AP-SG7.2</b>	<b>CMK223BP-SG7.2</b>
<b>CMK223AP-SG9</b>	<b>CMK223BP-SG9</b>
<b>CMK223AP-SG10</b>	<b>CMK223BP-SG10</b>
<b>CMK223AP-SG18</b>	<b>CMK223BP-SG18</b>
<b>CMK223AP-SG36</b>	<b>CMK223BP-SG36</b>
<b>CMK243AP-SG3.6</b>	<b>CMK243BP-SG3.6</b>
<b>CMK243AP-SG7.2</b>	<b>CMK243BP-SG7.2</b>
<b>CMK243AP-SG9</b>	<b>CMK243BP-SG9</b>
<b>CMK243AP-SG10</b>	<b>CMK243BP-SG10</b>
<b>CMK243AP-SG18</b>	<b>CMK243BP-SG18</b>
<b>CMK243AP-SG36</b>	<b>CMK243BP-SG36</b>
<b>CMK243AP-SG50</b>	<b>CMK243BP-SG50</b>
<b>CMK243AP-SG100</b>	<b>CMK243BP-SG100</b>
<b>CMK264AP-SG3.6</b>	<b>CMK264BP-SG3.6</b>
<b>CMK264AP-SG7.2</b>	<b>CMK264BP-SG7.2</b>
<b>CMK264AP-SG9</b>	<b>CMK264BP-SG9</b>
<b>CMK264AP-SG10</b>	<b>CMK264BP-SG10</b>
<b>CMK264AP-SG18</b>	<b>CMK264BP-SG18</b>
<b>CMK264AP-SG36</b>	<b>CMK264BP-SG36</b>
<b>CMK264AP-SG50</b>	<b>CMK264BP-SG50</b>
<b>CMK264AP-SG100</b>	<b>CMK264BP-SG100</b>

The following items are included in each product.  
Motor, Driver, Driver Connector, Motor Lead Wire/Connector Assembly\*, Mounting Screws for Motor, Operating Manual  
\*Only for connector-coupled motor

# High-Torque Type Motor Frame Size 28 mm

## Specifications RoHS

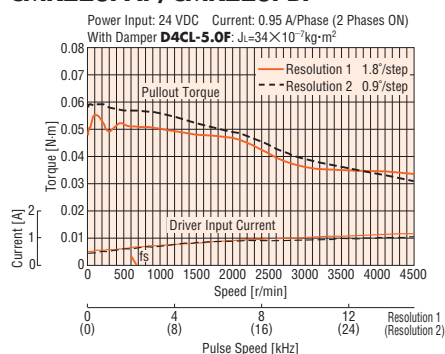
Model	Single Shaft	CMK223PAP*	CMK224PAP*	CMK225PAP*
	Double Shaft			
Maximum Holding Torque	N·m	0.05	0.075	0.09
Rotor Inertia	J: kg·m <sup>2</sup>	9×10 <sup>-7</sup>	12×10 <sup>-7</sup>	18×10 <sup>-7</sup>
Rated Current	A/Phase	0.95		
Basic Step Angle		1.8°		
Power Source		24 VDC±10% 1.5 A		
Excitation Mode		Microstep		
Mass	Motor kg	0.11	0.14	0.2
	Driver kg			
Dimension No.	Motor	□		
	Driver	□		

How to read specifications table → Page C-10

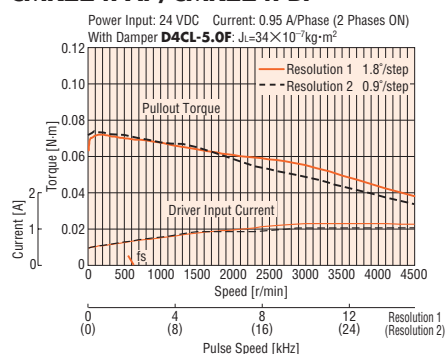
\* Motor lead wire/connector assembly of 0.6 m is included with the motor and driver package of connector coupled type.

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-10

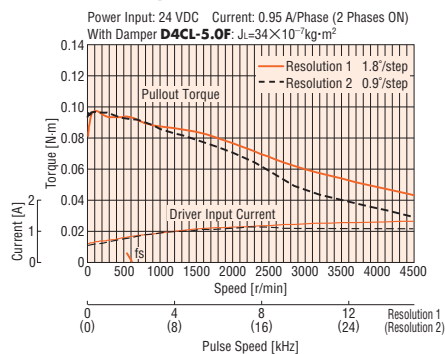
### CMK223PAP/CMK223PBP



### CMK224PAP/CMK224PBP



### CMK225PAP/CMK225PBP



● The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.

# High-Torque Type Motor Frame Size 35 mm, 42 mm

## Specifications RoHS

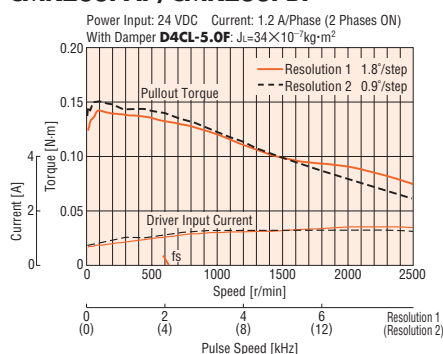
Model	Single Shaft	<b>CMK233PAP*</b>	<b>CMK235PAP*</b>	<b>CMK244PAP*</b>	<b>CMK246PAP*</b>	
	Double Shaft	<b>CMK233PBP*</b>	<b>CMK235PBP*</b>	<b>CMK244PBP*</b>	<b>CMK246PBP*</b>	
Maximum Holding Torque	N·m	0.16	0.3	0.39	0.75	
Rotor Inertia	J: kg·m <sup>2</sup>	24×10 <sup>-7</sup>	50×10 <sup>-7</sup>	57×10 <sup>-7</sup>	114×10 <sup>-7</sup>	
Rated Current	A/Phase	1.2				
Basic Step Angle		1.8°				
Power Source		24 VDC±10% 1.7 A				
Excitation Mode		Microstep				
Mass	Motor	kg	0.18	0.285	0.3	0.5
	Driver	kg	0.05			
Dimension No.	Motor	[2]		[3]		
	Driver	[10]				

How to read specifications table → Page C-10

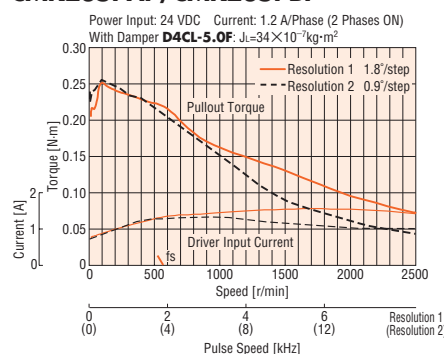
\* Motor lead wire/connector assembly of 0.6 m is included with the motor and driver package of connector coupled type.

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-10

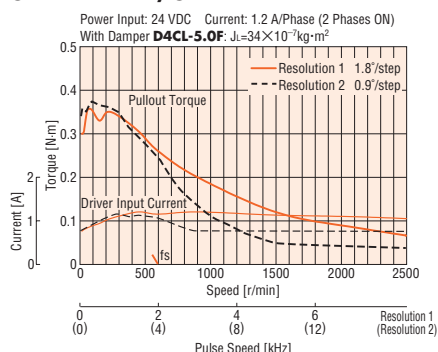
### CMK233PAP/CMK233PBP



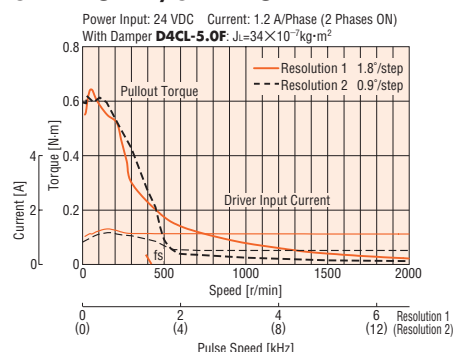
### CMK235PAP/CMK235PBP



### CMK244PAP/CMK244PBP



### CMK246PAP/CMK246PBP



● The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.

# Standard Type Motor Frame Size 42 mm, 50 mm

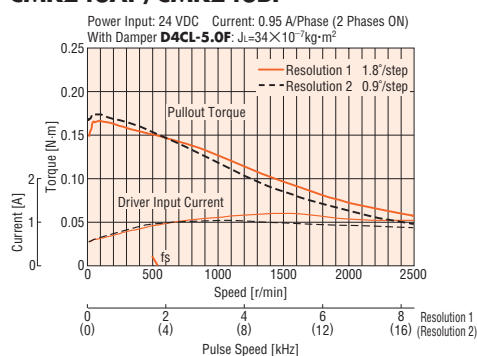
## Specifications RoHS

Model	Single Shaft	<b>CMK243AP</b>	<b>CMK244AP</b>	<b>CMK245AP</b>	<b>CMK256AP</b>	<b>CMK258AP</b>
	Double Shaft	<b>CMK243BP</b>	<b>CMK244BP</b>	<b>CMK245BP</b>	<b>CMK256BP</b>	<b>CMK258BP</b>
Maximum Holding Torque	N·m	0.16	0.26	0.32	0.56	1.2
Rotor Inertia	J: kg·m <sup>2</sup>	35×10 <sup>-7</sup>	54×10 <sup>-7</sup>	68×10 <sup>-7</sup>	230×10 <sup>-7</sup>	420×10 <sup>-7</sup>
Rated Current	A/Phase	0.95		1.2		2
Basic Step Angle		1.8°				
Power Source		24 VDC±10% 1.5 A	24 VDC±10% 1.7 A		24 VDC±10% 2.9 A	
Excitation Mode		Microstep				
Mass	Motor	kg	0.21	0.27	0.35	0.53
	Driver	kg	0.05			
Dimension No.	Motor	[4]			[5]	
	Driver	[10]				

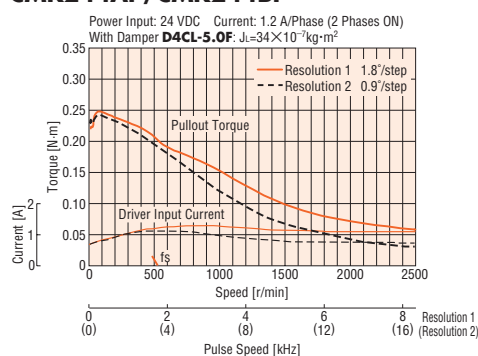
How to read specifications table → Page C-10

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-10

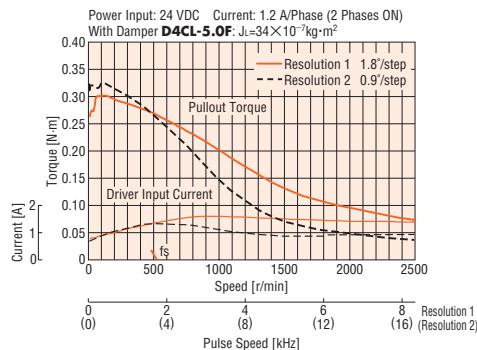
### CMK243AP/CMK243BP



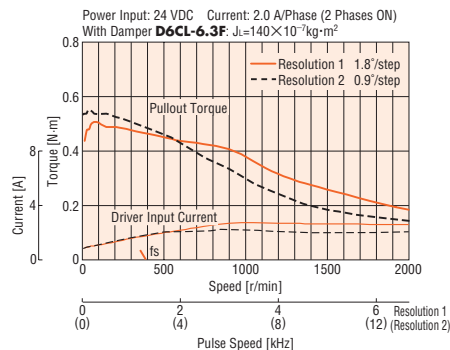
### CMK244AP/CMK244BP



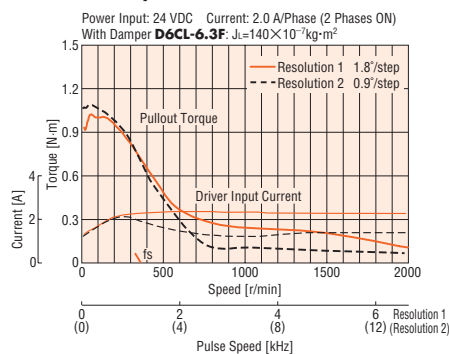
### CMK245AP/CMK245BP



### CMK256AP/CMK256BP



### CMK258AP/CMK258BP



● The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.



# Standard Type Motor Frame Size 56.4 mm

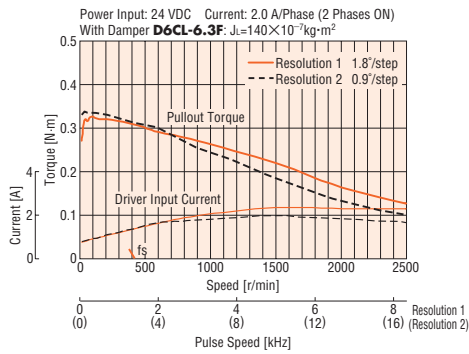
## Specifications RoHS

Model	Single Shaft	<b>CMK264AP</b>	<b>CMK266AP</b>	<b>CMK268AP</b>
	Double Shaft	<b>CMK264BP</b>	<b>CMK266BP</b>	<b>CMK268BP</b>
Maximum Holding Torque	N·m	0.36	0.82	1.35
Rotor Inertia	J: kg·m <sup>2</sup>	120×10 <sup>-7</sup>	300×10 <sup>-7</sup>	480×10 <sup>-7</sup>
Rated Current	A/Phase	2		
Basic Step Angle	1.8°			
Power Source	24 VDC±10% 2.9 A			
Excitation Mode	Microstep			
Mass	Motor	kg	0.45	0.7
	Driver	kg	0.05	
Dimension No.	Motor	6		
	Driver	10		

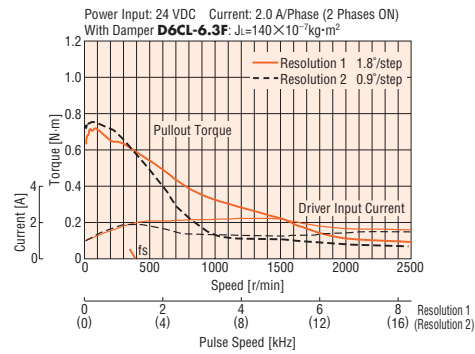
How to read specifications table → Page C-10

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-10

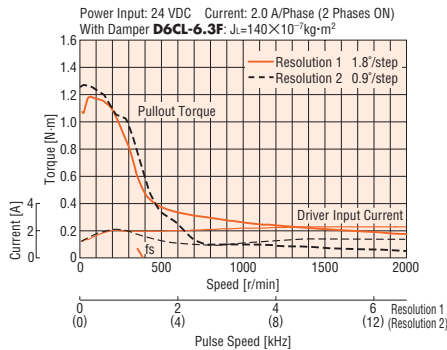
### CMK264AP/CMK264BP



### CMK266AP/CMK266BP



### CMK268AP/CMK268BP



- The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.



# High-Resolution Type Motor Frame Size 42 mm, 56.4 mm

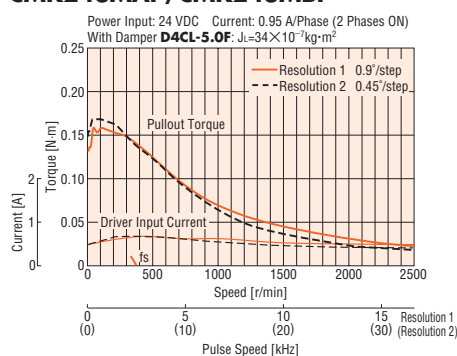
## Specifications RoHS

Model	Single Shaft	<b>CMK243MAP</b>	<b>CMK244MAP</b>	<b>CMK245MAP</b>	<b>CMK264MAP</b>	<b>CMK266MAP</b>	<b>CMK268MAP</b>	
	Double Shaft	<b>CMK243MBP</b>	<b>CMK244MBP</b>	<b>CMK245MBP</b>	<b>CMK264MBP</b>	<b>CMK266MBP</b>	<b>CMK268MBP</b>	
Maximum Holding Torque	N·m	0.16	0.26	0.32	0.37	0.9	1.35	
Rotor Inertia	J: kg·m <sup>2</sup>	35×10 <sup>-7</sup>	54×10 <sup>-7</sup>	68×10 <sup>-7</sup>	120×10 <sup>-7</sup>	300×10 <sup>-7</sup>	480×10 <sup>-7</sup>	
Rated Current	A/Phase	0.95	1.2		2			
Basic Step Angle		0.9°						
Power Source		24 VDC±10% 1.5 A		24 VDC±10% 1.7 A		24 VDC±10% 2.9 A		
Excitation Mode		Microstep						
Mass	Motor	kg	0.24	0.3	0.37	0.45	0.7	1
	Driver	kg	0.05					
Dimension No.	Motor		[4]		[6]			
	Driver		[10]					

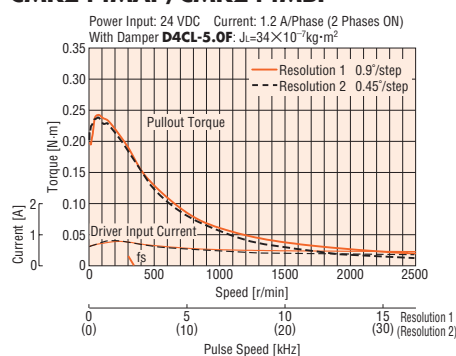
How to read specifications table → Page C-10

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-10

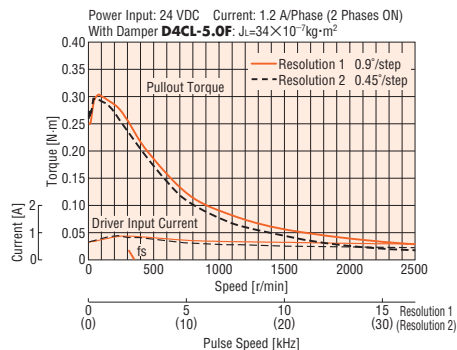
### CMK243MAP/CMK243MBP



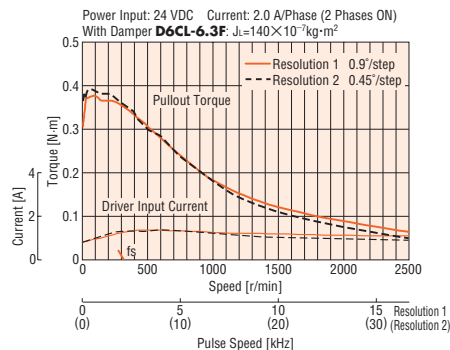
### CMK244MAP/CMK244MBP



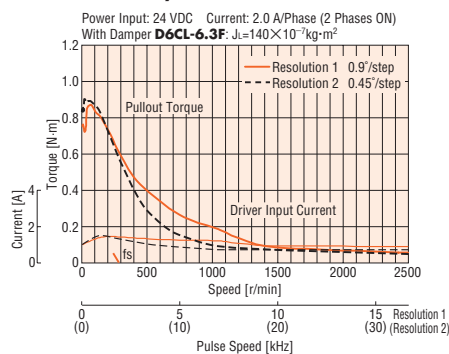
### CMK245MAP/CMK245MBP



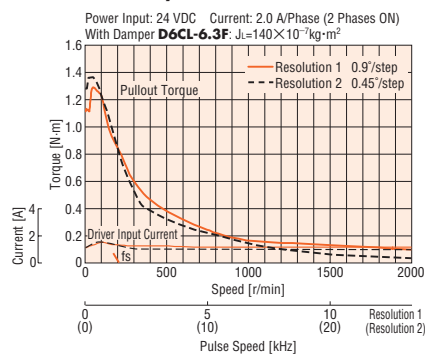
### CMK264MAP/CMK264MBP



### CMK266MAP/CMK266MBP



### CMK268MAP/CMK268MBP



● The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.

# SH Geared Type Motor Frame Size 28 mm

## Specifications RoHS

Model	Single Shaft	CMK223AP-SG7.2*	CMK223AP-SG9*	CMK223AP-SG10*	CMK223AP-SG18*	CMK223AP-SG36*
	Double Shaft	CMK223BP-SG7.2*	CMK223BP-SG9*	CMK223BP-SG10*	CMK223BP-SG18*	CMK223BP-SG36*
Maximum Holding Torque	N·m	0.3			0.4	
Rotor Inertia	J: kg·m <sup>2</sup>	9×10 <sup>-7</sup>				
Rated Current	A/Phase	0.95				
Basic Step Angle		0.25°	0.2°	0.18°	0.1°	0.05°
Gear Ratio		1: 7.2	1: 9	1: 10	1: 18	1: 36
Permissible Torque	N·m	0.3			0.4	
Permissible Speed Range	r/min	0~250	0~200	0~180	0~100	0~50
Power Source		24 VDC±10% 1.5 A				
Excitation Mode		Microstep				
Mass	Motor	kg			0.16	
	Driver	kg			0.05	
Dimension No.	Motor				7	
	Driver				10	

How to read specifications table → Page C-10

\* Motor lead wire/connector assembly of 0.6 m is included with the motor and driver package of connector coupled type.

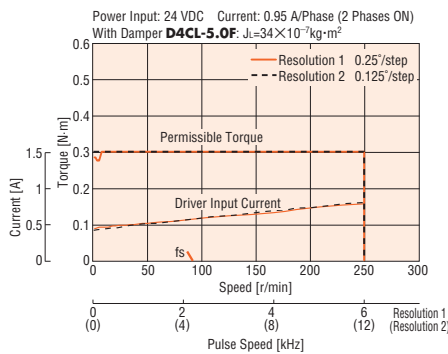
● Backlash value is approximately 1 to 2°.

Note:

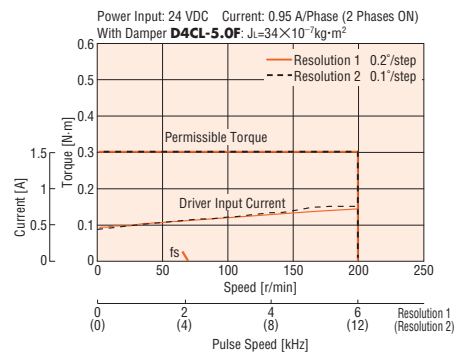
● Direction of rotation of the motor and that of the gear output shaft are the same for gear ratios 1:7.2 and 1:36. It is the opposite for 1:9, 1:10 and 1:18 gear ratios.

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-10

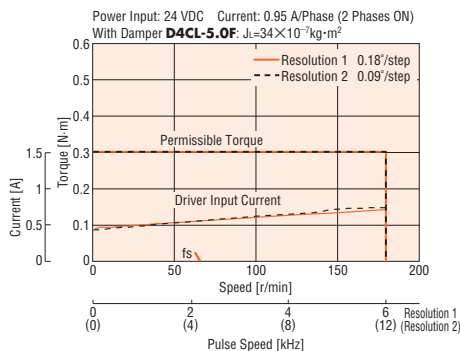
### CMK223AP-SG7.2/CMK223BP-SG7.2



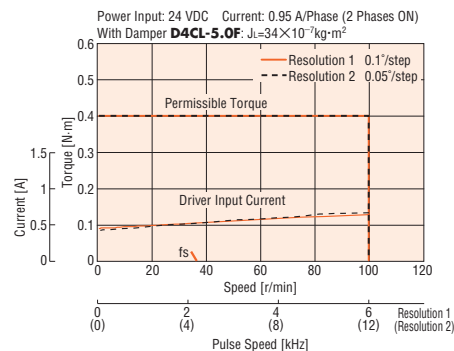
### CMK223AP-SG9/CMK223BP-SG9



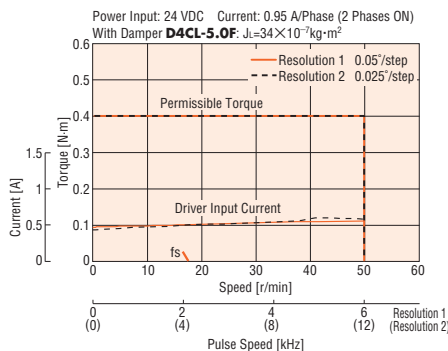
### CMK223AP-SG10/CMK223BP-SG10



### CMK223AP-SG18/CMK223BP-SG18



### CMK223AP-SG36/CMK223BP-SG36



● The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.

# SH Geared Type Motor Frame Size 42 mm

## Specifications RoHS

Model	Single Shaft	<b>CMK243AP-SG3.6</b>	<b>CMK243AP-SG7.2</b>	<b>CMK243AP-SG9</b>	<b>CMK243AP-SG10</b>
	Double Shaft	<b>CMK243BP-SG3.6</b>	<b>CMK243BP-SG7.2</b>	<b>CMK243BP-SG9</b>	<b>CMK243BP-SG10</b>
Maximum Holding Torque	N·m	0.2	0.4	0.5	0.56
Rotor Inertia	J: kg·m <sup>2</sup>	35 × 10 <sup>-7</sup>			
Rated Current	A/Phase	0.95			
Basic Step Angle		0.5°	0.25°	0.2°	0.18°
Gear Ratio		1: 3.6	1: 7.2	1: 9	1: 10
Permissible Torque	N·m	0.2	0.4	0.5	0.56
Permissible Speed Range	r/min	0~500	0~250	0~200	0~180
Power Source		24 VDC ± 10% 1.5 A			
Excitation Mode		Microstep			
Mass	Motor	kg		0.35	
	Driver	kg		0.05	
Dimension No.	Motor	[8]			
	Driver	[10]			

Model	Single Shaft	<b>CMK243AP-SG18</b>	<b>CMK243AP-SG36</b>	<b>CMK243AP-SG50</b>	<b>CMK243AP-SG100</b>
	Double Shaft	<b>CMK243BP-SG18</b>	<b>CMK243BP-SG36</b>	<b>CMK243BP-SG50</b>	<b>CMK243BP-SG100</b>
Maximum Holding Torque	N·m	0.8			
Rotor Inertia	J: kg·m <sup>2</sup>	35 × 10 <sup>-7</sup>			
Rated Current	A/Phase	0.95			
Basic Step Angle		0.1°	0.05°	0.036°	0.018°
Gear Ratio		1: 18	1: 36	1: 50	1: 100
Permissible Torque	N·m	0.8			
Permissible Speed Range	r/min	0~100	0~50	0~36	0~18
Power Source		24 VDC ± 10% 1.5 A			
Excitation Mode		Microstep			
Mass	Motor	kg		0.35	
	Driver	kg		0.05	
Dimension No.	Motor	[8]			
	Driver	[10]			

How to read specifications table → Page C-10

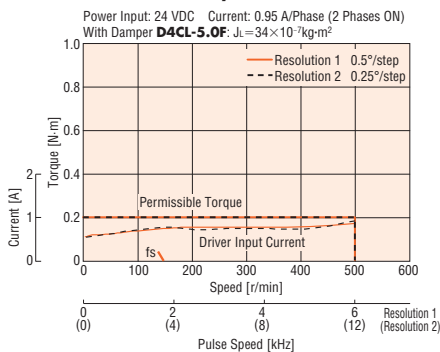
● Backlash value is approximately 1 to 2°.

**Note:**

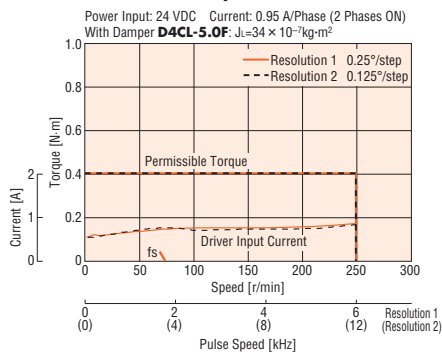
● Direction of rotation of the motor and that of the gear output shaft are the same for gear ratios 1: 3.6, 1: 7.2, 1: 9, 1: 10, 1: 50 and 1: 100. It is the opposite for 1:18 and 1:36 gear ratios.

## Speed – Torque Characteristics How to read speed – torque characteristics → Page C-10

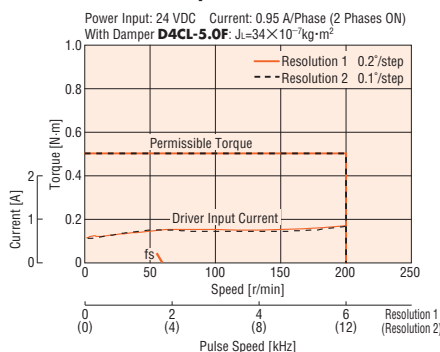
### CMK243AP-SG3.6/CMK243BP-SG3.6



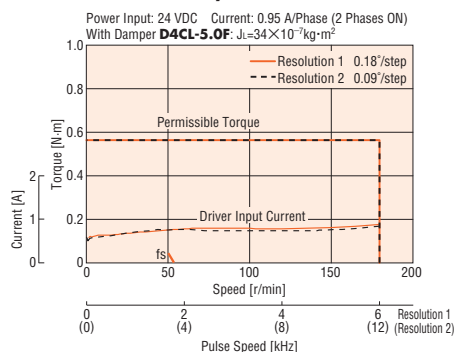
### CMK243AP-SG7.2/CMK243BP-SG7.2



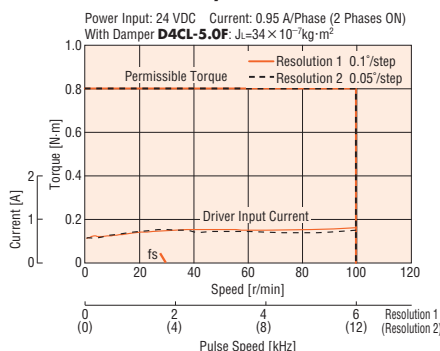
### CMK243AP-SG9/CMK243BP-SG9



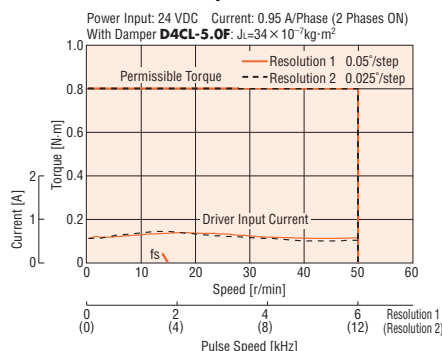
### CMK243AP-SG10/CMK243BP-SG10



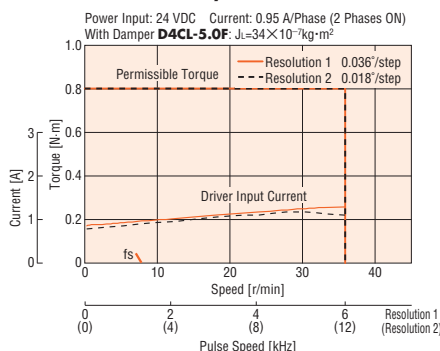
### CMK243AP-SG18/CMK243BP-SG18



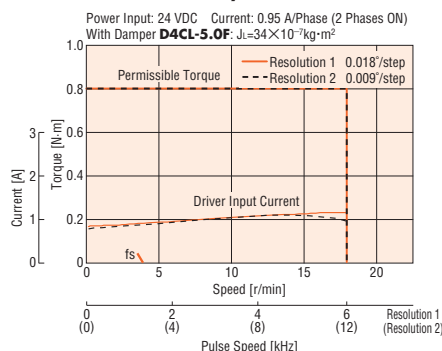
### CMK243AP-SG36/CMK243BP-SG36



### CMK243AP-SG50/CMK243BP-SG50



### CMK243AP-SG100/CMK243BP-SG100



- The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.

# SH Geared Type Motor Frame Size 60 mm

## Specifications RoHS

Model	Single Shaft	<b>CMK264AP-SG3.6</b>	<b>CMK264AP-SG7.2</b>	<b>CMK264AP-SG9</b>	<b>CMK264AP-SG10</b>
	Double Shaft	<b>CMK264BP-SG3.6</b>	<b>CMK264BP-SG7.2</b>	<b>CMK264BP-SG9</b>	<b>CMK264BP-SG10</b>
Maximum Holding Torque	N·m	1	2	2.5	2.7
Rotor Inertia	J: kg·m <sup>2</sup>	120×10 <sup>-7</sup>			
Rated Current	A/Phase	2			
Basic Step Angle		0.5°	0.25°	0.2°	0.18°
Gear Ratio		1: 3.6	1: 7.2	1: 9	1: 10
Permissible Torque	N·m	1	2	2.5	2.7
Permissible Speed Range	r/min	0~500	0~250	0~200	0~180
Power Source		24 VDC±10% 2.9 A			
Excitation Mode		Microstep			
Mass	Motor	kg		0.75	
	Driver	kg		0.05	
Dimension No.	Motor	[9]			
	Driver	[10]			

Model	Single Shaft	<b>CMK264AP-SG18</b>	<b>CMK264AP-SG36</b>	<b>CMK264AP-SG50</b>	<b>CMK264AP-SG100</b>
	Double Shaft	<b>CMK264BP-SG18</b>	<b>CMK264BP-SG36</b>	<b>CMK264BP-SG50</b>	<b>CMK264BP-SG100</b>
Maximum Holding Torque	N·m	3	4		
Rotor Inertia	J: kg·m <sup>2</sup>	120×10 <sup>-7</sup>			
Rated Current	A/Phase	2			
Basic Step Angle		0.1°	0.05°	0.036°	0.018°
Gear Ratio		1: 18	1: 36	1: 50	1: 100
Permissible Torque	N·m	3	4		
Permissible Speed Range	r/min	0~100	0~50	0~36	0~18
Power Source		24 VDC±10% 2.9 A			
Excitation Mode		Microstep			
Mass	Motor	kg		0.75	
	Driver	kg		0.05	
Dimension No.	Motor	[9]			
	Driver	[10]			

How to read specifications table → Page C-10

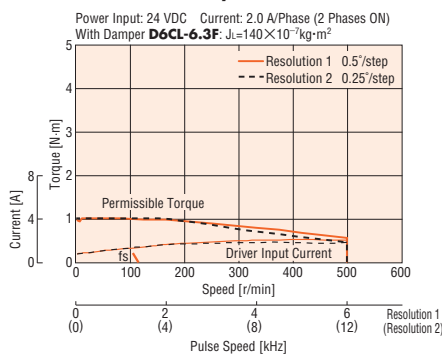
● Backlash value is approximately 1 to 2°.

**Note:**

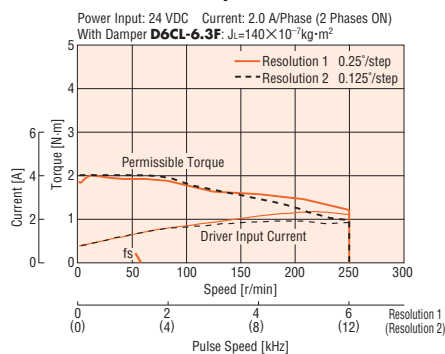
● Direction of rotation of the motor and that of the gear output shaft are the same for gear ratios 1:3.6, 1:7.2, 1:9, 1:10, 1:50 and 1:100. It is the opposite for 1:18 and 1:36 gear ratios.

**Speed – Torque Characteristics** How to read speed – torque characteristics → Page C-10

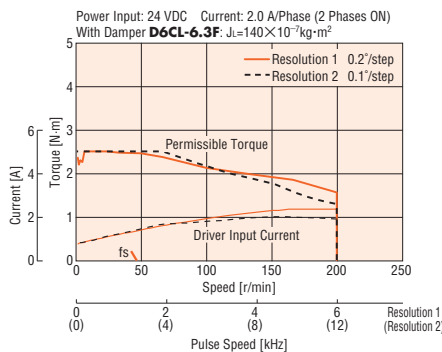
**CMK264AP-SG3.6/CMK264BP-SG3.6**



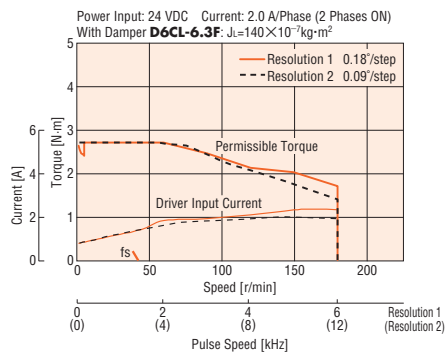
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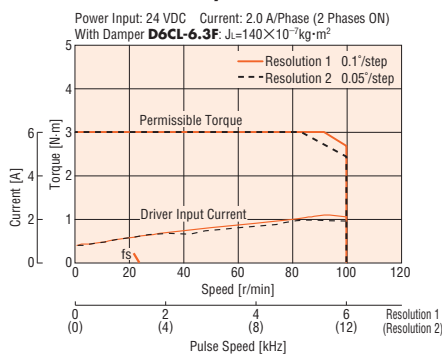
**CMK264AP-SG9/CMK264BP-SG9**



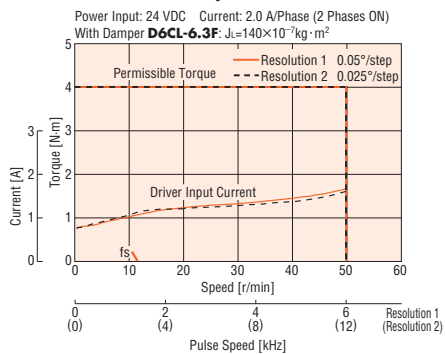
**CMK264AP-SG10/CMK264BP-SG10**



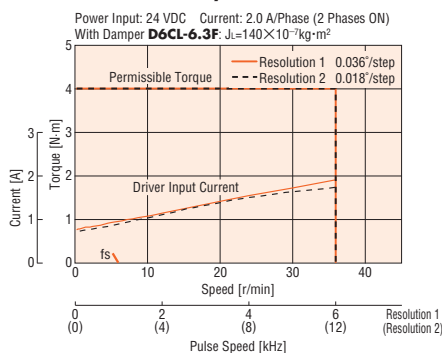
**CMK264AP-SG18/CMK264BP-SG18**



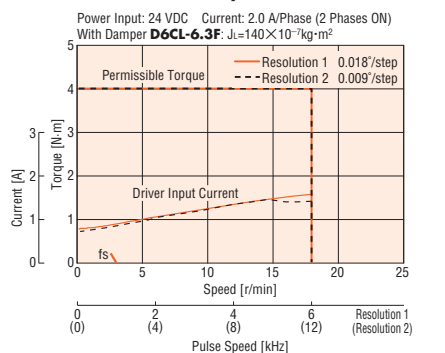
**CMK264AP-SG36/CMK264BP-SG36**



**CMK264AP-SG50/CMK264BP-SG50**



**CMK264AP-SG100/CMK264BP-SG100**



● The pulse input circuit responds to approximately 100 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.
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 40%.

Introduction

AC Input

DC Input

AC Input

5-Phase CRK

DC Input

2-Phase CSK

2-Phase Stepping Motors

5-Phase Stepping Motors

Controllers

Accessories

Installation

## Driver Specifications

Input Signal	Input Mode	Photocoupler input Pulse (CW pulse) signal/Rotation direction (CCW pulse) signal: Input resistance 200 Ω, Input current 5~20 mA Photocoupler ON: +3~5.25 V Photocoupler OFF: 0~+1 V (Voltage between terminals) All windings off signal/Step angle select signal/Automatic current cutback release signal: Input resistance 3.3 kΩ, Input current 1 mA (5 VDC)/8 mA (24 VDC) Photocoupler ON: +4.5~26.4 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: 5 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 ON to OFF. Maximum input pulse frequency: 100 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: 5 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 ON to OFF. Maximum input pulse frequency: 100 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 output current to the motor is turned on.
	Step Angle Select Signal	When in the "photocoupler ON" state, the motor operates at the basic step angle regardless of the settings of the step angle setting switches. When in the "photocoupler OFF" state, the motor operates at the step angle set by the step angle setting switches.
	Automatic 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 Mode	Photocoupler, Open-collector output External use condition: 24 VDC maximum, 10 mA maximum	
Output Signal	Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0" (Photocoupler: ON). • High-torque type, standard type Example) 1.8°/step (resolution 1): signal output every 4 pulses 0.45°/step (resolution 4): signal output every 16 pulses • High-resolution type Example) 0.9°/step (resolution 1): signal output every 4 pulses 0.225°/step (resolution 4): signal output every 16 pulses • SH geared type (gear ratio 1:18) Example) 0.1°/step (resolution 1): signal output every 4 pulses 0.025°/step (resolution 4): signal output every 16 pulses
Function	Automatic current cutback, Step angle select, Pulse input mode switch, All windings off, Excitation timing	
Cooling Method	Natural ventilation	

## General Specifications

Specifications	Motor	Driver
Insulation Class	Class B (130°C)	—
Insulation Resistance	100 MΩ or more when 500 VDC megger is applied between the windings and the case under normal ambient temperature and humidity.	—
Dielectric Strength	Sufficient to withstand 1.0 kV at 50 Hz or 60 Hz applied between the windings and the case for 1 minute under normal ambient temperature and humidity. (0.5 kV for models with frame size 42 mm or smaller)	—
Operating Environment (In Operation)	Ambient Temperature	−10~+50°C (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Atmosphere	No corrosive gases, dust, water or oil
Temperature Rise	Temperature rise of windings are 80°C or less measured by the resistance change method (at rated voltage, at standstill, two phases energized)	—
Stop Position Accuracy*1	±3 arc minutes (±0.05°)	—
Shaft Runout	0.05 T.I.R. (mm)*4	—
Radial Play*2	0.025 mm maximum of 5 N	—
Axial Play*3	0.075 mm maximum of 10 N	—
Concentricity	0.075 T.I.R. (mm)*4	—
Perpendicularity	0.075 T.I.R. (mm)*4	—

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

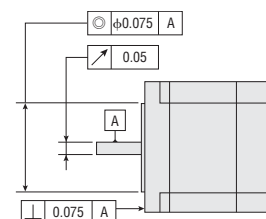
\*2 Radial Play: Displacement in shaft position in the radial direction, when a 5 N load is applied in the vertical direction to the tip of the motor's shaft.

\*3 Axial Play: Displacement in shaft position in the axial direction, when a 10 N 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

Type	Model	Permissible Overhung Load Distance from Shaft End (mm)					Permissible Thrust Load
		0	5	10	15	20	
High-Torque Type	CMK223P□P CMK224P□P CMK225P□P	25	34	52	—	—	The permissible thrust load shall be no greater than the motor mass.
	CMK233P□P CMK235P□P	20	25	34	52	—	
	CMK244P□P CMK246P□P	20	25	34	52	—	
Standard Type	CMK243□P CMK244□P CMK245□P	20	25	34	52	—	
	CMK256□P CMK258□P	54	67	89	130	—	
	CMK264□P CMK266□P CMK268□P	54	67	89	130	—	
High-Resolution Type	CMK243M□P CMK244M□P CMK245M□P	20	25	34	52	—	
	CMK264M□P CMK266M□P CMK268M□P	54	67	89	130	—	
SH Geared Type	CMK223□P-SG7.2 CMK223□P-SG9 CMK223□P-SG10 CMK223□P-SG18 CMK223□P-SG36	15	17	20	23	—	
	CMK243□P-SG3.6 CMK243□P-SG7.2 CMK243□P-SG9 CMK243□P-SG10 CMK243□P-SG18 CMK243□P-SG36 CMK243□P-SG50 CMK243□P-SG100	10	15	20	30	—	15
	CMK264□P-SG3.6 CMK264□P-SG7.2 CMK264□P-SG9 CMK264□P-SG10	30	40	50	60	70	30
	CMK264□P-SG18 CMK264□P-SG36 CMK264□P-SG50 CMK264□P-SG100	80	100	120	140	160	

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

Introduction

AC Input  
Q5STEP  
ASDC Input  
Q5STEP  
ASCAC Input  
5-Phase  
RK5-Phase  
CRKDC Input  
2-Phase  
CMK2-Phase  
CSK2-Phase  
Stepping  
Motors5-Phase  
Stepping  
Motors

Controllers

Accessories

Installation

## Dimensions (Unit = mm)

### ● Motor

#### ◇ High-Torque Type

##### 1 □ 28 mm

Model	Motor Model	L1	L2	Mass (kg)
<b>CMK223PAP</b>	PK223PA	32	—	0.11
<b>CMK223PBP</b>	PK223PB		42	
<b>CMK224PAP</b>	PK224PA	40	—	0.14
<b>CMK224PBP</b>	PK224PB		50	
<b>CMK225PAP</b>	PK225PA	51.5	—	0.2
<b>CMK225PBP</b>	PK225PB		61.5	

Motor lead wire/connector assembly (0.6 m) is included with the package. UL Style 3265, AWG24

If you are purchasing only a motor for maintenance purpose, etc., motor lead wire/connector assembly and connector will not be supplied. They must be purchased separately.

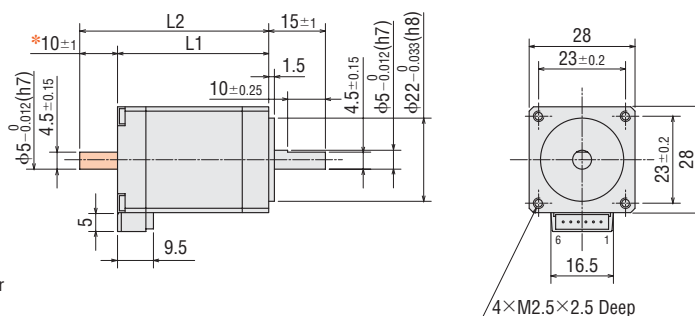
→ Page C-255

#### ● Applicable Connector

Connector housing: 51065-0600 (MOLEX)

Contact: 50212-8100 (MOLEX)

Crimp tool: 57176-5000 (MOLEX)



\*The length of machining on double shaft model is 10±0.25.

##### 2 □ 35 mm

Model	Motor Model	L1	L2	Mass (kg)
<b>CMK233PAP</b>	PK233PA	37	—	0.18
<b>CMK233PBP</b>	PK233PB		52	
<b>CMK235PAP</b>	PK235PA	52	—	0.285
<b>CMK235PBP</b>	PK235PB		67	

Motor lead wire/connector assembly (0.6 m) is included with the package. UL Style 3265, AWG24

If you are purchasing only a motor for maintenance purpose, etc., motor lead wire/connector assembly and connector will not be supplied. They must be purchased separately.

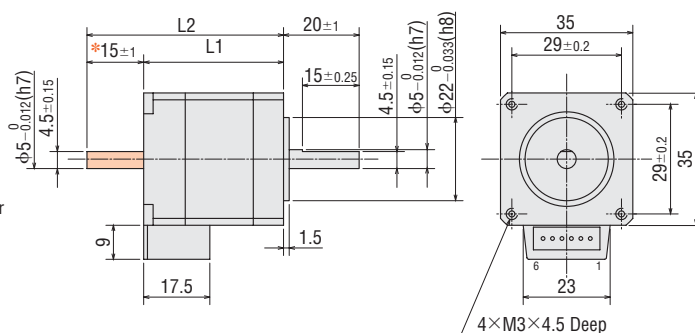
→ Page C-255

#### ● Applicable Connector

Connector housing: 51103-0600 (MOLEX)

Contact: 50351-8100 (MOLEX)

Crimp tool: 57295-5000 (MOLEX)



\*The length of machining on double shaft model is 15±0.25.

##### 3 □ 42 mm

Model	Motor Model	L1	L2	Mass (kg)
<b>CMK244PAP</b>	PK244PA	39	—	0.3
<b>CMK244PBP</b>	PK244PB		54	
<b>CMK246PAP</b>	PK246PA	59	—	0.5
<b>CMK246PBP</b>	PK246PB		74	

Motor lead wire/connector assembly (0.6 m) is included with the package. UL Style 3265, AWG24

If you are purchasing only a motor for maintenance purpose, etc., motor lead wire/connector assembly and connector will not be supplied. They must be purchased separately.

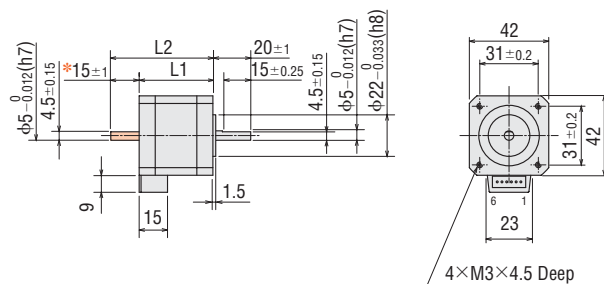
→ Page C-255

#### ● Applicable Connector

Connector housing: 51103-0600 (MOLEX)

Contact: 50351-8100 (MOLEX)

Crimp tool: 57295-5000 (MOLEX)



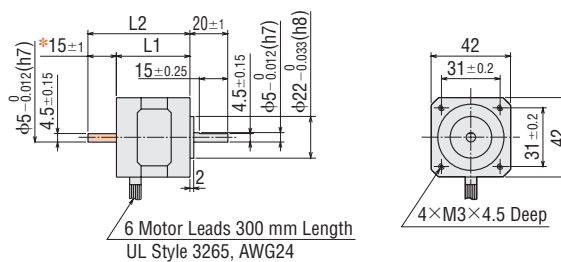
\*The length of machining on double shaft model is 15±0.25.

● These dimensions are for double shaft models. For single shaft models, ignore the orange (■) areas.

## ◇ Standard Type, High-Resolution Type

## ④ □42 mm

Model	Motor Model	L1	L2	Mass (kg)
<b>CMK243AP</b>	PK243-01A	33	—	0.21
<b>CMK243MAP</b>	PK243MA		—	0.24
<b>CMK243BP</b>	PK243-01B	48	—	0.21
<b>CMK243MBP</b>	PK243MB		—	0.24
<b>CMK244AP</b>	PK244-01A	39	—	0.27
<b>CMK244MAP</b>	PK244MA		—	0.3
<b>CMK244BP</b>	PK244-01B		54	0.27
<b>CMK244MBP</b>	PK244MB	47	—	0.3
<b>CMK245AP</b>	PK245-01A		—	0.35
<b>CMK245MAP</b>	PK245MA		—	0.37
<b>CMK245BP</b>	PK245-01B	62	—	0.35
<b>CMK245MBP</b>	PK245MB		—	0.37

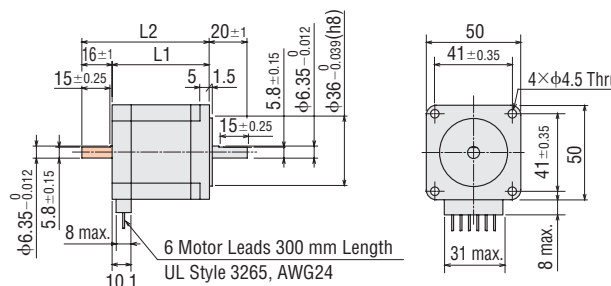


\*The length of machining on double shaft model is  $15 \pm 0.25$ .

## ◇ Standard Type

## ⑤ □50 mm

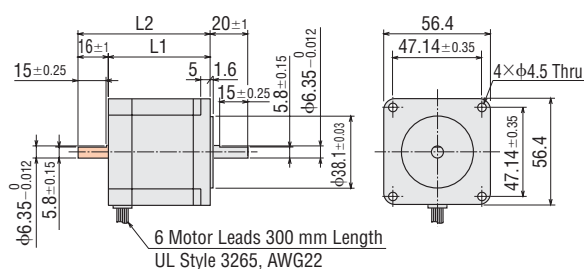
Model	Motor Model	L1	L2	Mass (kg)
<b>CMK256AP</b>	PK256-02A	51.5	—	0.53
<b>CMK256BP</b>	PK256-02B		67.5	
<b>CMK258AP</b>	PK258-02A	81	—	0.89
<b>CMK258BP</b>	PK258-02B		97	



## ◇ Standard Type, High-Resolution Type

## ⑥ □56.4 mm

Model	Motor Model	L1	L2	Mass (kg)
<b>CMK264AP</b>	PK264-02A	39	—	0.45
<b>CMK264MAP</b>	PK264MA		—	
<b>CMK264BP</b>	PK264-02B		55	
<b>CMK264MBP</b>	PK264MB	54	—	0.7
<b>CMK266AP</b>	PK266-02A		—	
<b>CMK266MAP</b>	PK266MA		—	
<b>CMK266BP</b>	PK266-02B	76	70	1.0
<b>CMK266MBP</b>	PK266MB		—	
<b>CMK268AP</b>	PK268-02A	76	—	1.0
<b>CMK268MAP</b>	PK268MA		—	
<b>CMK268BP</b>	PK268-02B		92	
<b>CMK268MBP</b>	PK268MB	—	—	—



● These dimensions are for double shaft models. For single shaft models, ignore the orange (■) areas.

## ◇ SH Geared Type

## 7 □ 28 mm

Model	Motor Model	Gear Ratio	Mass (kg)
<b>CMK223AP-SG</b> □	PK223PA-SG □	<b>7.2, 9, 10, 18, 36</b>	0.16
<b>CMK223BP-SG</b> □	PK223PB-SG □		

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

Motor lead wire/connector assembly (0.6 m) is included with the package. UL Style 3265, AWG24

If you are purchasing only a motor for maintenance purpose, etc., motor lead wire/connector assembly and connector will not be supplied. They must be purchased separately.

→ Page C-255

## ● Screws (Included)

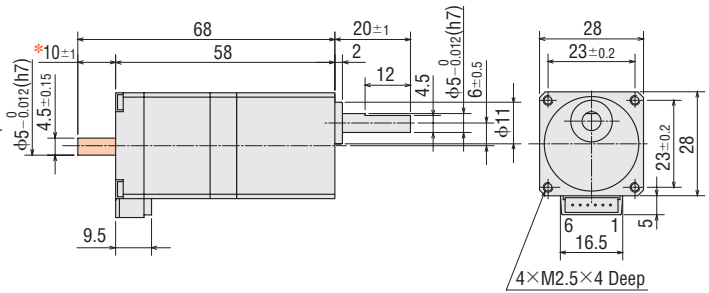
M2.5 Length 8 mm ... 4 Pieces

## ● Applicable Connector

Connector housing: 51065-0600 (MOLEX)

Contact: 50212-8100 (MOLEX)

Crimp tool: 57176-5000 (MOLEX)



\*The length of machining on double shaft model is  $10 \pm 0.25$ .

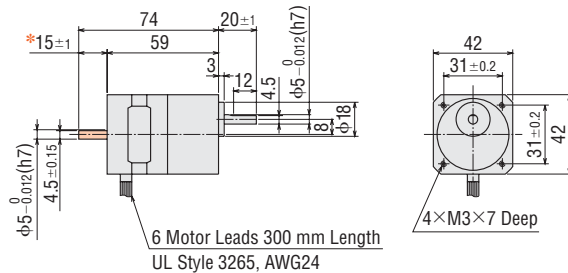
## 8 □ 42 mm

Model	Motor Model	Gear Ratio	Mass (kg)
<b>CMK243AP-SG</b> □	PK243A1-SG □	<b>3.6, 7.2, 9, 10, 18, 36, 50, 100</b>	0.35
<b>CMK243BP-SG</b> □	PK243B1-SG □		

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

## ● Screws (Included)

M3 Length 10 mm ... 4 Pieces



\*The length of machining on double shaft model is  $15 \pm 0.25$ .

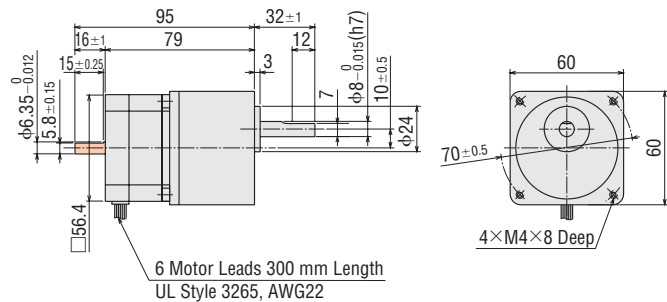
## 9 □ 60 mm

Model	Motor Model	Gear Ratio	Mass (kg)
<b>CMK264AP-SG</b> □	PK264A2-SG □	<b>3.6, 7.2, 9, 10, 18, 36, 50, 100</b>	0.75
<b>CMK264BP-SG</b> □	PK264B2-SG □		

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

## ● Screws (Included)

M4 Length 15 mm ... 4 Pieces

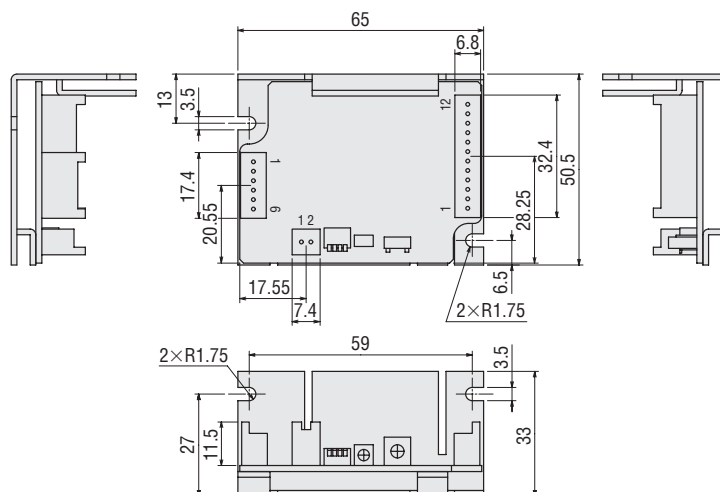


● These dimensions are for double shaft models. For single shaft models, ignore the orange (■) areas.

## ● Driver

Driver Model: CMD2109P, CMD2112P, CMD2120P

Mass: 0.05 kg



- Connector Housing (Included)
  - 51103-0200 (MOLEX)
  - 51103-1200 (MOLEX)
  - 51103-0600 (MOLEX)
- Contact (Included)
  - 50351-8100 (MOLEX)

**Note:**

- Use the included connector for power supply, signal and motor. When assembling the connectors, use the hand-operated crimp tool [57295-5000 (MOLEX)]. The crimp tool is not included with the package. It must be purchased separately.

Driver lead wire set crimped with connector (sold separately) is available. → Page C-257

Introduction

AC Input

DC Input

AC Input

AC Input

DC Input

DC Input

2-Phase Stepping Motors

5-Phase Stepping Motors

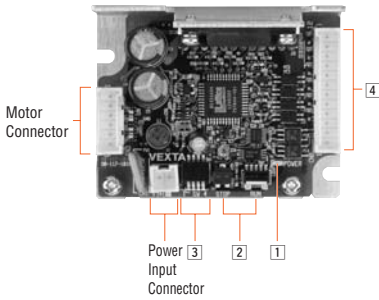
Controllers

Accessories

Installation

## Connection and Operation

### Names and Functions of Driver Parts



#### 1 Power Input Display

Color	Function	When Activated
Green	Power supply indication	Lights when power is on.

#### 2 Current Adjustment Switch

Indication	Switch Name	Function
RUN	Motor run current switch	For adjusting the motor running current
STOP	Motor stop current potentiometer	For adjusting the current at motor standstill

#### 3 Function Select Switch

Indication	Switch Name	Function
1	Pulse input mode switch	Switches between 1-pulse input and 2-pulse input.
2, 3, 4	Step angle setting switch	These switches can be set to the desired resolution from the five resolution levels.

### Step Angle Setting Switch

SW-2	SW-3	SW-4	Microstep/Step	Resolution	Step Angle
OFF	OFF	OFF	1	200	1.8°
OFF	OFF	ON	2	400	0.9°
OFF	ON	OFF	4	800	0.45°
OFF	ON	ON	8	1600	0.225°
ON	OFF	OFF	16	3200	0.1125°

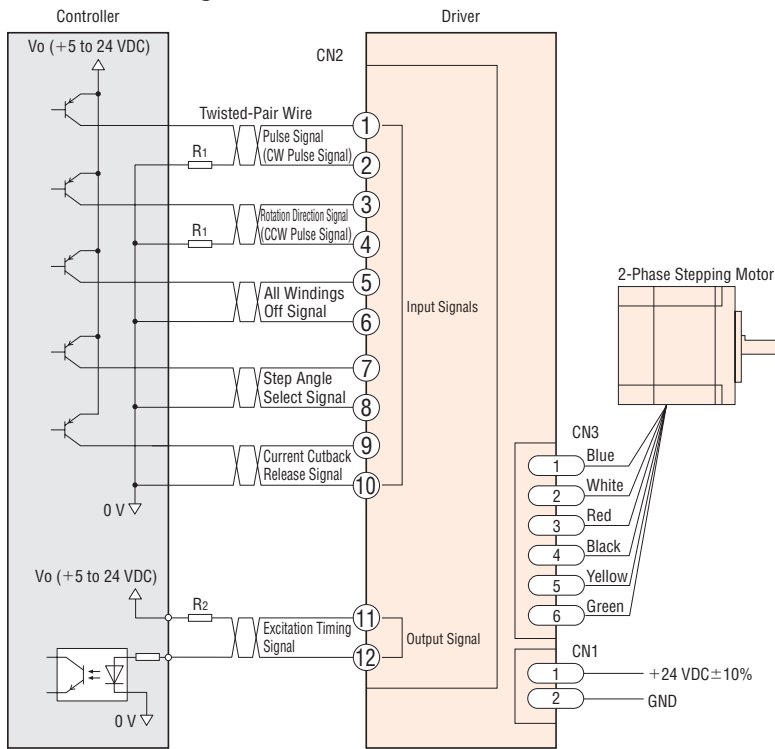
#### Notes:

- Use of any setting other than the combinations listed in the table will automatically set the microstep to "1" and the motor will operate at the basic step angle.
- 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 1.8°.
- With the high-resolution type, the basic step angle and resolution are 0.9°, 400 (microstep/step: 1).
- The step angle set with the step angle setting switches will become effective when the "Step Angle Select" (CS) signal input is OFF.
- Do not change the CS (step angle select) signal input or step angle setting switch while the motor is operating. It may cause the motor to misstep and stop. Change the step angle setting switches, when the "Step Angle Select" signal input is OFF and the "Excitation Timing" signal output is ON.

#### 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 OFF: CCW, Photocoupler ON: CW (The motor will rotate in the CCW direction when in 2-pulse input mode.)
		4		
		5	All windings off signal	Cuts the output current to the motor and allows the motor shafts to be rotated by external force.
		6		
		7	Step angle select signal	The motor will operate at the basic step angle regardless of the settings of the step angle setting switches.
		8		
		9	Automatic current cutback release signal	This signal is used to disable the automatic current cutback function.
		10		
Output signal		11	Excitation timing signal	Outputs signals when the excitation sequence is at STEP "0."
		12		

● Connection Diagrams



◇ Input Signal Connection

● Pulse (CW) Signal/Rotation Direction (CCW) Signal  
 Signals can be connected directly when 5 VDC is supplied. When the voltage exceeds 5 VDC, connect the external resistor to keep input current at 20 mA or less.  
 When 5 VDC or more is applied without the external resistor, the internal components get damaged.  
 Example: If the voltage is 24 VDC, connect a resistor ( $R_1$ ) of 1.5 to 2.2 k $\Omega$  and 0.5 W or more.  
 ● All Windings Off Signal/Step Angle Select Signal/Automatic Current Cutback Release Signal  
 Signals can be connected directly when 5 to 24 VDC is supplied.

◇ Output Signal Connection

Use the output signal at 24 VDC or less and 10 mA or less. If these specifications are exceeded, the internal components may get damaged. Check the specification of the connected equipment. If the current exceeds 10 mA, connect the external resistor  $R_2$ .

◇ 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 of AWG24 to 22 (0.2 to 0.3 mm<sup>2</sup>) and 2 m or less in length for the signal lines.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases. **Technical reference** → Page F-46
- Use wires of AWG22 (0.3 mm<sup>2</sup>) for power supply lines. When assembling the connectors, use the hand-operated crimp tool or driver lead wire set crimped with connector (sold separately). The crimp tool is not included with the package. It must be purchased separately.
- Signal lines should be kept at least 2 cm away from power lines (power supply lines and motor lines). Do not run the signal lines in the same duct as power lines or bundle them together.
- If noise generated by the motor cable or power supply cable causes a problem, try shielding the cables or insert ferrite cores.
- Incorrect connection of DC power input will lead to driver (circuit) damage. Make sure that the polarity is correct before turning power on.

● Description of Input/Output Signals

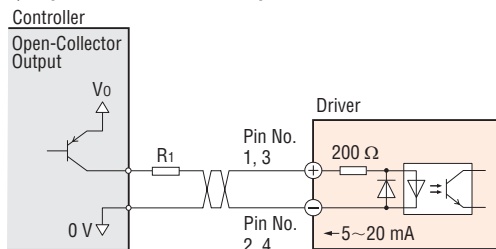
Indication of Input/Output Signal "ON"/"OFF"

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

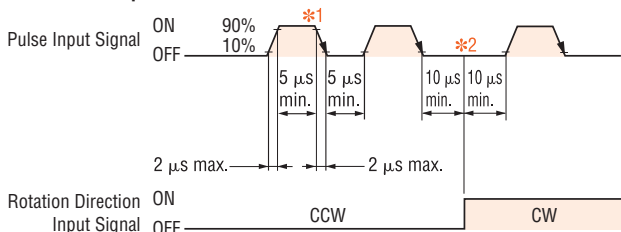
Pulse (CW) and Rotation Direction (CCW) Input Signal

◇ Input Circuit and Sample Connection

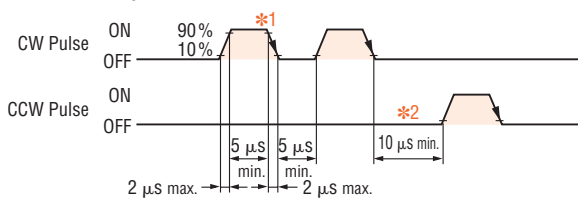


◇ Pulse Waveform Characteristics

● 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 10  $\mu$ s is shown as a response time of circuit. This value varies greatly depending on the motor type and load inertia.

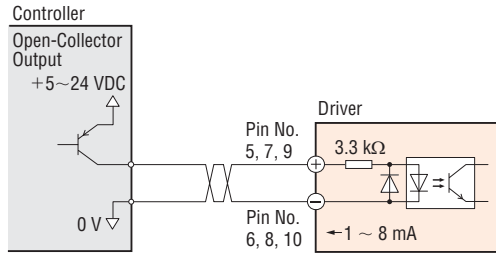
◇ Pulse Signal Characteristics

- 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 ("OFF") when changing rotation directions.
- In 2-pulse input mode, do not input a CW pulse and CCW pulse simultaneously.



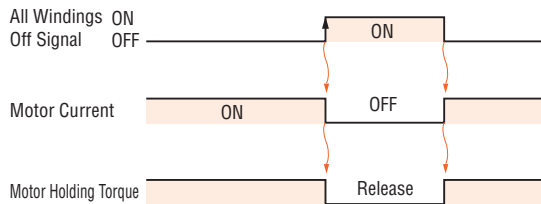
## All Windings Off (AWO)/Step Angle Select (CS)/Automatic Current Cutback Release (ACDOFF) Input Signal

### ◇ Input Circuit and Sample Connection



### ◇ All Windings Off (AWO) Input Signal

- Inputting this signal puts the motor in a non-excitation (free) state.
- This signal is used when moving the motor by external force or perform positioning manually. The photocoupler must be "OFF" when operating the motor.



The shaded 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  $\pm 3.6^\circ$  (geared type:  $\pm 3.6^\circ/\text{gear ratio}$ ) from the position set after the "All Windings Off" signal is released.

### ◇ Step Angle Select (CS) Input Signal

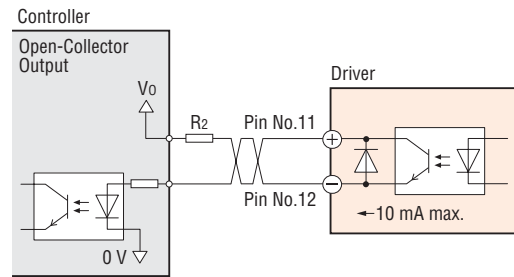
- When this signal input is "ON," the motor will operate at the basic step angle regardless of the settings of the step angle setting switches. When the signal input is "OFF," the motor will operate at the step angle set with the step angle setting switches.
- To change the step angle, do so when the "Excitation Timing" signal output is "ON" and the motor is at standstill.

### ◇ Automatic Current Cutback Release (ACDOFF) 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 (TIM) Output Signal

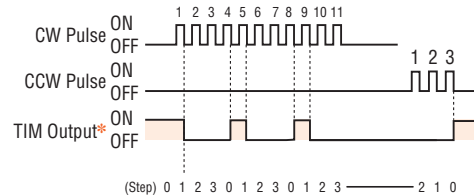
### ◇ Output Circuit and Sample Connection



- The "Excitation Timing" signal is output to indicate when the motor excitation 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° (3.6° for high-resolution type) rotation of the motor output shaft.  
Microstep/step 1: Signal is output once every 4 pulses.  
Microstep/step 4: Signal is output once every 16 pulses.

### Timing chart at 1.8°/step (microstep/step 1)

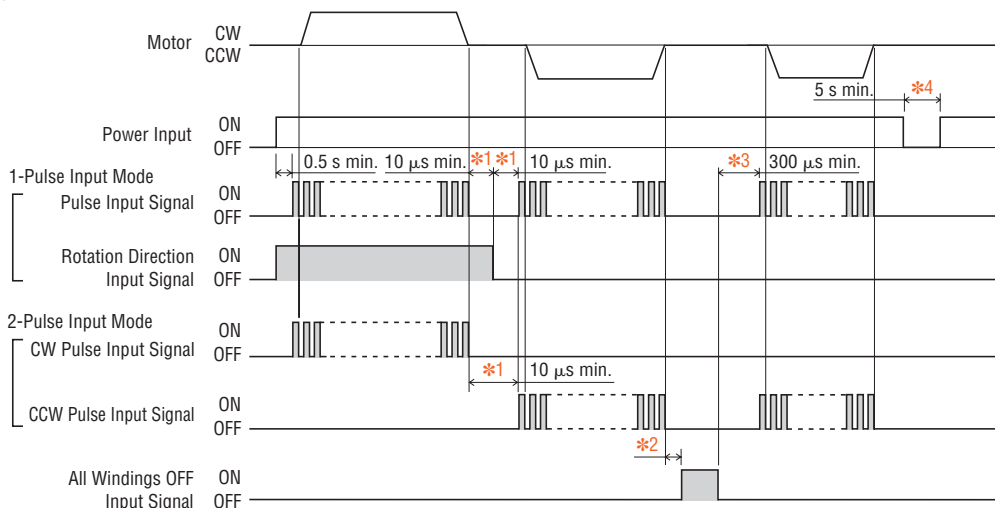
\* When connected as shown in the sample connection, the signal will be "photocoupler ON" at step "0."



#### Notes:

- When power is turned on, the excitation sequence is reset to step "0" and the "Excitation Timing" signal will be output.
- When operating the motor using the "Excitation Timing" signal output, make sure the motor output shaft stops at an integral multiple of 7.2° (3.6° for high-resolution type).

## Timing Chart



The  section indicates that the photocoupler diode is emitting light.

- \*1 The minimum switching time to change rotation direction (1-pulse input mode), and switching time to change CW, CCW pulse (2-pulse input mode) 10  $\mu$ s 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 pulse signal immediately after switching the "All Windings Off" signal to "photocoupler OFF." The motor may not start.
- \*4 Wait at least five seconds before turning on the power again.

## List of Motor and Driver Combinations

Model names for motor and driver combinations are shown below.

Type	Model	Motor Model	Driver Model
High-Torque Type	<b>CMK223PAP</b>	PK223PA*	CMD2109P
	<b>CMK223PBP</b>	PK223PB*	
	<b>CMK224PAP</b>	PK224PA*	
	<b>CMK224PBP</b>	PK224PB*	
	<b>CMK225PAP</b>	PK225PA*	
	<b>CMK225PBP</b>	PK225PB*	
	<b>CMK233PAP</b>	PK233PA*	CMD2112P
	<b>CMK233PBP</b>	PK233PB*	
	<b>CMK235PAP</b>	PK235PA*	
	<b>CMK235PBP</b>	PK235PB*	
	<b>CMK244PAP</b>	PK244PA*	
	<b>CMK244PBP</b>	PK244PB*	
	<b>CMK246PAP</b>	PK246PA*	
	<b>CMK246PBP</b>	PK246PB*	
Standard Type	<b>CMK243AP</b>	PK243-01A	CMD2109P
	<b>CMK243BP</b>	PK243-01B	
	<b>CMK244AP</b>	PK244-01A	CMD2112P
	<b>CMK244BP</b>	PK244-01B	
	<b>CMK245AP</b>	PK245-01A	
	<b>CMK245BP</b>	PK245-01B	
	<b>CMK256AP</b>	PK256-02A	CMD2120P
	<b>CMK256BP</b>	PK256-02B	
	<b>CMK258AP</b>	PK258-02A	
	<b>CMK258BP</b>	PK258-02B	
<b>CMK264AP</b>	PK264-02A		
<b>CMK264BP</b>	PK264-02B		
<b>CMK266AP</b>	PK266-02A		
<b>CMK266BP</b>	PK266-02B		
<b>CMK268AP</b>	PK268-02A		
<b>CMK268BP</b>	PK268-02B		
High-Resolution Type	<b>CMK243MAP</b>	PK243MA	CMD2109P
	<b>CMK243MBP</b>	PK243MB	
	<b>CMK244MAP</b>	PK244MA	CMD2112P
	<b>CMK244MBP</b>	PK244MB	
	<b>CMK245MAP</b>	PK245MA	
	<b>CMK245MBP</b>	PK245MB	
	<b>CMK264MAP</b>	PK264MA	CMD2120P
	<b>CMK264MBP</b>	PK264MB	
	<b>CMK266MAP</b>	PK266MA	
	<b>CMK266MBP</b>	PK266MB	
	<b>CMK268MAP</b>	PK268MA	
	<b>CMK268MBP</b>	PK268MB	

Type	Model	Motor Model	Driver Model	
SH Geared Type	<b>CMK223AP-SG7.2</b>	PK223PA-SG7.2*	CMD2109P	
	<b>CMK223BP-SG7.2</b>	PK223PB-SG7.2*		
	<b>CMK223AP-SG9</b>	PK223PA-SG9*		
	<b>CMK223BP-SG9</b>	PK223PB-SG9*		
	<b>CMK223AP-SG10</b>	PK223PA-SG10*		
	<b>CMK223BP-SG10</b>	PK223PB-SG10*		
	<b>CMK223AP-SG18</b>	PK223PA-SG18*		
	<b>CMK223BP-SG18</b>	PK223PB-SG18*		
	<b>CMK223AP-SG36</b>	PK223PA-SG36*		
	<b>CMK223BP-SG36</b>	PK223PB-SG36*		
	<b>CMK243AP-SG3.6</b>	PK243A1-SG3.6		
	<b>CMK243BP-SG3.6</b>	PK243B1-SG3.6		
	<b>CMK243AP-SG7.2</b>	PK243A1-SG7.2		
	<b>CMK243BP-SG7.2</b>	PK243B1-SG7.2		
	<b>CMK243AP-SG9</b>	PK243A1-SG9		
	<b>CMK243BP-SG9</b>	PK243B1-SG9		
	<b>CMK243AP-SG10</b>	PK243A1-SG10		
	<b>CMK243BP-SG10</b>	PK243B1-SG10		
	<b>CMK243AP-SG18</b>	PK243A1-SG18		
	<b>CMK243BP-SG18</b>	PK243B1-SG18		
	<b>CMK243AP-SG36</b>	PK243A1-SG36		
	<b>CMK243BP-SG36</b>	PK243B1-SG36		
	<b>CMK243AP-SG50</b>	PK243A1-SG50		
	<b>CMK243BP-SG50</b>	PK243B1-SG50		
	<b>CMK243AP-SG100</b>	PK243A1-SG100		
	<b>CMK243BP-SG100</b>	PK243B1-SG100		
	<b>CMK264AP-SG3.6</b>	PK264A2-SG3.6		CMD2120P
	<b>CMK264BP-SG3.6</b>	PK264B2-SG3.6		
	<b>CMK264AP-SG7.2</b>	PK264A2-SG7.2		
	<b>CMK264BP-SG7.2</b>	PK264B2-SG7.2		
	<b>CMK264AP-SG9</b>	PK264A2-SG9		
	<b>CMK264BP-SG9</b>	PK264B2-SG9		
<b>CMK264AP-SG10</b>	PK264A2-SG10			
<b>CMK264BP-SG10</b>	PK264B2-SG10			
<b>CMK264AP-SG18</b>	PK264A2-SG18			
<b>CMK264BP-SG18</b>	PK264B2-SG18			
<b>CMK264AP-SG36</b>	PK264A2-SG36			
<b>CMK264BP-SG36</b>	PK264B2-SG36			
<b>CMK264AP-SG50</b>	PK264A2-SG50			
<b>CMK264BP-SG50</b>	PK264B2-SG50			
<b>CMK264AP-SG100</b>	PK264A2-SG100			
<b>CMK264BP-SG100</b>	PK264B2-SG100			

\* If you are purchasing only a motor for maintenance purpose, etc., motor lead wire/connector assembly and connector will not be supplied. They must be purchased separately. Accessory motor lead wire/connector assembly and motor connector set are available.

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