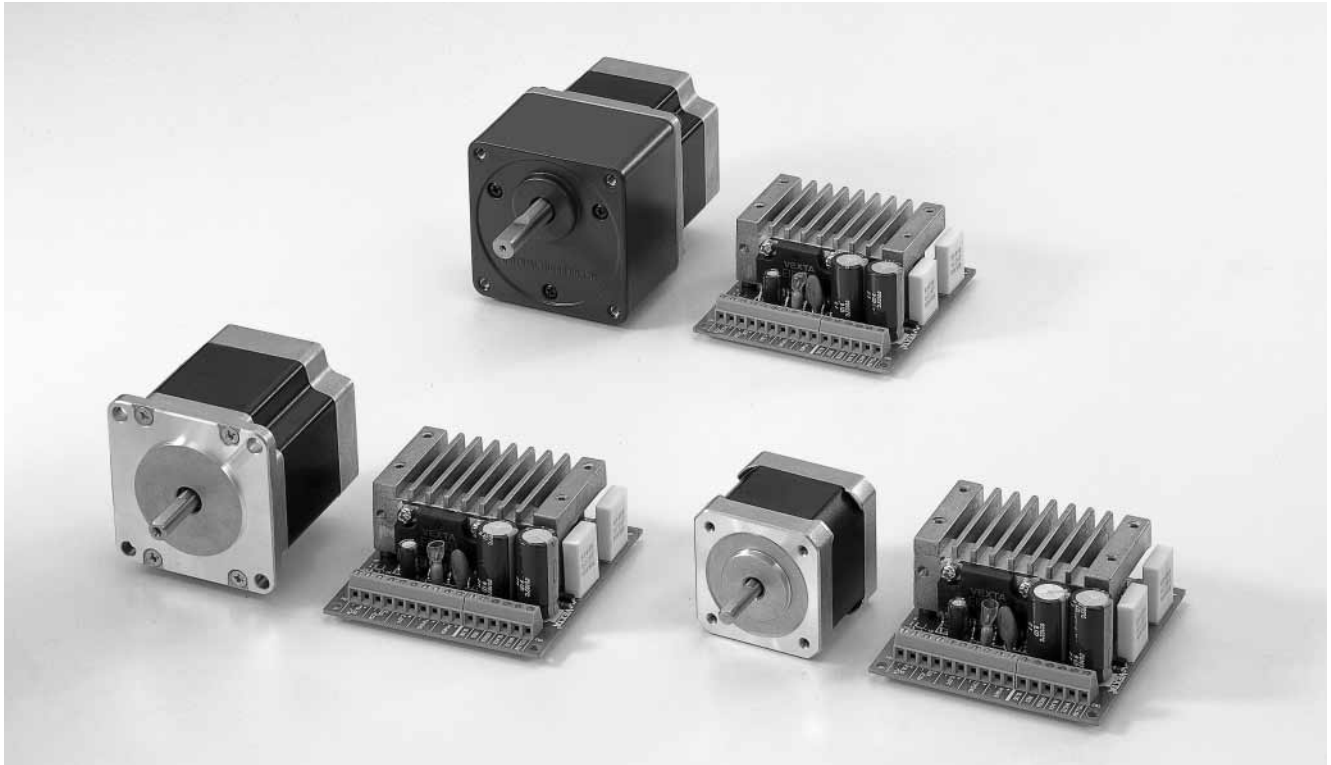


2-Phase Stepping Motor and Driver Package

CSK Series

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2-Phase Stepping Motor and Driver Package

CSK Series**1. High Torque**

The **CSK** high-torque 2-phase stepping motor series combines the **PK** series of 2-phase high-torque motors. The maximum holding torque values are as follows:

CSK24 □ : 0.16N·m ~ 0.32N·m

CSK26 □ : 0.39N·m ~ 1.35N·m

2. Powerful SH Geared Type

The product line for the **CSK** series also includes the **SH** geared type that provides high torques. There are six gear ratios: 1:3.6, 1:7.2, 1:9, 1:10, 1:18, and 1:36.

3. High-Resolution Type

The product line for the **CSK** series also includes high-resolution types for which the basic step angle (1.8°/step) for the two-phase stepping motors is cut in half to 0.9°/step (for full steps).

The resolution is doubled from 200 steps per revolution for standard types to 400 steps per revolution. The high-resolution type can be run in half-step mode to provide 800 steps per revolution.

4. Compact Driver

The drivers produce a high output of 2A/phase for 24V/36V DC. None the less, they are compact in size 72mm(W) × 77mm(D) × 31mm(H), due to a custom IC, surface mount technology and FET output stage.

5. Expanded control functions

These motors are equipped with an "Automatic Current Cutback" function and "Excitation Timing" output, which is handy for detecting the mechanical home position of the device.

Furthermore, internal switches can set the step angle and pulse type.

6. Simple and reliable connections

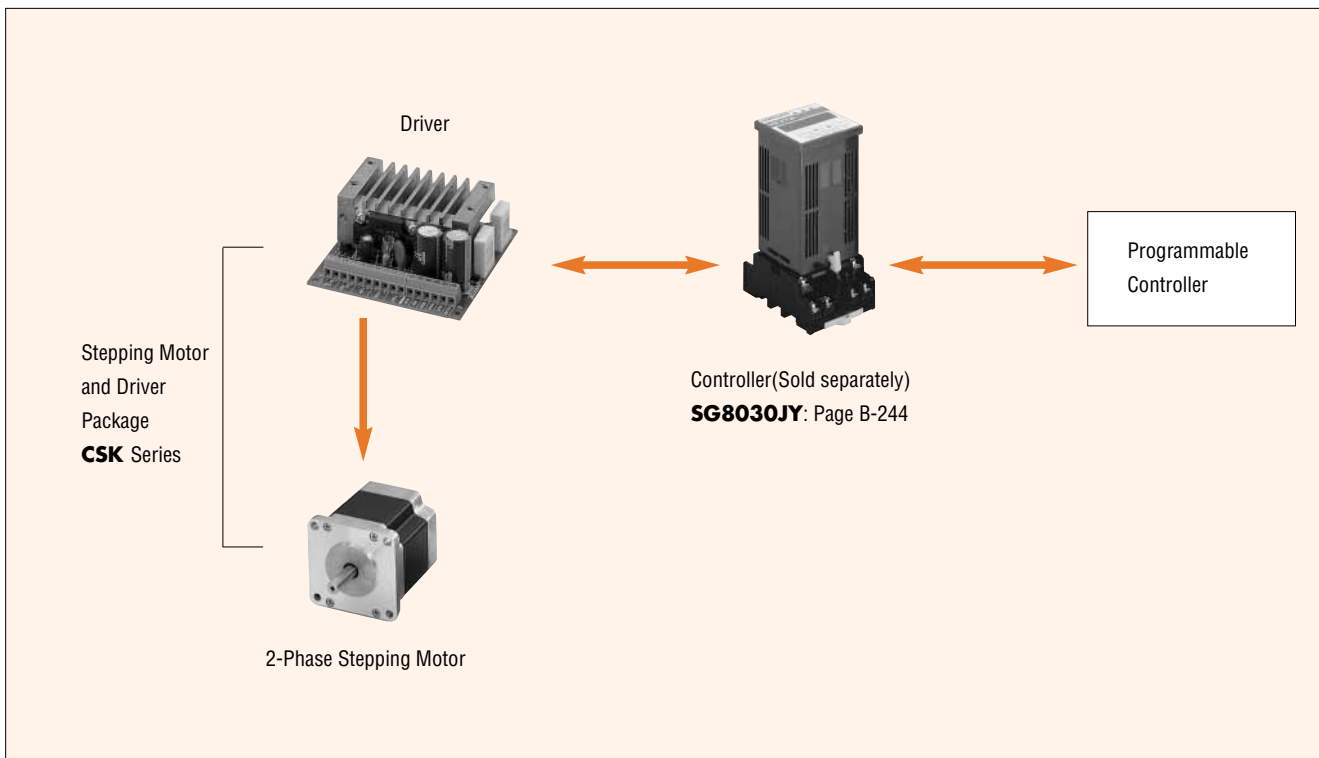
Independent connectors are used for the driver input/output signals and the motor output lines.

7. Highly reliable photocoupler input

Photocouplers are used in the input/output signal section because they are not easily effected by external noise. Since there is a single power supply, wiring is simple.

CSK Series System Configuration

A compact stepping motor and driver are combined to make possible high-precision positioning with open loop control.



Accessories (Sold separately)

The diagram shows three accessories with their respective descriptions and page references:

- Mounting Bracket:** A black metal bracket used for mounting the motor. **Motor Mounting Brackets : Page B-248**
- Clean Damper:** A white cylindrical component used to suppress motor vibration. **Clean Dampers : Page B-251**
Effective at suppressing motor vibration and improving performance
- Flexible Coupling:** A black cylindrical component used for clamping. **Flexible Couplings : Page B-252**
Clamping Type

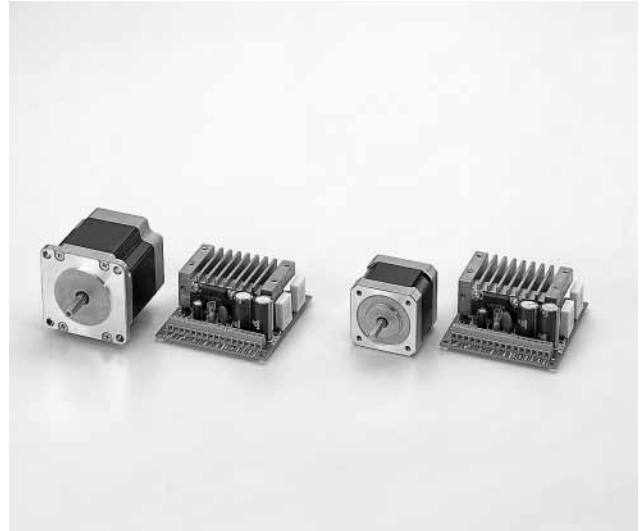
Note: Mounting brackets cannot be fitted to **SH** geared motor types.

Note: Flexible Couplings can not be fitted to **SH** geared motor types.

CSK Series Standard Type (Full Step Angle : 1.8°)

Page B-178

Two sizes are available: the **CSK24** with a 42mm square mounting and the **CSK26** with a 56.4mm square mounting.



CSK Series High-Resolution Type (Full Step Angle : 0.9°)

Page B-181

CSK high-resolution type has a full step angle of 0.9° (400 per revolution).

Two sizes are available: the **CSK24M** with a 42mm square mounting and the **CSK26M** with a 56.4mm square mounting.



CSK Series SH Geared Type Page B-184

Six gear ratios are available: 1:3.6, 1:7.2, 1:9, 1:10, 1:18 and 1:36.

The low ratios allow the gear shaft speed to be reduced without reducing the speed of the motor too much, thus enabling more precise resolution and smoother rotation at low speed.



List of Motor and Driver Combinations

Model numbers for motor and driver combinations are shown below

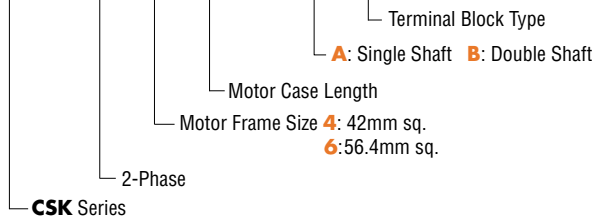
Type	Package Model	Stepping Motor		Driver	
		Model	Current A/phase	Model	
Standard Type	CSK243-□T	PK243-01 □	0.95	CSD2109-T	
	CSK244-□T CSK245-□T	PK244-01 □ PK245-01 □	1.2	CSD2112-T	
	CSK264-□T CSK266-□T CSK268-□T	PK264-02 □ PK266-02 □ PK268-02 □	2	CSD2120-T	
	High-Resolution Type	CSK243M□T	PK243M□	0.95	CSD2109-T
		CSK244M□T CSK245M□T	PK244M□ PK245M□	1.2	CSD2112-T
		CSK264M□T CSK266M□T CSK268M□T	PK264M□ PK266M□ PK268M□	2	CSD2120-T
SH Geared Type		CSK243 □T-SG3.6 CSK243 □T-SG7.2 CSK243 □T-SG9 CSK243 □T-SG10 CSK243 □T-SG18 CSK243 □T-SG36	PK243 □1-SG3.6 PK243 □1-SG7.2 PK243 □1-SG9 PK243 □1-SG10 PK243 □1-SG18 PK243 □1-SG36	0.95	CSD2109-T
	CSK264 □T-SG3.6 CSK264 □T-SG7.2 CSK264 □T-SG9 CSK264 □T-SG10 CSK264 □T-SG18 CSK264 □T-SG36	PK264 □2-SG3.6 PK264 □2-SG7.2 PK264 □2-SG9 PK264 □2-SG10 PK264 □2-SG18 PK264 □2-SG36	2	CSD2120-T	

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



Product Number Code

CSK 2 4 5 - A T



Specifications: Standard Type (Full Step Angle 1.8°)

Package Model	Single Shaft	CSK243-AT	CSK244-AT	CSK245-AT	CSK264-AT	CSK266-AT	CSK268-AT
	Double Shaft	CSK243-BT	CSK244-BT	CSK245-BT	CSK264-BT	CSK266-BT	CSK268-BT
Maximum Holding Torque	N · m	0.16	0.26	0.32	0.39	0.9	1.35
Rotor Inertia	kg · m ²	35×10 ⁻⁷	54×10 ⁻⁷	68×10 ⁻⁷	120×10 ⁻⁷	300×10 ⁻⁷	480×10 ⁻⁷
Rated Current	A/phase	0.95	1.2		2		
Basic Step Angle		1.8°					
Insulation Class		Class B (130°C)					
Power Source		DC24V±10% 1.6A or DC36V±10% 1.6A Maximum (1.4A for CSK243 type)			DC24V±10% 2.8A or DC36V±10% 2.8A Maximum		
Output Current	A/phase	0.95	1.2		2		
Excitation Mode		<ul style="list-style-type: none"> ● Full Step : 1.8°/step (2 phase excitation) ● Half Step : 0.9°/step (1-2 phase excitation) 					
Input Signals	Input Signal Circuit	Photocoupler Input, Input resistance 220Ω, input current 20mA maximum. Signal voltage Photocoupler ON : +4~+5V, Photocoupler OFF : 0~+0.5V					
	● Pulse Signal (CW Pulse Signal)	Step Command Pulse Signal (CW Direction Command Pulse Signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	● Rotation Direction Signal (CCW Pulse Signal)	Rotation Direction Command Pulse Signal Photocoupler ON : CW, Photocoupler OFF : CCW (CCW Direction Command Pulse signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	● All Windings off Signal	When in the "photocoupler ON" state the current to the motor is cut off and the motor shaft can be rotated manually. When in the "photocoupler OFF" state the current level set by the RUN potentiometer is supplied to the motor.					
Output Signals	Output Signal Circuit	Photocoupler, Open-Collector Output External use condition: 24V DC maximum, 10mA maximum					
	● Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0". (photocoupler : ON) Full step : signal output every 4 pulses, Half step : signal output every 8 pulses.					
Functions		Automatic current cutback, Pulse input mode switch, Step angle switch, Power supply voltage switch					
Cooling Method (Driver)		Natural ventilation					
Mass	Motor kg	0.21	0.27	0.35	0.45	0.7	1.0
	Driver kg	0.13					
Insulation Resistance	Motor	100M Ω or more under normal ambient temperature and humidity when the megger reading between the windings and the frame is DC500V.					
Dielectric Strength	Motor	Under normal ambient temperature and humidity, sufficient to withstand 1.0kV at 50 Hz (0.5kV for CSK24□ type) applied between the windings and the frame for one minute following a period of continuous operation.					
Ambient temperature	Motor	-10°C ~ +50°C					
	Driver	0°C ~ +40°C					

● Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2-phase excitation). Use this value to compare motor torque performance. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

● The current indicated in power input is the driver's maximum input current when a load is applied to the motor. (The value varies according to the pulse speed.)

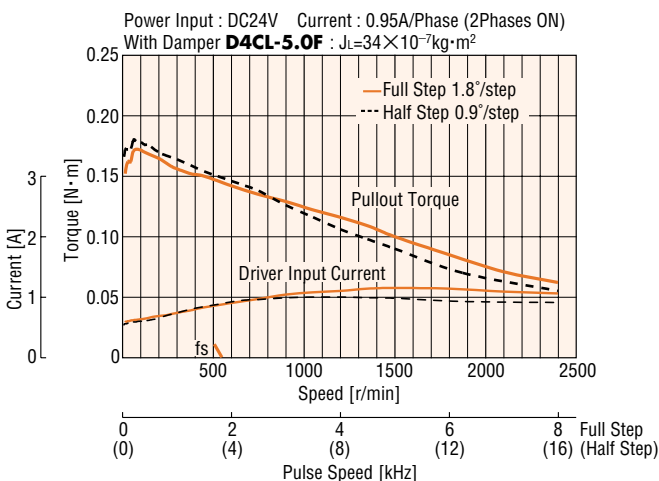
* Responds up to approximately 10kHz with a pulse duty of 50%. When using it at higher speeds, narrow the pulse width (shorten the photocoupler's ON time.)

Speed-Torque Characteristics

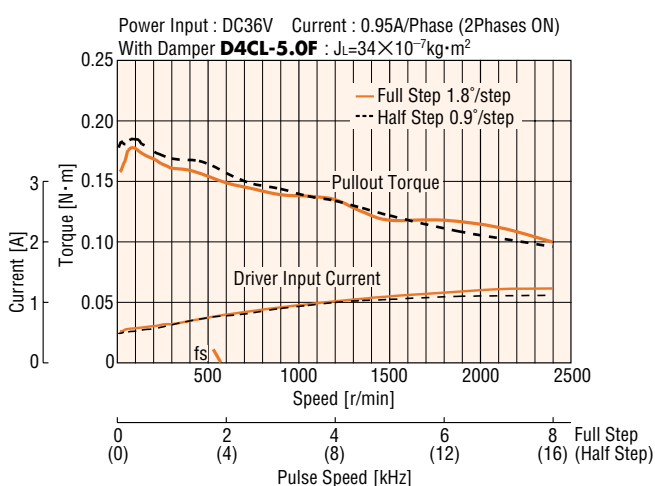
fs: Maximum Starting Pulse Rate

Standard Type

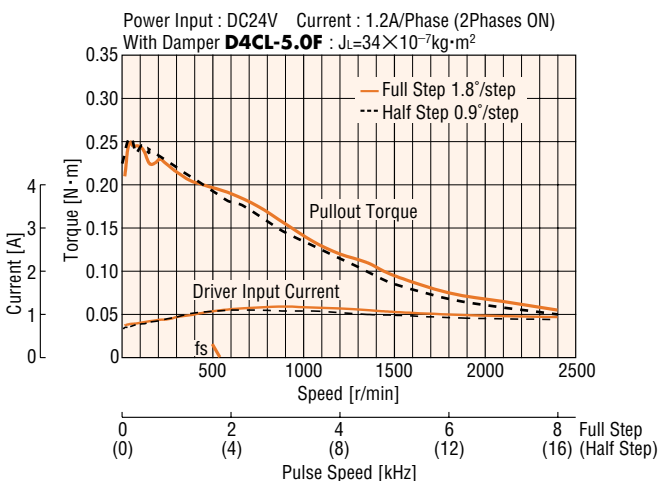
CSK243-BT DC24V



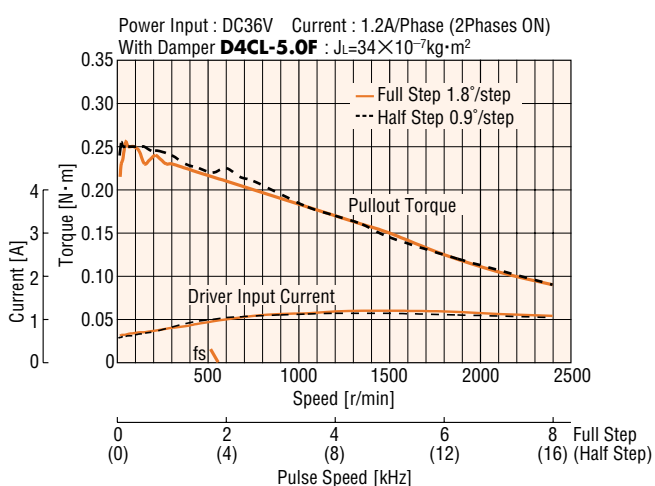
CSK243-BT DC36V



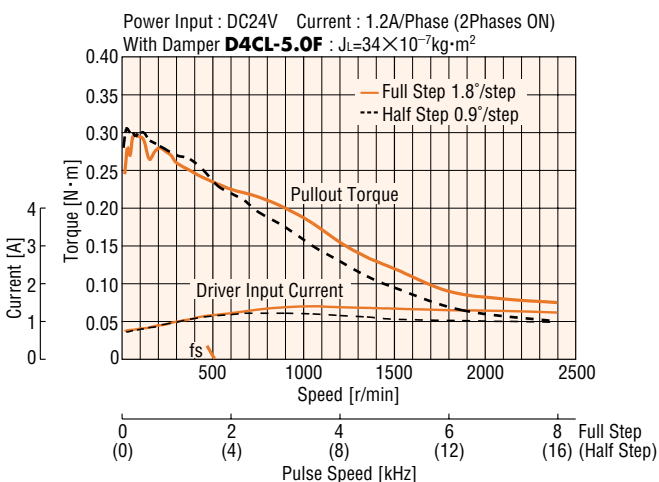
CSK244-BT DC24V



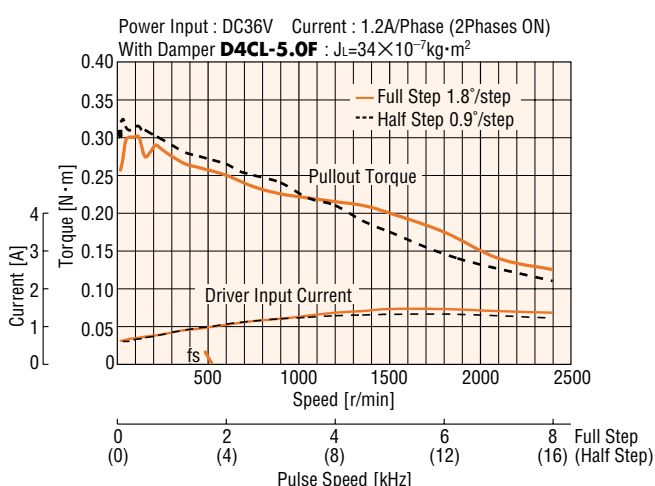
CSK244-BT DC36V



CSK245-BT DC24V



CSK245-BT DC36V



Notes:

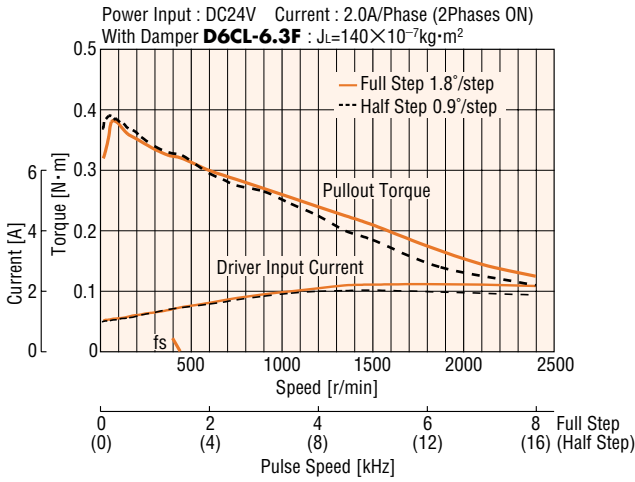
1. Pay attention to heat dissipation from motor and driver. The motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C
2. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

Speed-Torque Characteristics

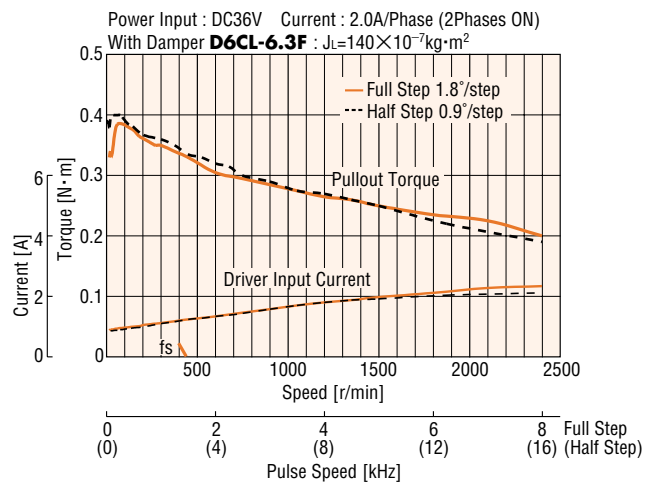
fs: Maximum Starting Pulse Rate

Standard Type

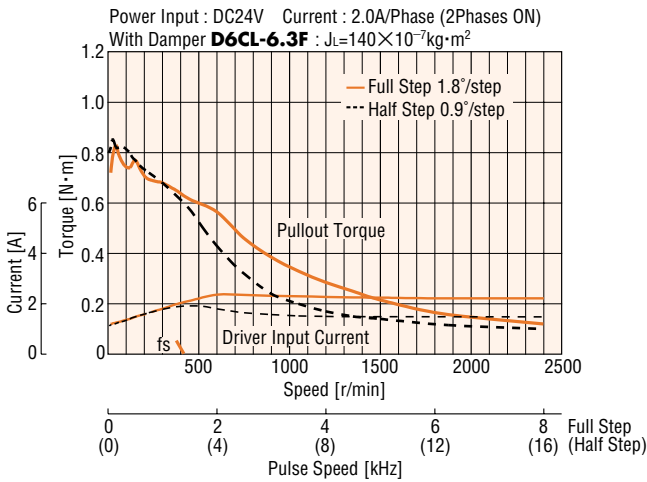
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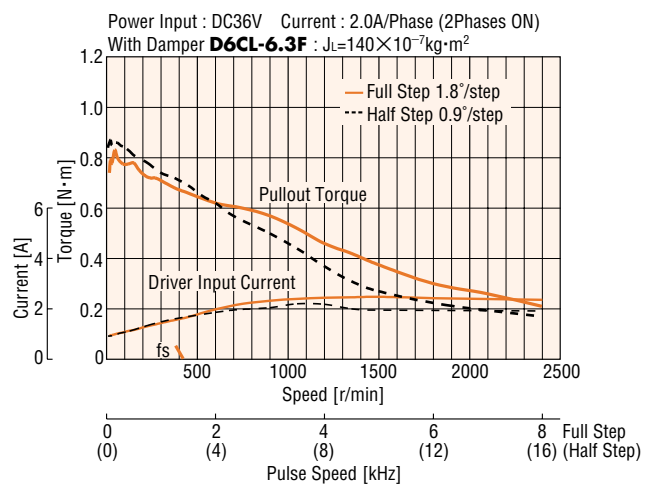
CSK264-BT DC36V



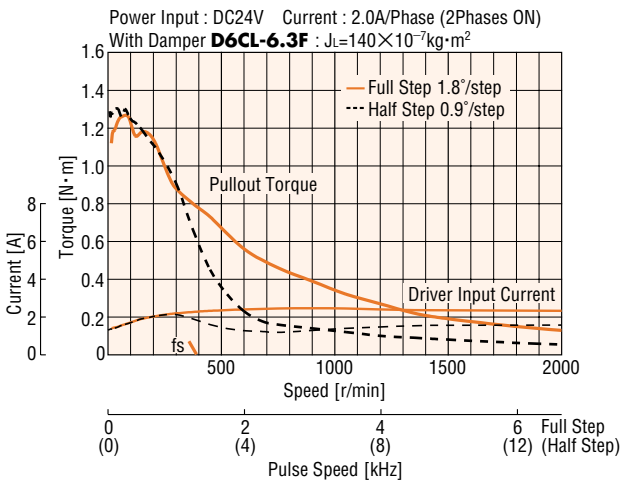
CSK266-BT DC24V



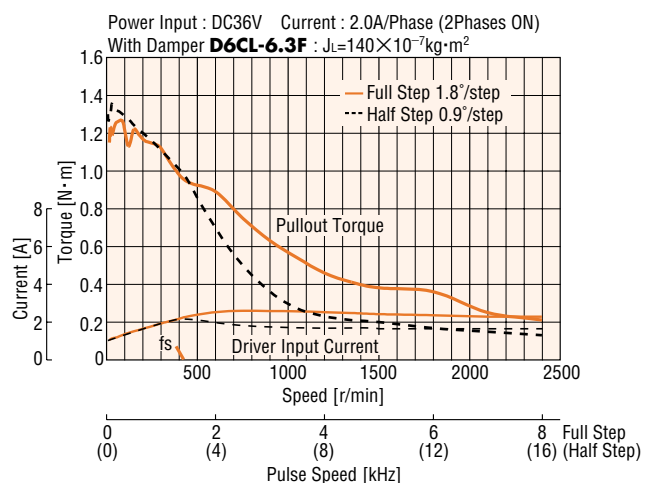
CSK266-BT DC36V



CSK268-BT DC24V



CSK268-BT DC36V

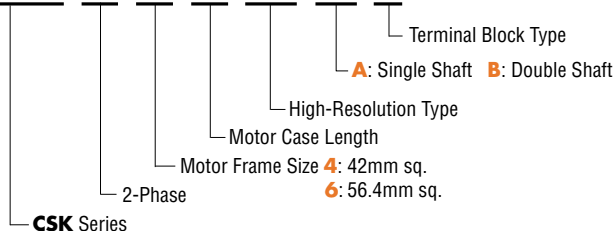


Notes:

1. Pay attention to heat dissipation from motor and driver. The motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C
2. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

Product Number Code

CSK 2 6 6 M A T



Specifications: High Resolution Type (Full Step Angle 0.9°)

Package Model	Single Shaft	CSK243MAT	CSK244MAT	CSK245MAT	CSK264MAT	CSK266MAT	CSK268MAT
	Double Shaft	CSK243MBT	CSK244MBT	CSK245MBT	CSK264MBT	CSK266MBT	CSK268MBT
Maximum Holding Torque	N · m	0.16	0.26	0.32	0.39	0.9	1.35
Rotor Inertia	kg · m ²	35×10 ⁻⁷	54×10 ⁻⁷	68×10 ⁻⁷	120×10 ⁻⁷	300×10 ⁻⁷	480×10 ⁻⁷
Rated Current	A/phase	0.95	1.2		2		
Basic Step Angle		0.9°					
Insulation Class		Class B (130°C)					
Power Source		DC24V±10% 1.6A or DC36V±10% 1.6A Maximum (1.4A for CSK243M type)			DC24V±10% 2.8A or DC36V±10% 2.8A Maximum		
Output Current	A/phase	0.95	1.2		2		
Excitation Mode		<ul style="list-style-type: none"> Full Step : 0.9°/step (2 phase excitation) Half Step : 0.45°/step (1-2 phase excitation) 					
Input Signals	Input Signal Circuit	Photocoupler Input, Input resistance 220Ω, input current 20mA maximum. Signal voltage Photocoupler ON : +4~+5V, Photocoupler OFF : 0~+0.5V					
	<ul style="list-style-type: none"> Pulse Signal (CW Pulse Signal) 	Step Command Pulse Signal (CW Direction Command Pulse Signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	<ul style="list-style-type: none"> Rotation Direction Signal (CCW Pulse Signal) 	Rotation Direction Command Pulse Signal Photocoupler ON : CW, Photocoupler OFF : CCW (CCW Direction Command Pulse signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
Output Signals	<ul style="list-style-type: none"> All Windings Off Signal 	When in the "photocoupler ON" state the current to the motor is cut off and the motor shaft can be rotated manually. When in the "photocoupler OFF" state the current level set by the RUN potentiometer is supplied to the motor.					
	Output Signal Circuit	Photocoupler, Open-Collector Output External use condition: 24V DC maximum, 10mA maximum					
Functions	<ul style="list-style-type: none"> Excitation Timing Signal 	The signal is output every time the excitation sequence returns to the initial stage "0". (photocoupler : ON) Full step : signal is output every 4 pulses, Half step : signal is output every 8 pulses.					
		Automatic current cutback, Step angle switch, Pulse input mode switch, Power supply voltage switch					
Cooling Method (Driver)		Natural ventilation					
Mass	Motor kg	0.24	0.3	0.37	0.45	0.7	1
	Driver kg	0.13					
Insulation Resistance	Motor	100M Ω or more under normal ambient temperature and humidity when the megger reading between the windings and the frame is DC500V.					
Dielectric Strength	Motor	Under normal ambient temperature and humidity, sufficient to withstand 1.0kV at 50 Hz (0.5kV for CSK24□ type) applied between the windings and the frame for one minute following a period of continuous operation.					
Ambient temperature	Motor	-10°C ~ +50°C					
	Driver	0°C ~ +40°C					

● Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2-phase excitation). Use this value to compare motor torque performance. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

● The current indicated in power input is the driver's maximum input current when a load is applied to the motor. (The value varies according to the pulse speed.)

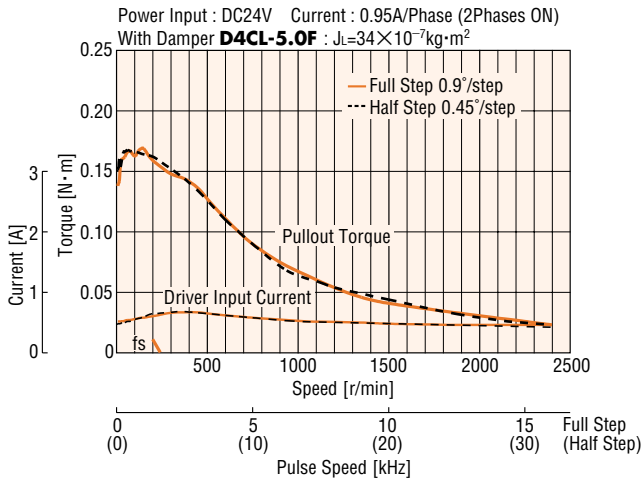
* Responds up to approximately 10kHz with a pulse duty of 50%. When using it at higher speeds, narrow the pulse width (shorten the photocoupler's ON time.)

Speed-Torque Characteristics

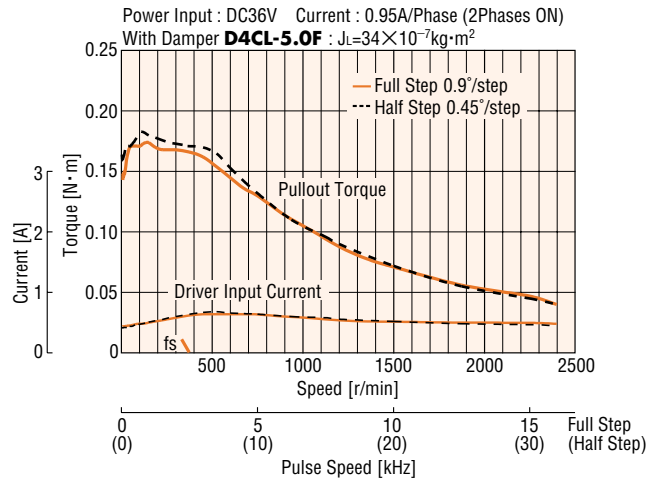
fs: Maximum Starting Pulse Rate

High-Resolution Type

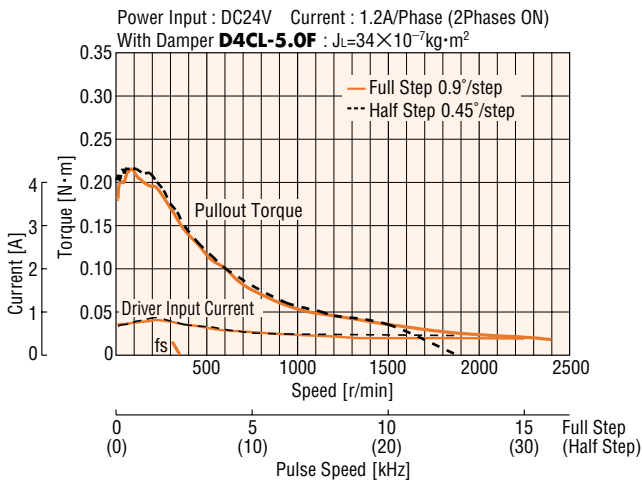
CSK243MBT DC24V



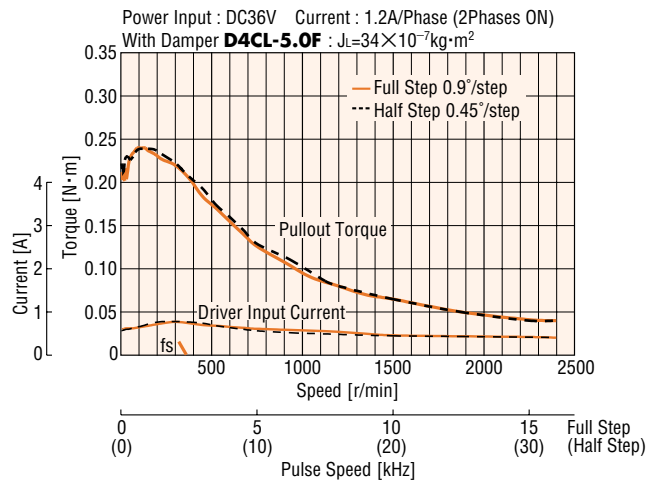
CSK243MBT DC36V



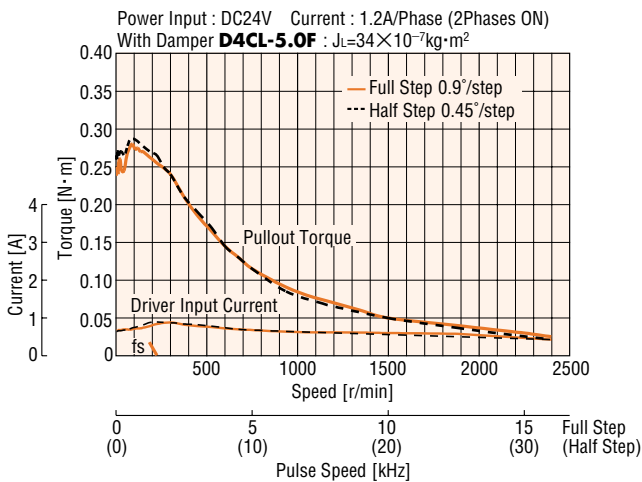
CSK244MBT DC24V



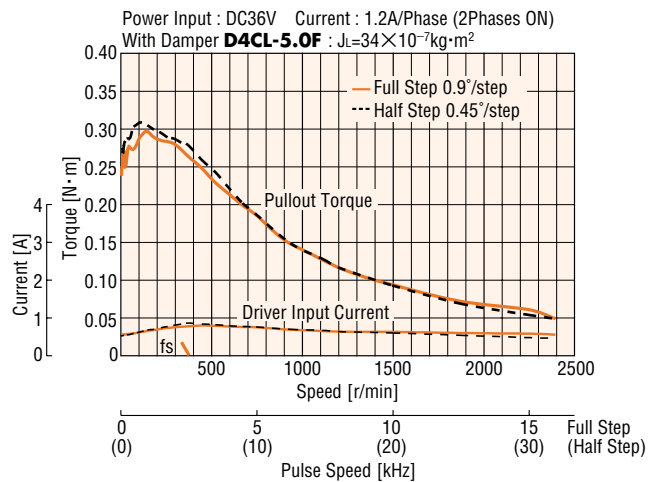
CSK244MBT DC36V



CSK245MBT DC24V

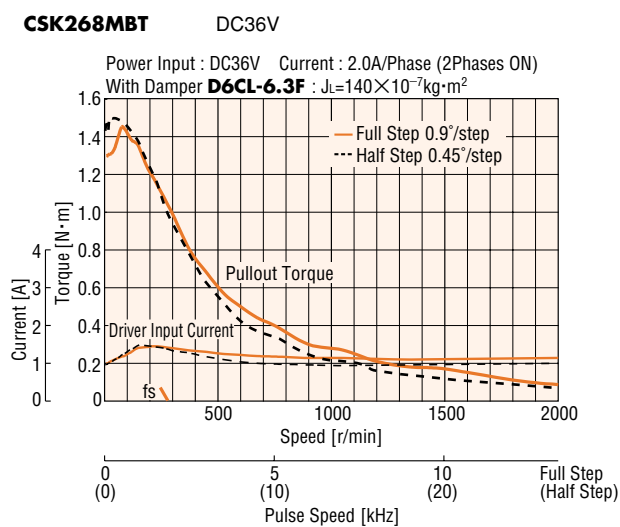
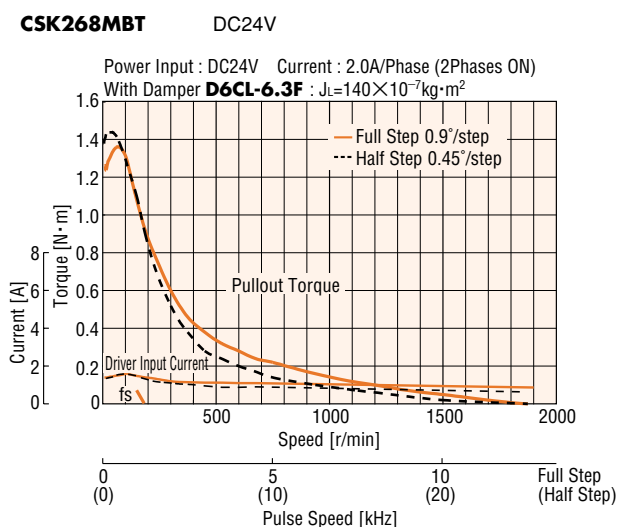
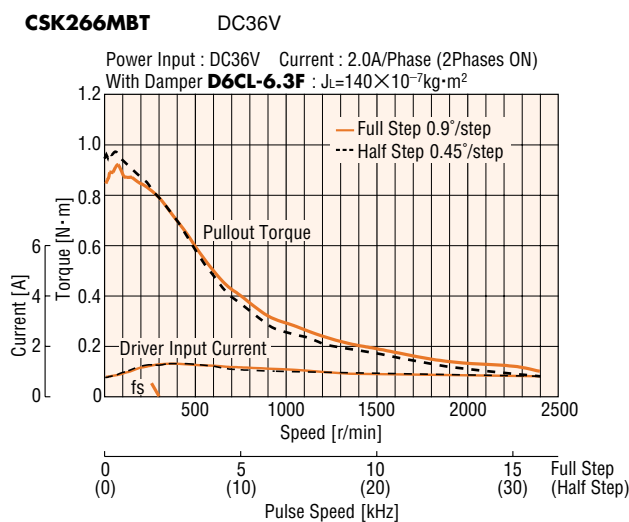
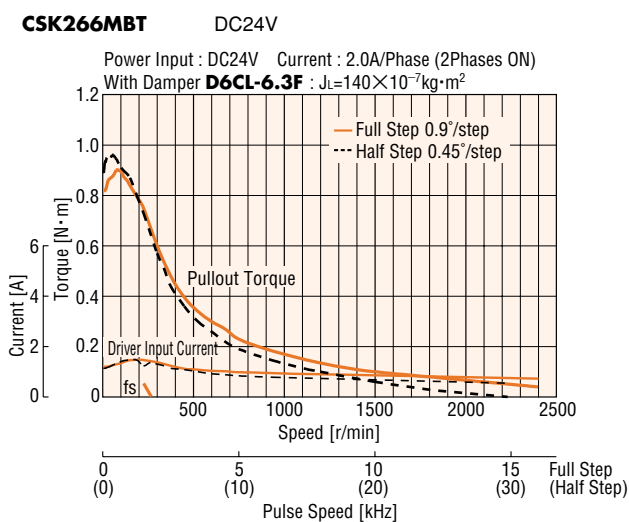
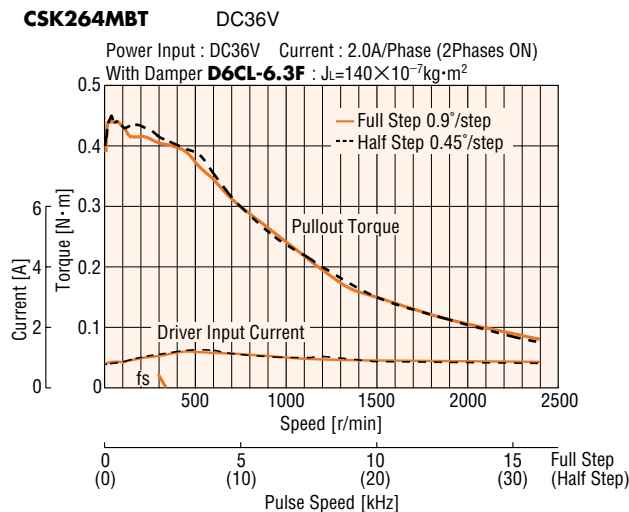
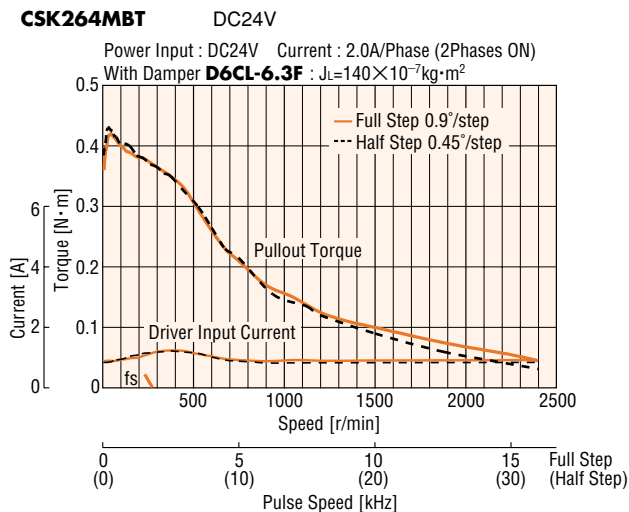


CSK245MBT DC36V



Notes:

1. Pay attention to heat dissipation from motor and driver. The motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C
2. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

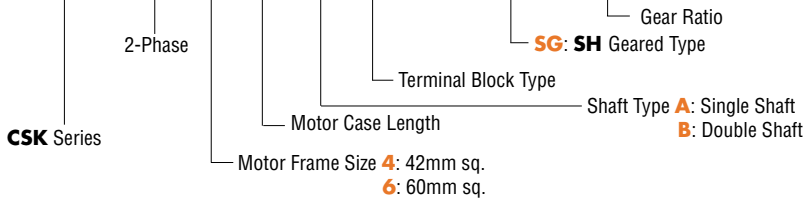


Notes:

1. Pay attention to heat dissipation from motor and driver. The motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C
2. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

Product Number Code

CSK 2 6 4 A T - SG 10



Specifications: SH Geared Type

Package Model	Single Shaft	CSK243AT-SG3.6	CSK243AT-SG7.2	CSK243AT-SG9	CSK243AT-SG10	CSK243AT-SG18	CSK243AT-SG36
	Double Shaft	CSK243BT-SG3.6	CSK243BT-SG7.2	CSK243BT-SG9	CSK243BT-SG10	CSK243BT-SG18	CSK243BT-SG36
Maximum Holding Torque	N · m	0.2	0.4	0.5	0.56	0.8	0.8
Rotor Inertia	kg · m ²	35 × 10 ⁻⁷					
Rated Current	A/phase	0.95					
Basic Step Angle		0.5°	0.25°	0.2°	0.18°	0.1°	0.05°
Reduction Gear Ratio		1:3.6	1:7.2	1:9	1:10	1:18	1:36
Permissible Torque	N · m	0.2	0.4	0.5	0.56	0.8	0.8
Permissible Thrust Load	N	15					
Permissible Overhung Load	N	20					
Permissible Speed Range (Gear Output Shaft Speed)	Full Step	0~6000Hz (0~500r/min)	0~6000Hz (0~250r/min)	0~6000Hz (0~200r/min)	0~6000Hz (0~180r/min)	0~6000Hz (0~100r/min)	0~6000Hz (0~50r/min)
	Half Step	0~12000Hz (0~500r/min)	0~12000Hz (0~250r/min)	0~12000Hz (0~200r/min)	0~12000Hz (0~180r/min)	0~12000Hz (0~100r/min)	0~12000Hz (0~50r/min)
Insulation Class		Class B (130°C)					
Power Source		DC24V ± 10% 1.4A Maximum or DC36V ± 10% 1.4A Maximum					
Output Current	A/phase	0.95					
Excitation Mode	Full Step	0.5°/step	0.25°/step	0.2°/step	0.18°/step	0.1°/step	0.05°/step
	Half Step	0.25°/step	0.125°/step	0.1°/step	0.09°/step	0.05°/step	0.025°/step
Input Signals	Input Signal Circuit	Photocoupler Input, Input resistance 220Ω, input current 20mA maximum. Signal voltage Photocoupler ON : +4~+5V, Photocoupler OFF : 0~+0.5V					
	● Pulse Signal (CW Pulse Signal)	Step Command Pulse Signal (CW Direction Command Pulse Signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	● Rotation Direction Signal (CCW Pulse Signal)	Rotation Direction Command Pulse Signal Photocoupler ON : CW, Photocoupler OFF : CCW (CCW Direction Command Pulse signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	● All Windings Off Signal	When in the "photocoupler ON" state the current to the motor is cut off and the motor shaft can be rotated manually. When in the "photocoupler OFF" state the current level set by the RUN potentiometer is supplied to the motor.					
Output Signals	Output Signal Circuit	Photocoupler, Open-Collector Output External use condition: 24V DC maximum, 10mA maximum					
	● Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0". (photocoupler : ON) Full step : signal is output every 4 pulses, Half step : signal is output every 8 pulses.					
Functions		Automatic current cutback, Pulse input mode switch, Step angle switch, Power supply voltage switch					
Driver Cooling Method		Natural ventilation					
Mass	Motor	kg					0.35
	Driver	kg					0.13
Insulation Resistance	Motor	100M Ω or more under normal ambient temperature and humidity when the megger reading between the windings and the frame is DC500V.					
Dielectric Strength	Motor	Under normal ambient temperature and humidity, sufficient to withstand 0.5kV 50 Hz applied between the windings and the frame for one minute following a period of continuous operation.					
Ambient temperature	Motor	-10 °C ~ +50 °C					
	Driver	0 °C ~ +40 °C					

- Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2-phase excitation), with consideration given to the permissible strength of the gear. Use this value to compare motor torque performance. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.
- The current indicated in power input is the driver's maximum input current when a load is applied to the motor. (The value varies according to the pulse speed.)
- Permissible torque is the maximum value of the mechanical strength of the gear unit. Use the product with a total torque (load and acceleration) less than the permissible torque.
- Permissible overhung load indicates the maximum value measured at 10mm from the tip of the gear output shaft.
- The rotary direction of the motor and that of the gear output shaft are the same for the gear ratios 1:3.6, 1:7.2, 1:9 and 1:10. They are opposite for 1:18 and 1:36 ratios.
- * Responds up to about 10 kHz with a pulse duty of 50%. When using it at higher speeds, narrow the pulse width (shorten the photocoupler's ON time.)

Package Model	Single Shaft	CSK264AT-SG3.6	CSK264AT-SG7.2	CSK264AT-SG9	CSK264AT-SG10	CSK264AT-SG18	CSK264AT-SG36	
	Double Shaft	CSK264BT-SG3.6	CSK264BT-SG7.2	CSK264BT-SG9	CSK264BT-SG10	CSK264BT-SG18	CSK264BT-SG36	
Maximum Holding Torque	N · m	1	2	2.5	2.7	3	4	
Rotor Inertia	kg · m ²	120×10 ⁻⁷						
Rated Current	A/phase	2						
Basic Step Angle		0.5°	0.25°	0.2°	0.18°	0.1°	0.05°	
Reduction Gear Ratio		1:3.6	1:7.2	1:9	1:10	1:18	1:36	
Permissible Torque	N · m	1	2	2.5	2.7	3	4	
Permissible Thrust Load	N	30						
Permissible Overhung Load	N	50				120		
Permissible Speed Range (Gear Output Shaft Speed)	Full Step	0~6000Hz (0~500r/min)	0~6000Hz (0~250r/min)	0~6000Hz (0~200r/min)	0~6000Hz (0~180r/min)	0~6000Hz (0~100r/min)	0~6000Hz (0~50r/min)	
	Half Step	0~12000Hz (0~500r/min)	0~12000Hz (0~250r/min)	0~12000Hz (0~200r/min)	0~12000Hz (0~180r/min)	0~12000Hz (0~100r/min)	0~12000Hz (0~50r/min)	
Insulation Class		Class B (130°C)						
Power Source		DC24V±10% 2.8A Maximum or DC36V±10% 2.8A Maximum						
Output Current	A/phase	2						
Excitation Mode	Full Step	0.5°/step	0.25°/step	0.2°/step	0.18°/step	0.1°/step	0.05°/step	
	Half Step	0.25°/step	0.125°/step	0.1°/step	0.09°/step	0.05°/step	0.025°/step	
Input Signals	Input Signal Circuit	Photocoupler Input, Input resistance 220Ω, input current 20mA maximum. Signal voltage Photocoupler ON : +4~+5V, Photocoupler OFF : 0~+0.5V						
	● Pulse Signal (CW Pulse Signal)	Step Command Pulse Signal (CW Direction Command Pulse Signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum * Motor moves when the photocoupler state changes from ON to OFF.						
	● Rotation Direction Signal (CCW Pulse Signal)	Rotation Direction Command Pulse Signal Photocoupler ON : CW, Photocoupler OFF : CCW (CCW Direction Command Pulse signal at 2-pulse input mode) Pulse width: 5 μs minimum, Pulse rise/Pulse fall time 2 μs maximum * Motor moves when the photocoupler state changes from ON to OFF.						
	● All Windings Off Signal	When in the "photocoupler ON" state the current to the motor is cut off and the motor shaft can be rotated manually. When in the "photocoupler OFF" state the current level set by the RUN potentiometer is supplied to the motor.						
Output Signals	Output Signal Circuit	Photocoupler, Open-Collector Output External use condition: 24V DC maximum, 10mA maximum						
	● Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0". (photocoupler : ON) Full step : signal is output every 4 pulses, Half step : signal is output every 8 pulses.						
Functions		Automatic current cutback, Pulse input mode switch, Step angle switch, Power supply voltage switch						
Driver Cooling Method		Natural ventilation						
Mass	Motor	kg	0.75					
	Driver	kg	0.13					
Insulation Resistance	Motor	100M Ω or more under normal ambient temperature and humidity when the megger reading between the windings and the frame is DC500V.						
Dielectric Strength	Motor	Under normal ambient temperature and humidity, sufficient to withstand 1.0kV 50 Hz applied between the windings and the frame for one minute following a period of continuous operation.						
Ambient temperature	Motor	-10° C ~ +50° C						
	Driver	0° C ~ +40° C						

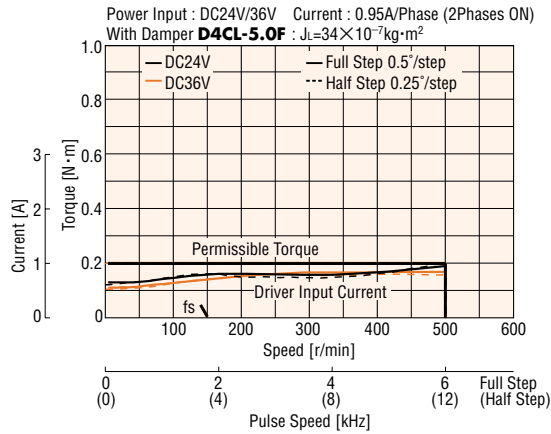
- Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2-phase excitation), with consideration given to the permissible strength of the gear. Use this value to compare motor torque performance. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.
- The current indicated in power input is the driver's maximum input current when a load is applied to the motor. (The value varies according to the pulse speed.)
- Permissible torque is the maximum value of the mechanical strength of the gear unit. Use the product with a total torque (load and acceleration) less than the permissible torque.
- Permissible overhung load indicates the maximum value measured at 10mm from the tip of the gear output shaft.
- The rotary direction of the motor and that of the gear output shaft are the same for the gear ratios 1:3.6, 1:7.2, 1:9 and 1:10. They are opposite for 1:18 and 1:36 ratios.
- * Responds up to about 10 kHz with a pulse duty of 50%. When using it at higher speeds, narrow the pulse width (shorten the photocoupler's ON time.)

Speed-Torque Characteristics

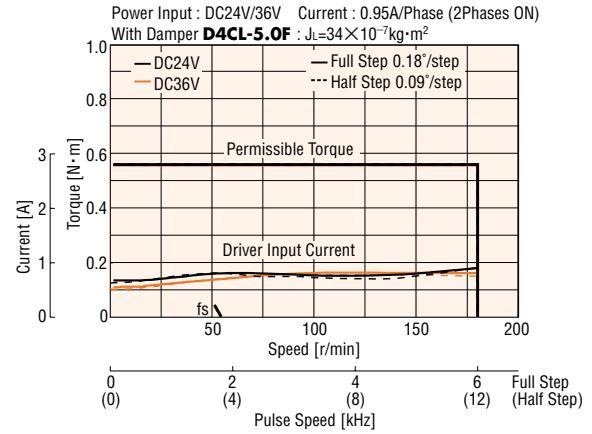
fs: Maximum Starting Pulse Rate

SH Geared Type

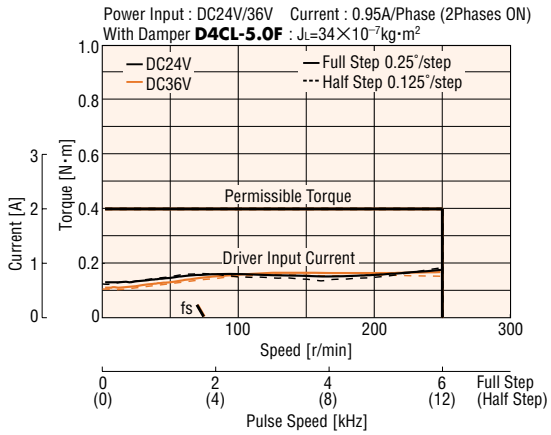
CSK243BT-SG3.6



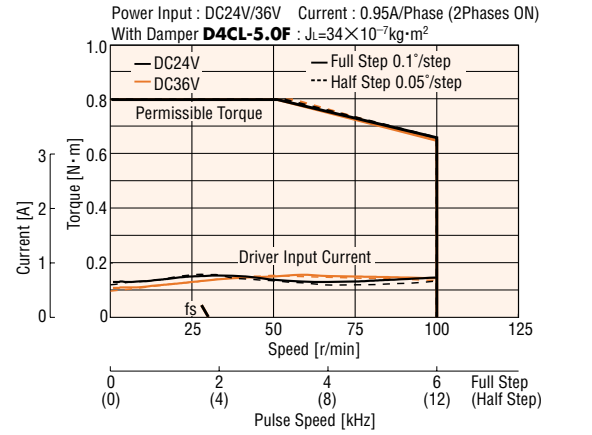
CSK243BT-SG10



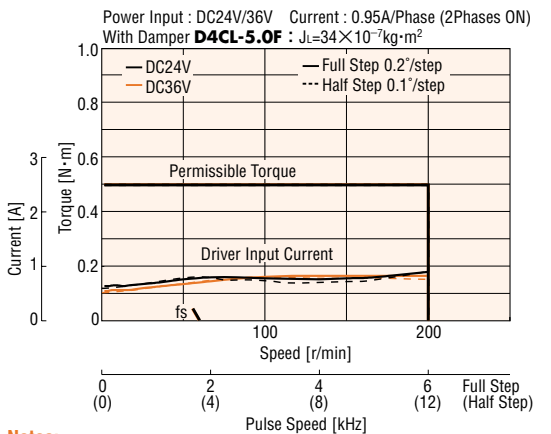
CSK243BT-SG7.2



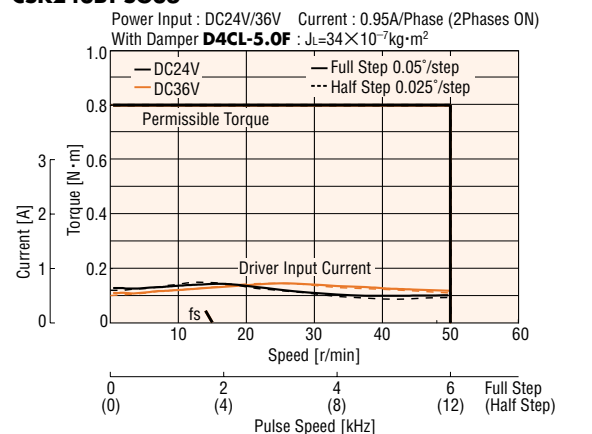
CSK243BT-SG18



CSK243BT-SG9



CSK243BT-SG36



Notes:

1. Pay attention to heat dissipation from motor and driver. The motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C
2. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

Precautions

When using the **CSK SH** geared type, please note the following:

1. Do not exceed the maximum permissible torque:

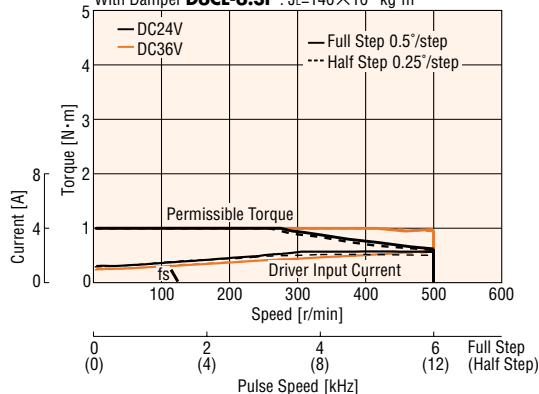
Permissible torque represents the maximum value of the mechanical strength of the gear unit. Be sure to keep the total value of acceleration/deceleration torque and load (friction) torque at the motor shaft under the permissible torque value. If torque exceeding the permissible torque is applied, the gear unit may fail.

2. Do not exceed the permissible speed range:

Do not exceed the maximum output speed of the gearhead indicated in the specifications on page B-184, 185. The speed affects the life of the gearhead. Be sure to use the gear unit within the maximum permissible speed range.

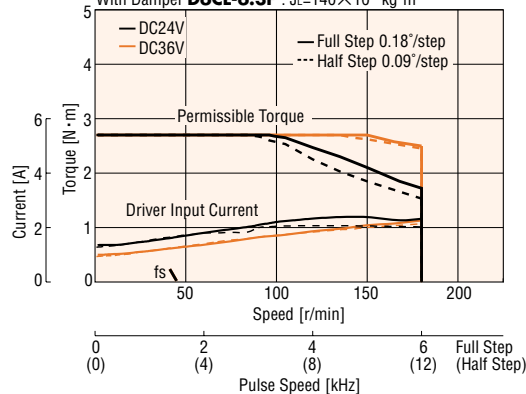
CSK264BT-SG3.6

Power Input : DC24V/36V Current : 2.0A/Phase (2Phases ON)
With Damper **D6CL-6.3F** : $J_L=140 \times 10^{-7} \text{kg} \cdot \text{m}^2$



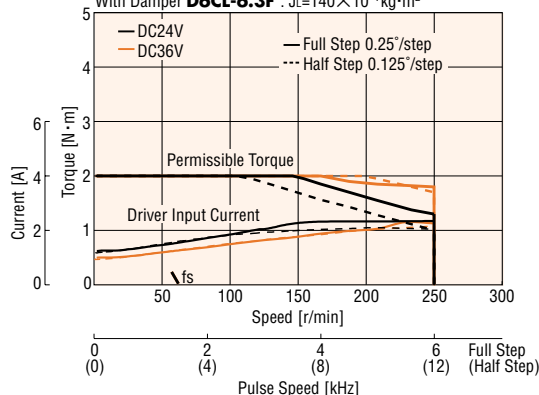
CSK264BT-SG10

Power Input : DC24V/36V Current : 2.0A/Phase (2Phases ON)
With Damper **D6CL-6.3F** : $J_L=140 \times 10^{-7} \text{kg} \cdot \text{m}^2$



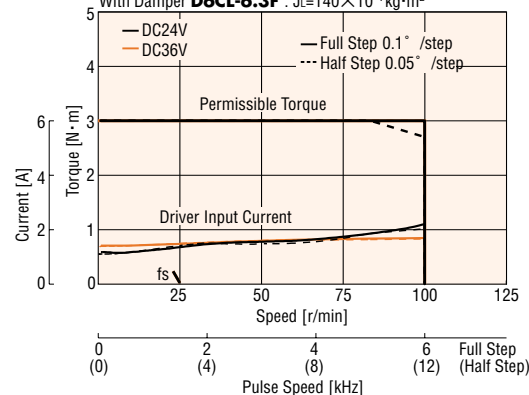
CSK264BT-SG7.2

Power Input : DC24V/36V Current : 2.0A/Phase (2Phases ON)
With Damper **D6CL-6.3F** : $J_L=140 \times 10^{-7} \text{kg} \cdot \text{m}^2$



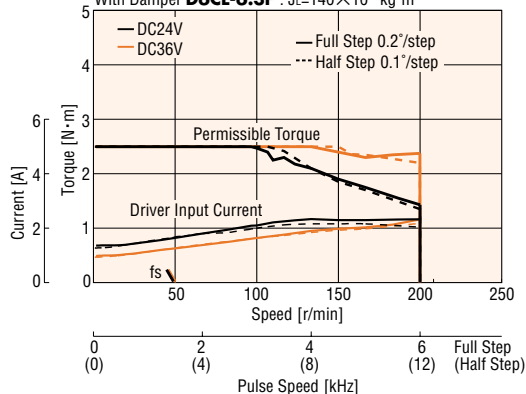
CSK264BT-SG18

Power Input : DC24V/36V Current : 2.0A/Phase (2Phases ON)
With Damper **D6CL-6.3F** : $J_L=140 \times 10^{-7} \text{kg} \cdot \text{m}^2$



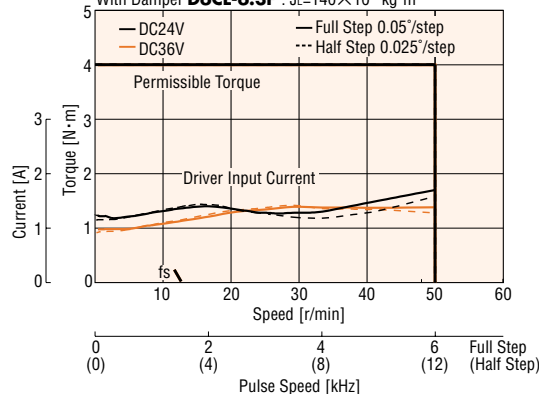
CSK264BT-SG9

Power Input : DC24V/36V Current : 2.0A/Phase (2Phases ON)
With Damper **D6CL-6.3F** : $J_L=140 \times 10^{-7} \text{kg} \cdot \text{m}^2$



CSK264BT-SG36

Power Input : DC24V/36V Current : 2.0A/Phase (2Phases ON)
With Damper **D6CL-6.3F** : $J_L=140 \times 10^{-7} \text{kg} \cdot \text{m}^2$



Notes:

1. Pay attention to heat dissipation from motor and driver. The motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C
2. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

3. Consider backlash in bi-directional positioning:

Backlash is the free rotation angle (i.e., play) of the output shaft when the input section of the reduction gear is fixed. If there is a problem with backlash in positioning in both forward-reverse directions, be sure to stop the motor in one direction.

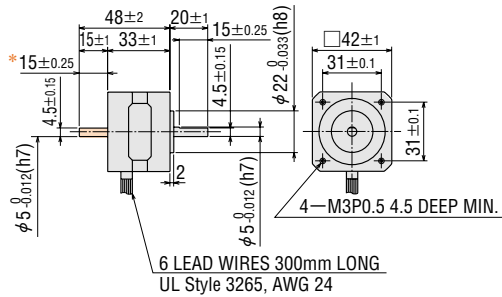
4. The direction of gear shaft rotations differs according to reduction ratios:

The direction of motor shaft rotation and gear shaft rotation according to the gear ratio applied:
Gear ratio - 1:3.6, 1:7.2, 1:9 or 1:10 - Same as motor shaft
Gear ratio - 1:18 or 1:36 - Opposite of motor shaft

■ Dimensions

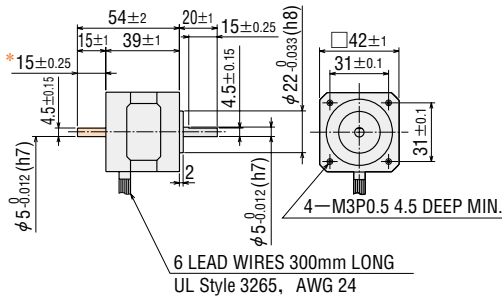
● Motor scale 1/4, unit=mm Standrd Type, High-Resolution Type

CSK243-AT (Single shaft)
Motor Model: PK243-01A Mass 0.21kg/Driver Model: CSD2109-T
CSK243MAT (Single shaft)
Motor Model: PK243MA Mass 0.24kg/Driver Model: CSD2109-T
CSK243-BT (Double shaft)
Motor Model: PK243-01B Mass 0.21kg/Driver Model: CSD2109-T
CSK243MBT (Double shaft)
Motor Model: PK243MB Mass 0.24kg/Driver Model: CSD2109-T



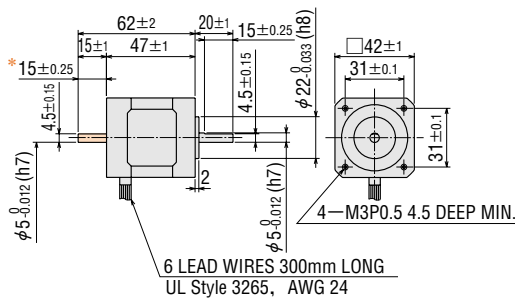
* 15±0.25 indicates the length of milling on motor shaft.

CSK244-AT (Single shaft)
Motor Model: PK244-01A Mass 0.27kg/Driver Model: CSD2112-T
CSK244MAT (Single shaft)
Motor Model: PK244MA Mass 0.3kg/Driver Model: CSD2112-T
CSK244-BT (Double shaft)
Motor Model: PK244-01B Mass 0.27kg/Driver Model: CSD2112-T
CSK244MBT (Double shaft)
Motor Model: PK244MB Mass 0.3kg/Driver Model: CSD2112-T



* 15±0.25 indicates the length of milling on motor shaft.

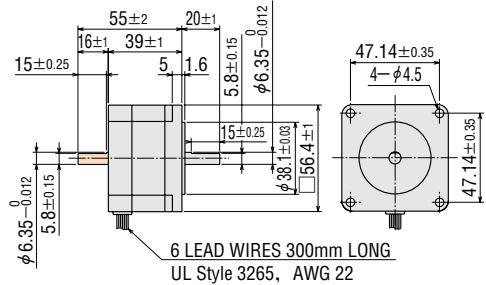
CSK245-AT (Single shaft)
Motor Model: PK245-01A Mass 0.35kg/Driver Model: CSD2112-T
CSK245MAT (Single shaft)
Motor Model: PK245MA Mass 0.37kg/Driver Model: CSD2112-T
CSK245-BT (Double shaft)
Motor Model: PK245-01B Mass 0.35kg/Driver Model: CSD2112-T
CSK245MBT (Double shaft)
Motor Model: PK245MB Mass 0.37kg/Driver Model: CSD2112-T



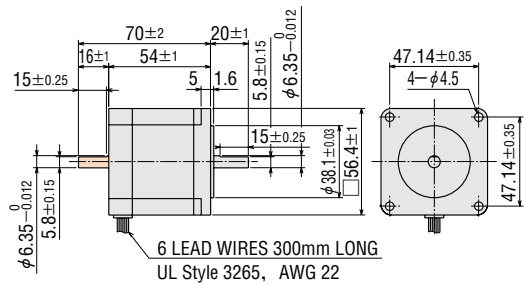
* 15±0.25 indicates the length of milling on motor shaft.

- These dimensions are for double shaft models. For single shaft, ignore the colored areas.
- Refer to page B-42 for information on motor installation.

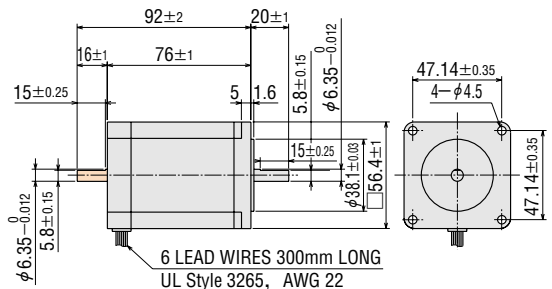
CSK264-AT (Single shaft)
Motor Model: PK264-02A Mass 0.45kg/Driver Model: CSD2120-T
CSK264MAT (Single shaft)
Motor Model: PK264MA Mass 0.45kg/Driver Model: CSD2120-T
CSK264-BT (Double shaft)
Motor Model: PK264-02B Mass 0.45kg/Driver Model: CSD2120-T
CSK264MBT (Double shaft)
Motor Model: PK264MB Mass 0.45kg/Driver Model: CSD2120-T



CSK266-AT (Single shaft)
Motor Model: PK266-02A Mass 0.7kg/Driver Model: CSD2120-T
CSK266MAT (Single shaft)
Motor Model: PK266MA Mass 0.7kg/Driver Model: CSD2120-T
CSK266-BT (Double shaft)
Motor Model: PK266-02B Mass 0.7kg/Driver Model: CSD2120-T
CSK266MBT (Double shaft)
Motor Model: PK266MB Mass 0.7kg/Driver Model: CSD2120-T



CSK268-AT (Single shaft)
Motor Model: PK268-02A Mass 1kg/Driver Model: CSD2120-T
CSK268MAT (Single shaft)
Motor Model: PK268MA Mass 1kg/Driver Model: CSD2120-T
CSK268-BT (Double shaft)
Motor Model: PK268-02B Mass 1kg/Driver Model: CSD2120-T
CSK268MBT (Double shaft)
Motor Model: PK268MB Mass 1kg/Driver Model: CSD2120-T



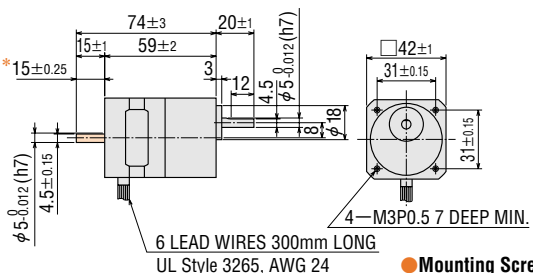
SH Geared Type

CSK243AT-SG (Single shaft)

Motor Model: PK243A1-SG Mass 0.35kg/Driver Model: CSD2109-T

CSK243BT-SG (Double shaft)

Motor Model: PK243B1-SG Mass 0.35kg/Driver Model: CSD2109-T



● **Mounting Screws** (included)
M3 P0.5 10mm long: 4 pieces

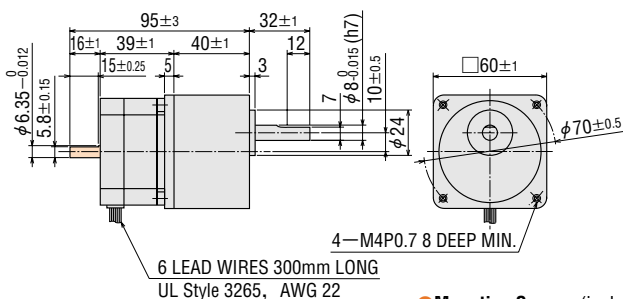
* 15±0.25 indicates the length of milling on motor shaft.

CSK264AT-SG (Single shaft)

Motor Model: PK264A2-SG Mass 0.75kg/Driver Model: CSD2120-T

CSK264BT-SG (Double shaft)

Motor Model: PK264B2-SG Mass 0.75kg/Driver Model: CSD2120-T

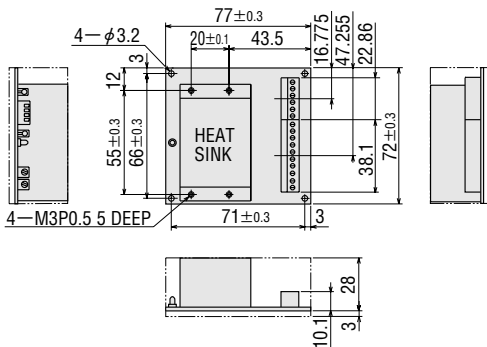


● **Mounting Screws** (included)
M4 P0.7 15mm long: 4 pieces

- These dimensions are for double shaft models. For single shaft, ignore the colored areas.
- Refer to page B-42 for information on motor installation.

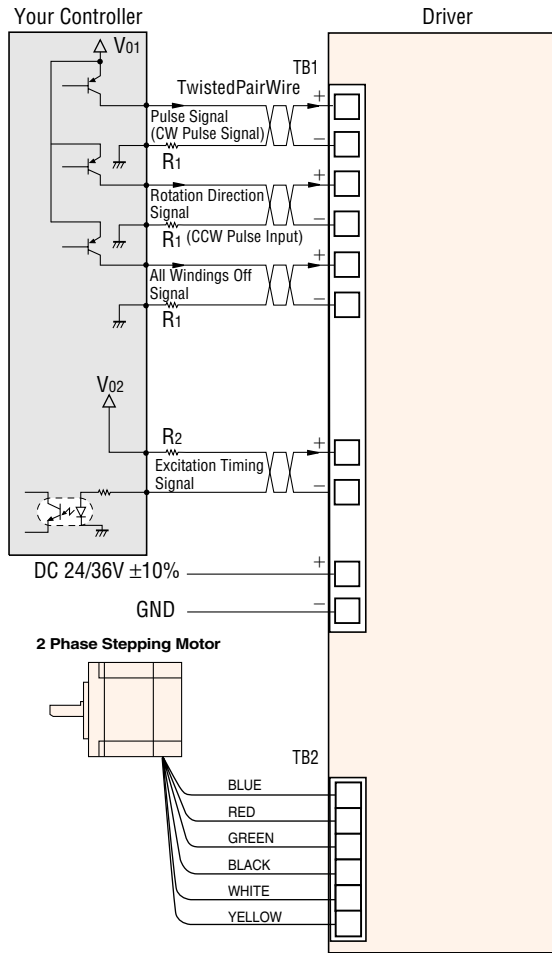
● Driver scale 1/4, unit=mm

Driver: CSD2109-T, CSD2112-T, CSD2120-T Mass 0.13kg



- Refer to page B-45 for information on driver installation.

Wiring Diagram

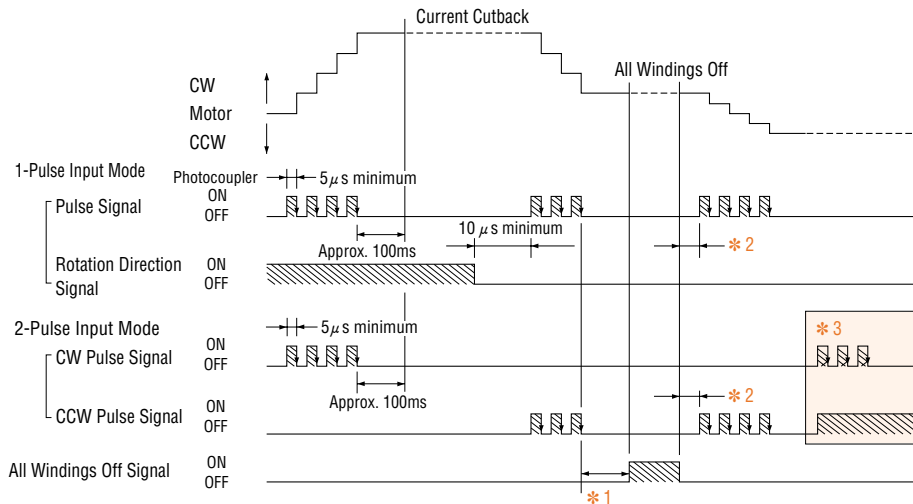


Notes regarding wiring

1. Keep the voltage V_{01} and V_{02} between DC5V and DC24V. When V_{01} is equal to DC5V, the external resistances R_1 is not necessary. When V_{01} is above DC5V, connect R_1 to keep the current below 20mA. When the output current exceeds 10mA, connect the external resistances R_2 to keep the current below 10mA.
2. The transmission frequency will get lower as the pulse line becomes longer and therefore caution should be taken.
3. Use twisted-pair wire of 0.2mm^2 or thicker and 2m or less in length for the signal line.

4. The suitable wire size for the TB1 and TB2 connectors is between AWG22 and 24. Use wires rated at AWG20 (0.5mm^2) for the power line.
5. Signal lines should be kept away at least 10cm from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
6. If noise generated by the motor lead wire causes problem, try shielding of the motor lead wires with conductive tape or wire mesh.

Timing Chart



The photocopier diode lights in their shaded area.
The motor moves when the photocopier state changes from "ON" to "OFF" as indicated by arrow.

Response up to about 10 KHz with a pulse duty of 50%. When using it at higher speeds, narrow the pulse width.

*** 1:**
It is recommended to wait a period of time to allow the motor oscillations to end before inputting the "All Windings Off" signal. This time varies with the load inertia, the load torque and the starting pulse rate. Signal input must be stopped before the motor stops.

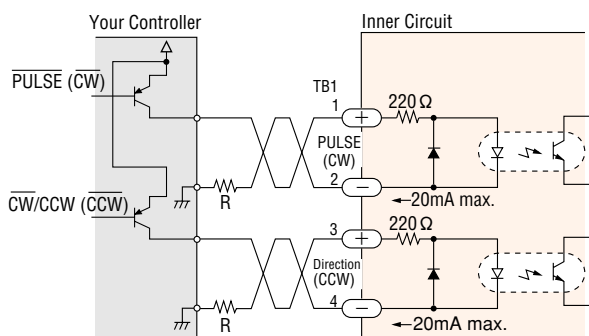
*** 2:**
Never input pulse signals immediately after switching the "All Windings Off" signal to the "photocopier OFF" state or the motor may lose synchronism. In general, an interval of 100ms (minimum) is required.

*** 3:**
At 2-pulse input mode, the motor will not operate properly when inputting a pulse signal while either the CW or CCW pulse signal is already in the "photocopier ON" state.

Description of Input/Output Signals

1. Pulse (Pulse and Direction) Signal

Input Circuit and Sample Connection



The characters indicate signals under the 1-pulse input mode, while the characters in parenthesis indicate signals under the 2-pulse input mode. The external resistance R is not needed when V_0 is 5V. When the voltage exceeds 5V, connect the external resistance R to keep input current at 20mA or less.

1-pulse Input Mode

Pulse Signal

When the photocopler state changes from "ON" to "OFF", the motor rotates one step.

The direction of the motor's rotation is determined by the following "Rotation Direction" signal.

Rotation Direction Signal

The "Rotation Direction" signal is input.

A "photocopler ON" signal input commands a clockwise direction rotation.

A "photocopler OFF" signal input commands a counterclockwise direction rotation.

2-pulse Input Mode

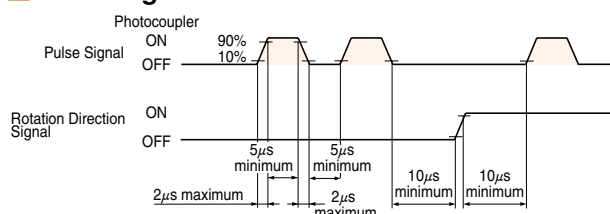
CW Pulse Signal

When the photocopler state changes from "ON" to "OFF", the motor rotates one step in a clockwise direction.

CCW Pulse Signal

When the photocopler state changes from "ON" to "OFF", the motor rotates one step in a counterclockwise direction.

Pulse Signal Characteristics



Shaded area indicates the radiation of the photocopler diode. The motor starts at the trailing edge, shown by the arrow.

Pulse Signal Characteristics

- The pulse voltage is 4 ~ 5V in the "photocopler ON" state, and 0 ~ 0.5V in the "photocopler OFF" state.
- Input pulses for a pulse width is 5μs or more, the rise/ fall time is 2μs or less and pulse duty is 50% or less.
- 10μs or more is the standard interval time for switching from CW to CCW. Note that the interval time greatly varies according to the motor and load inertia.

Pulse Signal Input Precautions

Be sure to set the signal in the "photocopler OFF" state when the pulse signal is at rest.

Setting to the signal in the "photocopler ON" state will not activate the "Automatic Current Cutback" function.

1-pulse Input Mode

Be sure to switch the direction of rotation with the "Pulse" signal in the "photocopler OFF" state.

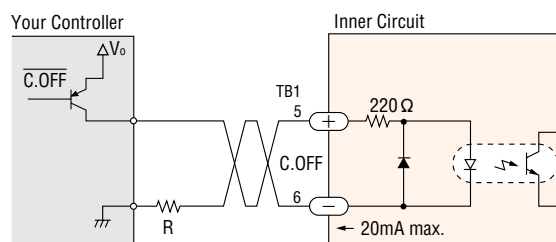
2-pulse Input Mode

Do not input CW pulses and CCW pulses at the same time.

When the "CW Pulse" signal or "CCW Pulse" signal is in the "photocopler ON" state the input of pulses to the other will not rotate the motor normally.

2. C. OFF (All Windings Off) Signal

Input Circuit and Sample Connection

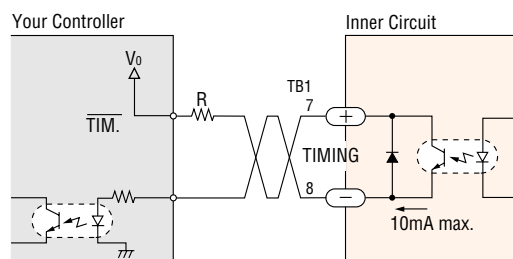


The external resistance R is not needed when V_0 is 5V. When the voltage exceeds 5V, connect the external resistance R to keep input current at 20mA or less.

- If the "C.OFF" signal is in the "photocopler ON" state the current does not flow through the motor and the motor shaft can be turned manually. This function can be used when the motor shaft needs external rotation or manual positioning. Be sure to set to the signal in the "photocopler OFF" state when operating the motor. For regular use, no connections are necessary. The holding torque can be set in proportion to the motor stop current set by the STOP potentiometer.
- Turning the "C.OFF" signal OFF does not change the excitation sequence (phase) of the motor. When the motor shaft is turned manually with C.OFF input, the shaft may turn $\pm 3.6^\circ$ from the shaft position when C.OFF is released.

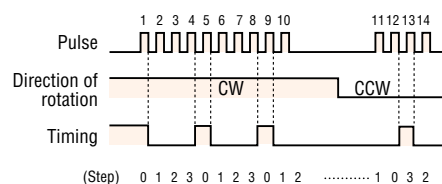
3. TIMING (Excitation Timing) Signal

Output Circuit and Sample Connection



Keep the voltage between 5V and 24V and current at 10mA or less.

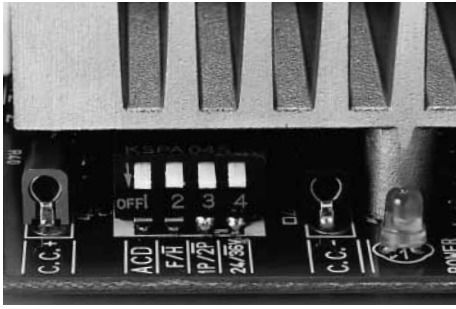
- The "Excitation Timing" (TIMING) signal indicates that the excitation of the motor is in the initial state (STEP 0). Use this signal to detect the home position accurately by matching the mechanical home position of the device and the excitation home position (STEP 0) of the motor.
- The signal is output once each time the excitation sequence returns to (STEP 0) in synchronization with input pulses. The excitation sequence is designed to complete one cycle as the motor shaft rotates 7.2° . Output is as follows:
Full step: 1 output per 4 pulses
Half step: 1 output per 8 pulses



When used as indicated in the sample connection, the signal is in the "photocopler ON" state at STEP 0.

Notes: When the power is turned ON, the excitation sequence is reset to STEP 0 and the timing lamp light up.

Switching and Setting Functions



(1) Automatic Current Cutback

When switch 1 (ACD) is set to ON, the "Automatic Current Cutback" function at motor standstill is active. Approximately 0.1 seconds after input pulses stop, the motor output current is automatically lowered to suppress heat generation in the motor and driver. Generally, the switch should be in the ON position. (If the switch is set to OFF, the "Automatic Current Cutback" function at motor standstill is disabled.)

(2) Step Angle

Standard Type:

When switch 2 (F/H) is set to ON, the driver is set for 1.8°/step (200 steps per revolution). When the switch is set to OFF, the driver is set for 0.9°/step (400 steps per revolution).

High-Resolution Type:

When switch 2 (F/H) is set to ON, the driver is set for 0.9°/step (400 steps per revolution). When the switch is set to OFF, the driver is set for 0.45°/step (800 steps per revolution).

(3) Pulse Input Mode

The driver is designed to function under either of the following two pulse output modes on the user's controller:

- When switch 3 (1P/2P) is set to OFF, the driver is set for the 2-pulse input mode, in which two types of pulse signal (one each for CW and CCW) are used to control the motor.
- When switch 3 (1P/2P) is set to ON, the driver is set for the 1-pulse input mode, in which a pulse signal and a direction of rotation signal are used to control the motor.

(4) Power Supply Voltage

When using a 24V DC power supply, switch 4 (24/36V) should be ON. When using a 36V DC power supply, the switch should be OFF.

Adjusting the Output Current

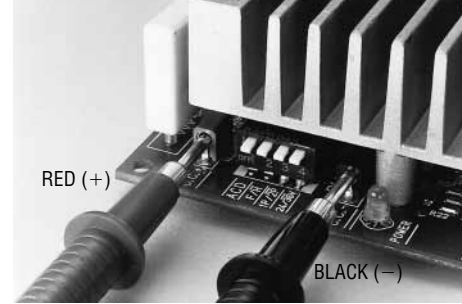
1. Adjustment Method

The rated output current is set at the factory. When it is necessary to change the current setting, follow the procedures described below.

Connecting voltmeter

Insert voltmeter test probes (approximately 2.1mm diameter) as shown below.

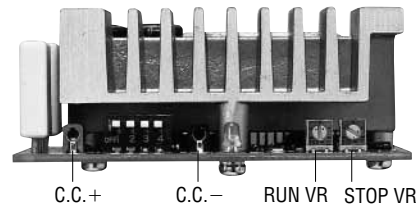
The current value for one phase is equivalent to the voltage shown by the voltmeter. (ex : voltmeter voltage 1V=1A/Phase)



2. Adjusting the Motor Operating Current

To set the "Automatic Current Cutback" function to inactive (SW1:OFF):

- Adjust the motor operating current with the RUN potentiometer. It can be adjusted from 0.3A/phase to the rated value of the driver.
- The motor operating current is set for the rated current at the time of shipping. The RUN potentiometer can be used lower the operating current to reduce temperature rise in the motor/driver, adjust torque margin and reduce vibration.



Note : The motor Run current should be less than the motor rated current.

3. Adjusting The Current At Motor Standstill

To set the "Automatic Current Cutback" function to active (SW1:ON):

- Adjust the current at motor standstill with the STOP potentiometer. It can be adjusted from 25% to 40% of the run operating current (0.3A minimum).
- At the time of shipping, the current at motor standstill is set for 40%. The STOP potentiometer readjusts the current to the value required to produce enough holding torque.

$$\text{Holding Torque (N}\cdot\text{m)} = \frac{\text{Rated Holding Torque (N}\cdot\text{m)} \times \text{Current at Motor Standstill [A]}}{\text{Motor Rated Current [A]}}$$