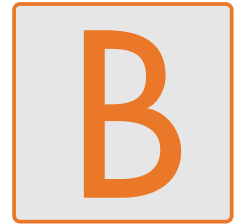


ORIENTAL MOTOR GENERAL CATALOG



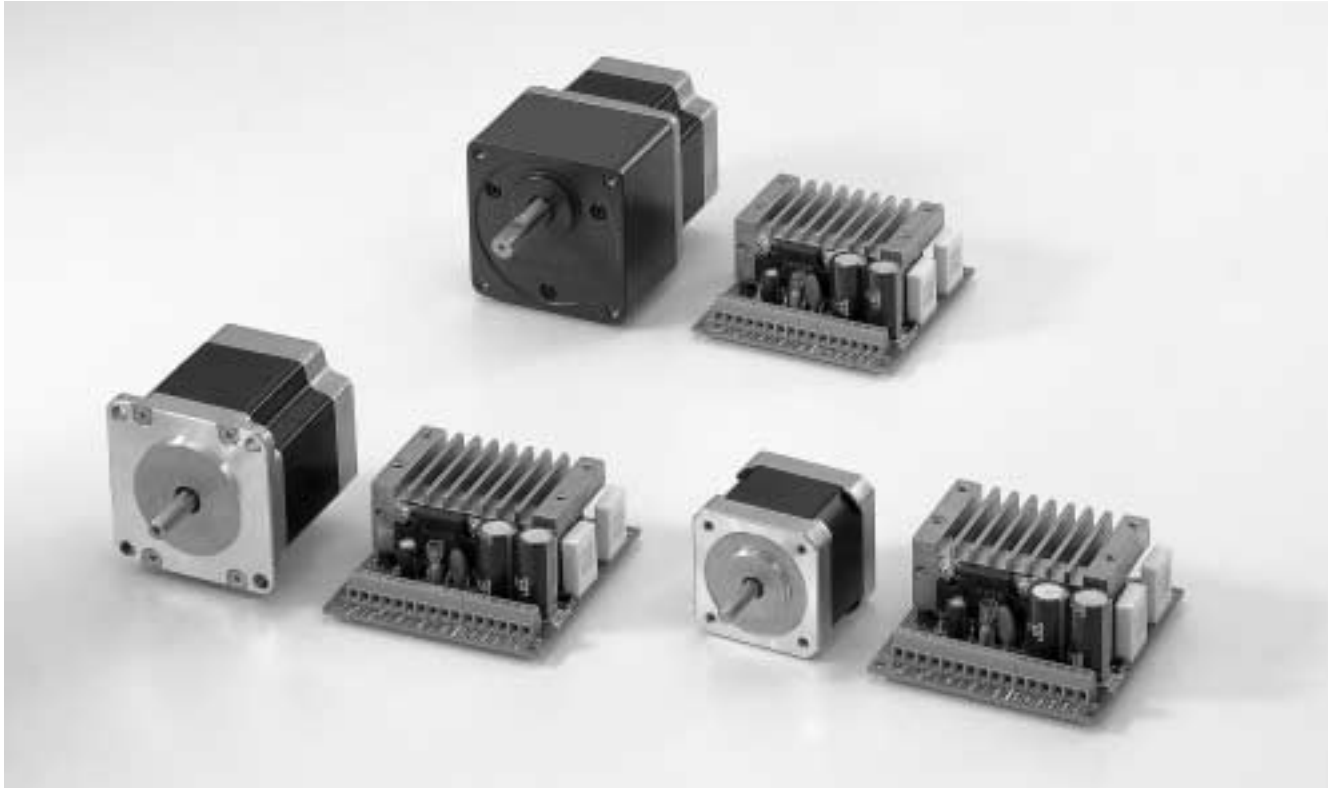
2-PHASE STEPPING MOTOR AND DRIVER PACKAGE

CSK Series

Features	B-234
Standard Type	B-238
High-Resolution Type	B-243
SH Geared Type	B-248
List of Motor and Driver Combinations	B-253
Wiring Diagram	B-254
Switching and Setting Functions	B-255
Adjusting the Output Current	B-255

<i>QSTEP</i>	
UPK•W	5 φ with AC Driver
UPK	
UPK•W	
PMU	
RFK	5 φ with DC Driver
CSK	
PMC	
UMK	2 φ with Driver
CSK	
Controllers	
2 φ Stepping Motors	
Low-Speed Synchronous Motors	
Accessories	

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□ : 22.2 oz-in (0.16N·m) ~ 44.4 oz-in (0.32N·m)

CSK26□ : 54.1 oz-in (0.39N·m) ~ 187 oz-in (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: 3.6:1, 7.2:1, 9:1, 10:1, 18:1, and 36:1.

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 W 2.64 in. (67mm) × D 2.83 in. (72mm) × H 1.22 in. (31mm), 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

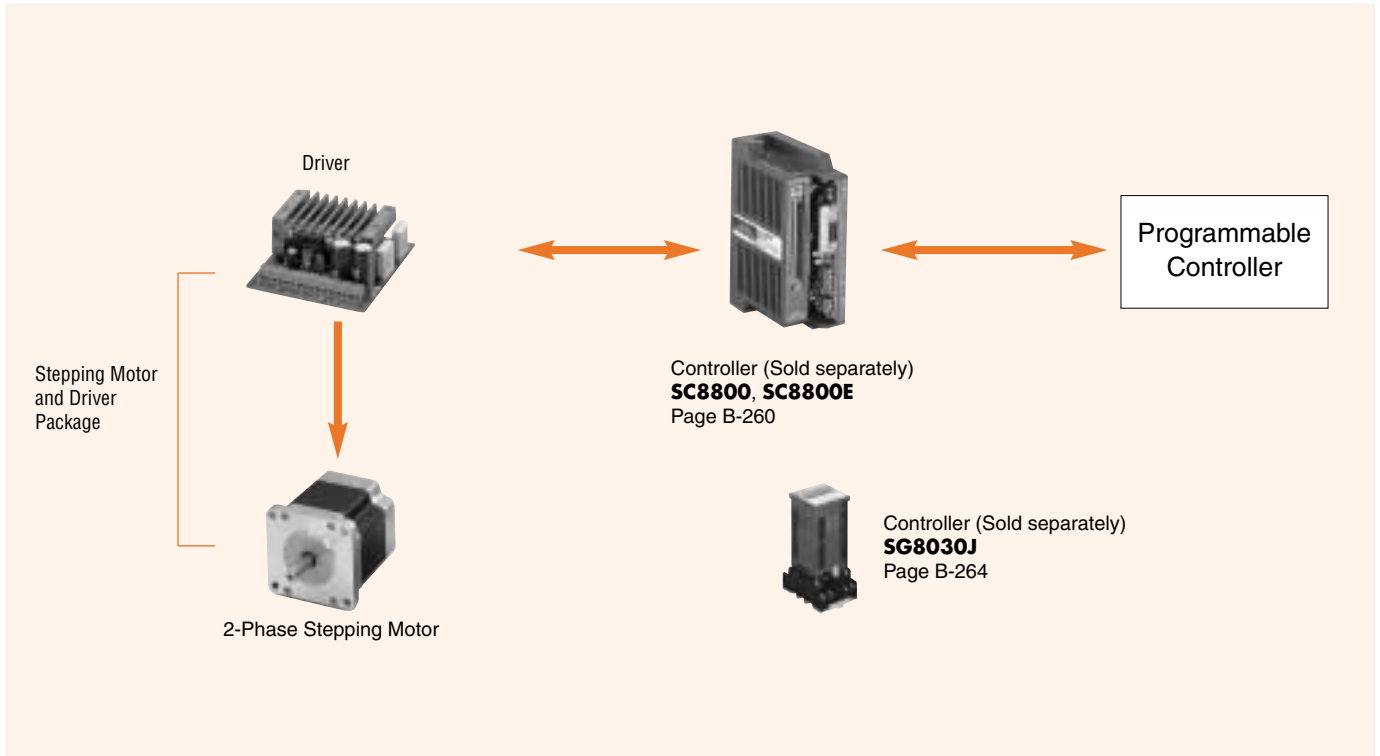
Independent connectors are used for the driver input/output signals and the motor output lines.

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)

Motor Mounting Bracket

Flexible Coupling

Clean Damper

- Motor Mounting Brackets
Page B-298
- Clean Dampers
Page B-300
Effective at suppressing motor vibration and improving performance.
- Flexible Couplings
Page B-301
MC Motor Couplings
- Flexible Couplings
Page B-303
MCL Gearmotor Couplings

Mounting bracket is cannot be fitted to **SH** geared types.

CSK Series Standard Type (Full Step Angle 1.8°)

Page B-238

Two sizes are available: the **CSK24**□ with a 1.65 inch (42mm) square mounting and the **CSK26**□ with a 2.22 inch (56.4mm) square mounting.

Package Model	Maximum Holding Torque	
	oz-in	N·m
CSK243-ATA (Single Shaft)	22.2	0.16
CSK243-BTA (Double Shaft)	22.2	0.16
CSK244-ATA (Single Shaft)	36.1	0.26
CSK244-BTA (Double Shaft)	36.1	0.26
CSK245-ATA (Single Shaft)	44.4	0.32
CSK245-BTA (Double Shaft)	44.4	0.32
CSK264-AT (Single Shaft)	54.1	0.39
CSK264-BT (Double Shaft)	54.1	0.39
CSK266-AT (Single Shaft)	124	0.9
CSK266-BT (Double Shaft)	124	0.9
CSK268-AT (Single Shaft)	187	1.35
CSK268-BT (Double Shaft)	187	1.35



CSK Series High-Resolution Type

(Full Step Angle 0.9°)

Page B-243

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

Two sizes are available: the **CSK24**□**M** with a 1.65 inch (42mm) square mounting and the **CSK26**□**M** with a 2.22 inch (56.4mm) square mounting.

Package Model	Maximum Holding Torque	
	oz-in	N·m
CSK243MATA (Single Shaft)	22.2	0.16
CSK243MBTA (Double Shaft)	22.2	0.16
CSK244MATA (Single Shaft)	36.1	0.26
CSK244MBTA (Double Shaft)	36.1	0.26
CSK245MATA (Single Shaft)	44.4	0.32
CSK245MBTA (Double Shaft)	44.4	0.32
CSK264MAT (Single Shaft)	54.1	0.39
CSK264MBT (Double Shaft)	54.1	0.39
CSK266MAT (Single Shaft)	124	0.9
CSK266MBT (Double Shaft)	124	0.9
CSK268MAT (Single Shaft)	187	1.35
CSK268MBT (Double Shaft)	187	1.35



CSK Series SH Geared Type

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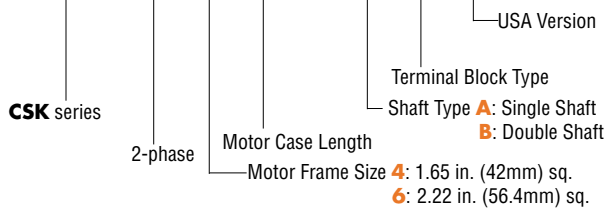
Six gear ratios are available: 3.6:1, 7.2:1, 9:1, 10:1, 18:1 and 36:1. The low ratios allow the gear shaft speed to be reduced without reducing the speed of the motor too much, thus enabling more precise resolution and smoother rotation at low speed.

Package Model	Permissible Torque	
	lb-in	N·m
CSK243ATA-SG3.6 (Single Shaft)	1.73	0.2
CSK243BTA-SG3.6 (Double Shaft)	1.73	0.2
CSK243ATA-SG7.2 (Single Shaft)	3.47	0.4
CSK243BTA-SG7.2 (Double Shaft)	3.47	0.4
CSK243ATA-SG9 (Single Shaft)	4.33	0.5
CSK243BTA-SG9 (Double Shaft)	4.33	0.5
CSK243ATA-SG10 (Single Shaft)	4.86	0.56
CSK243BTA-SG10 (Double Shaft)	4.86	0.56
CSK243ATA-SG18 (Single Shaft)	6.94	0.8
CSK243BTA-SG18 (Double Shaft)	6.94	0.8
CSK243ATA-SG36 (Single Shaft)	6.94	0.8
CSK243BTA-SG36 (Double Shaft)	6.94	0.8
CSK264ATA-SG3.6 (Single Shaft)	8.67	1
CSK264BTA-SG3.6 (Double Shaft)	8.67	1
CSK264ATA-SG7.2 (Single Shaft)	17.3	2
CSK264BTA-SG7.2 (Double Shaft)	17.3	2
CSK264ATA-SG9 (Single Shaft)	21.6	2.5
CSK264BTA-SG9 (Double Shaft)	21.6	2.5
CSK264ATA-SG10 (Single Shaft)	23.4	2.7
CSK264BTA-SG10 (Double Shaft)	23.4	2.7
CSK264ATA-SG18 (Single Shaft)	26	3
CSK264BTA-SG18 (Double Shaft)	26	3
CSK264ATA-SG36 (Single Shaft)	34.7	4
CSK264BTA-SG36 (Double Shaft)	34.7	4



■ PRODUCT NUMBER CODE

CSK 2 4 5 - A T A



■ SPECIFICATIONS STANDARD TYPE (Full Step Angle 1.8°)

Package Model	Single Shaft	CSK243-ATA	CSK244-ATA	CSK245-ATA	CSK264-AT	CSK266-AT	CSK268-AT
	Double Shaft	CSK243-BTA	CSK244-BTA	CSK245-BTA	CSK264-BT	CSK266-BT	CSK268-BT
Maximum Holding Torque	oz-in N · m	22.2 0.16	36.1 0.26	44.4 0.32	54.1 0.39	124 0.9	187 1.35
Rotor Inertia	oz-in ² kg · m ²	0.192 35×10 ⁻⁷	0.296 54×10 ⁻⁷	0.372 68×10 ⁻⁷	0.66 120×10 ⁻⁷	1.64 300×10 ⁻⁷	2.63 480×10 ⁻⁷
Rated Current	A/phase	0.95	1.2		2		
Basic Step Angle	1.8°						
Insulation Class	Class B [266°F (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 (2 phase excitation): 1.8°/step ● Half Step (1-2 phase excitation): 0.9°/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 step command signal at 2-pulse input mode) Pulse width: 5μs minimum, Pulse rise/fall: 2μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	● Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal Photocoupler ON: CW, Photocoupler OFF: CCW (CCW step command signal at 2-pulse input mode, Pulse width: 5μs minimum, Pulse rise/fall: 2μs 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 switch 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, Step angle switch, Pulse input mode switch, Power supply voltage switch						
Driver Cooling Method	Natural Ventilation						
Weight (Mass)	Motor lb. (kg)	0.47 (0.21)	0.6 (0.27)	0.78 (0.35)	1 (0.45)	1.55 (0.7)	2.21 (1)
	Driver lb. (kg)	0.29 (0.13)					
Insulation Resistance	Motor	100MΩ minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.					
Dielectric Strength	Motor	Sufficient to withstand 1.0kV (0.5kV for CSK24 □ type), 60Hz applied between the motor coils and casing for one minute, under normal ambient temperature and humidity.					
Ambient Temperature Range	Motor	+14°F~+122°F (-10°C~+50°C)					
	Driver	+32°F~+104°F (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 power source input current value represents the maximum current. (The input current varies according to the pulse frequency.)

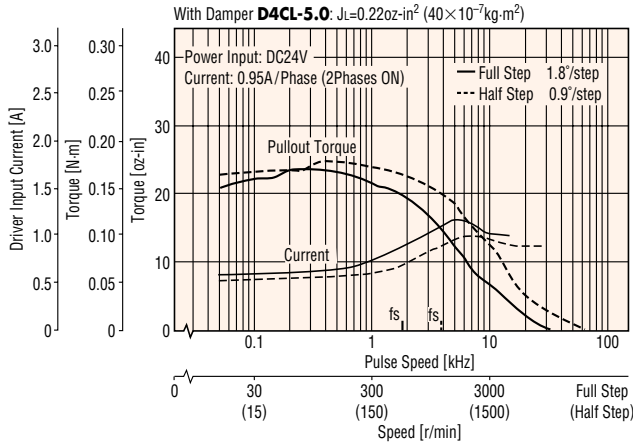
* Responds up to approximately 10 kHz with a pulse duty of 50%. When using it at higher speeds, narrow the pulse width (shorten the photocoupler's ON time.)

SPEED vs. TORQUE CHARACTERISTICS

fs : Maximum Starting Pulse Rate

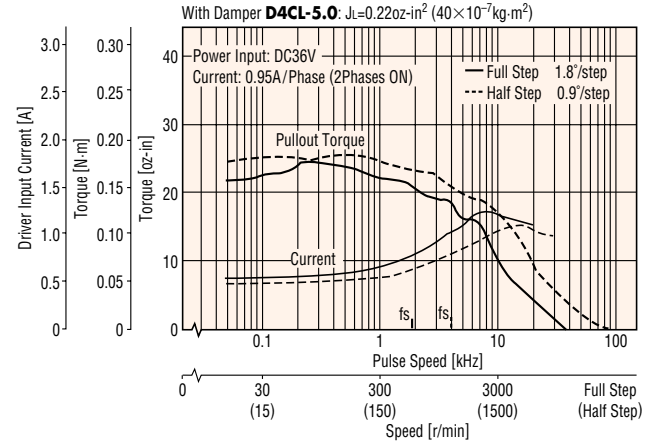
● DC24V

CSK243-BTA

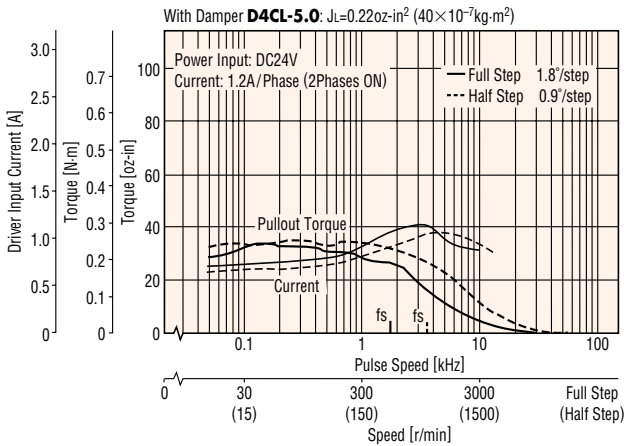


● DC36V

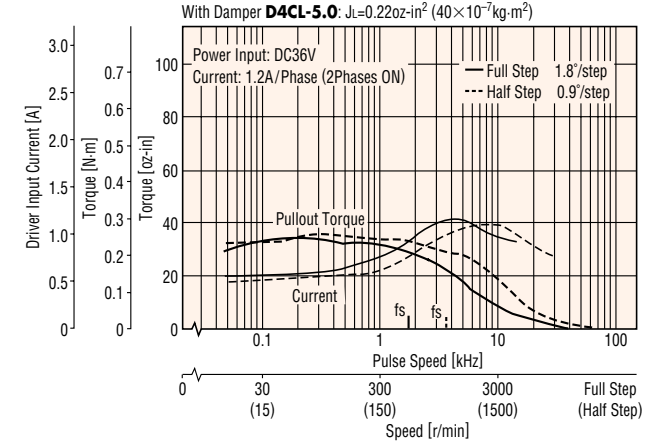
CSK243-BTA



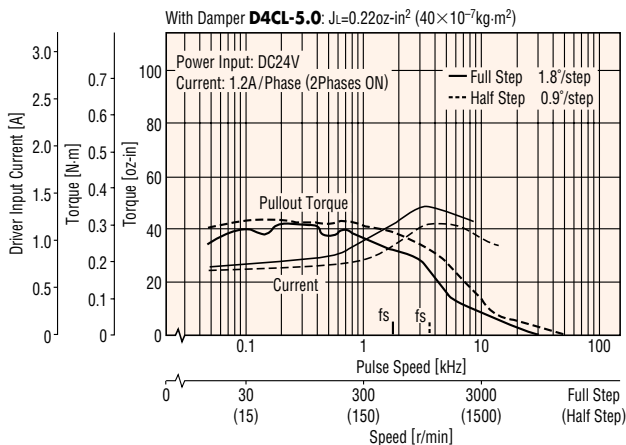
CSK244-BTA



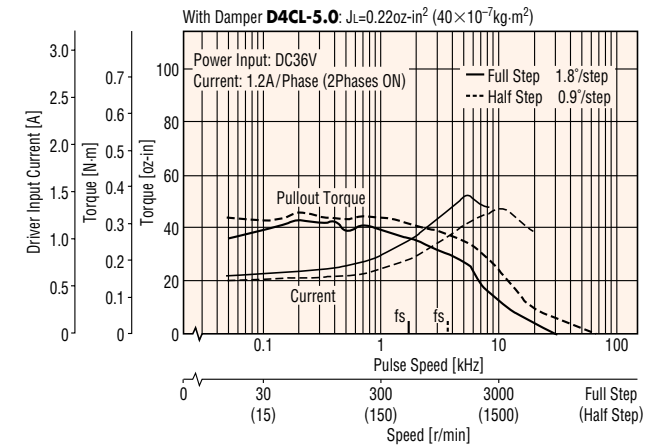
CSK244-BTA



CSK245-BTA



CSK245-BTA



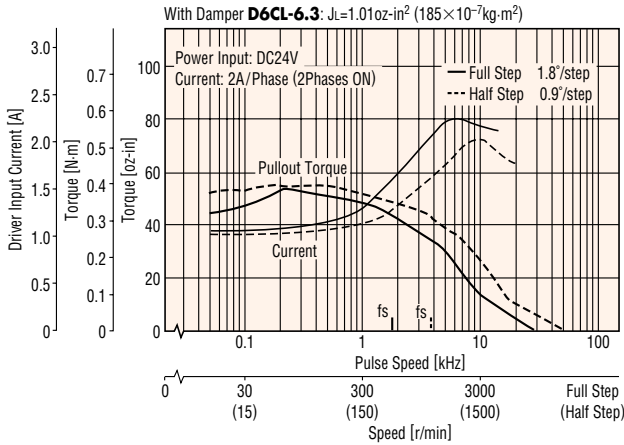
Note:

- 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 212°F (100°C).
- 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%.

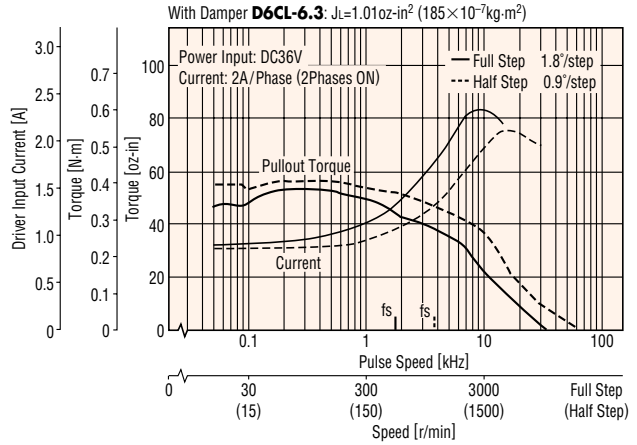
SPEED vs. TORQUE CHARACTERISTICS

fs : Maximum Starting Pulse Rate

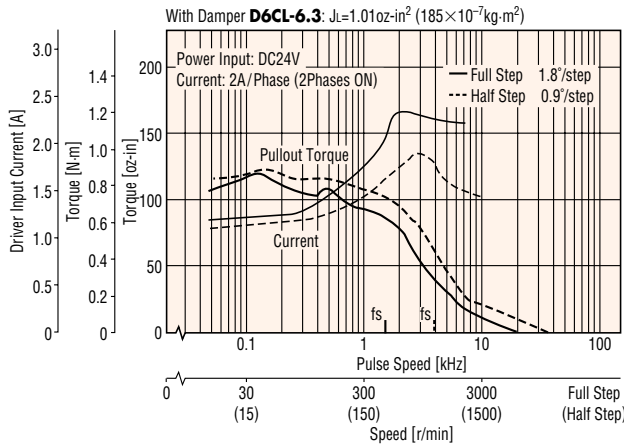
DC24V CSK264-BT



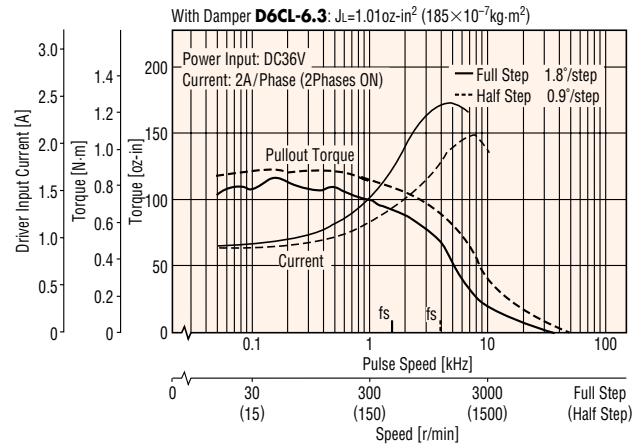
DC36V CSK264-BT



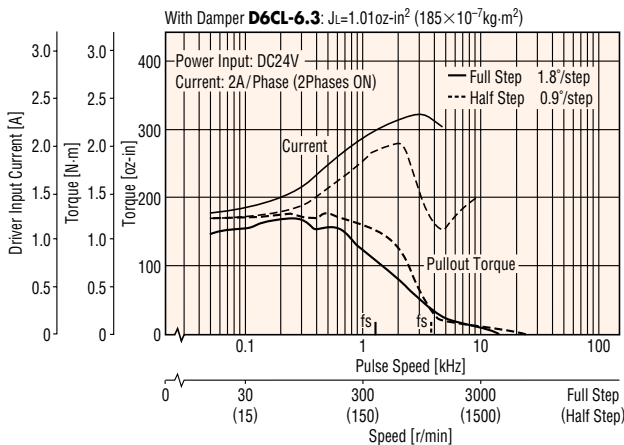
CSK266-BT



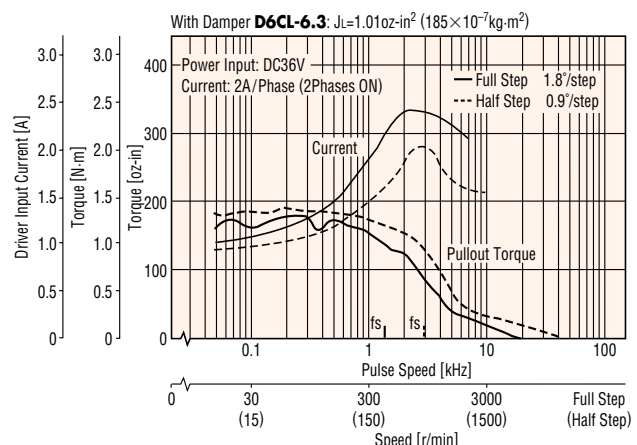
CSK266-BT



CSK268-BT



CSK268-BT



Note:

- 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 212°F (100°C).
- 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%.

DIMENSIONS scale 1/4, unit = inch (mm)

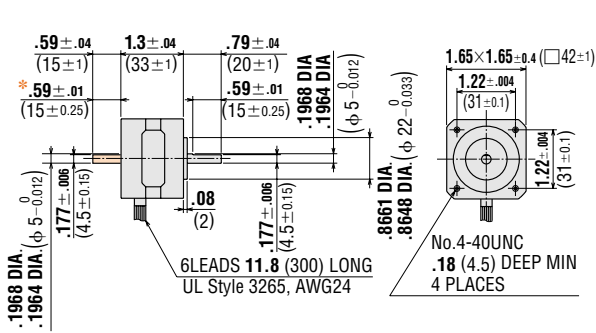
Motor

CSK243-ATA (Single shaft)

Motor Model: PK243-01AA Weight 0.47lb. (Mass 0.21kg)

CSK243-BTA (Double shaft)

Motor Model: PK243-01BA Weight 0.47lb. (Mass 0.21kg)



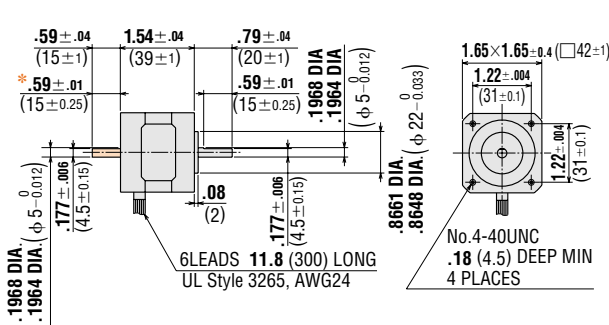
* .59 ± .01 (15 ± 0.25) indicates the length of milling on motor shaft.

CSK244-ATA (Single shaft)

Motor Model: PK244-01AA Weight 0.61lb. (Mass 0.27kg)

CSK244-BTA (Double shaft)

Motor Model: PK244-01BA Weight 0.61lb. (Mass 0.27kg)



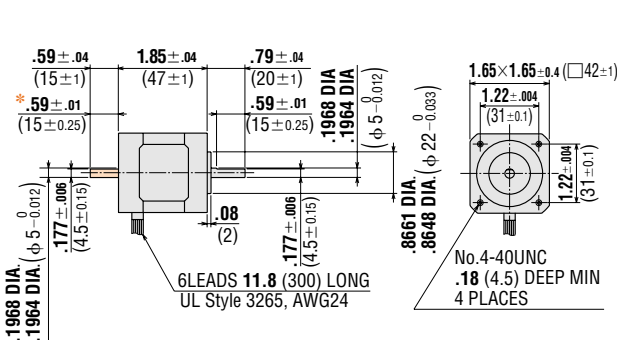
* .59 ± .01 (15 ± 0.25) indicates the length of milling on motor shaft.

CSK245-ATA (Single shaft)

Motor Model: PK245-01AA Weight 0.78lb. (Mass 0.35kg)

CSK245-BTA (Double shaft)

Motor Model: PK245-01BA Weight 0.78lb. (Mass 0.35kg)



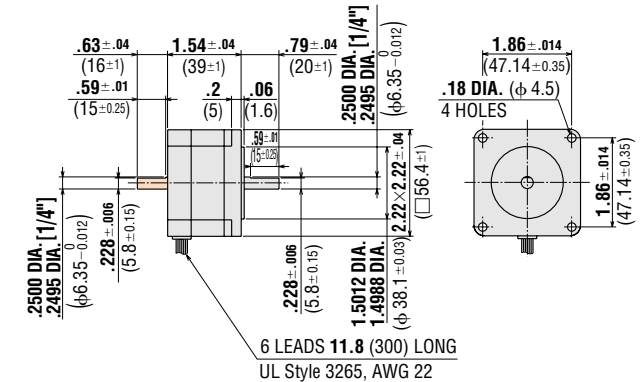
* .59 ± .01 (15 ± 0.25) indicates the length of milling on motor shaft.

CSK264-AT (Single shaft)

Motor Model: PK264-02A Weight 1lb. (Mass 0.45kg)

CSK264-BT (Double shaft)

Motor Model: PK264-02B Weight 1lb. (Mass 0.45kg)

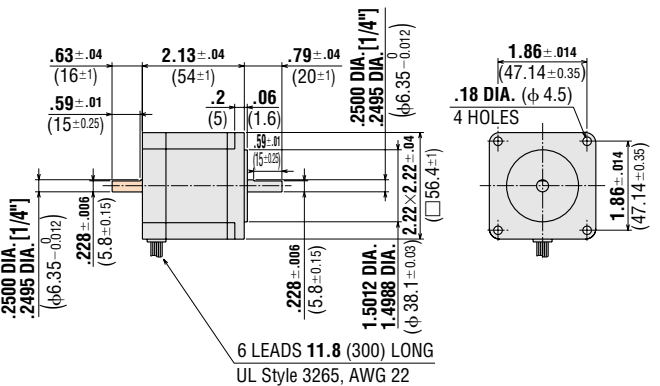


CSK266-AT (Single shaft)

Motor Model: PK266-02A Weight 1.55lb. (Mass 0.7kg)

CSK266-BT (Double shaft)

Motor Model: PK266-02B Weight 1.55lb. (Mass 0.7kg)

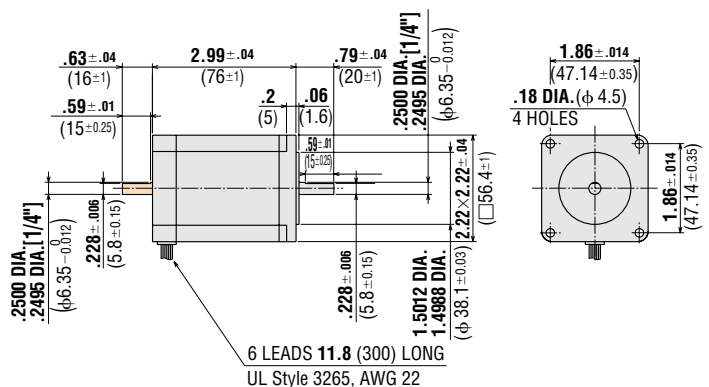


CSK268-AT (Single shaft)

Motor Model: PK268-02A Weight 2.21lb. (Mass 1kg)

CSK268-BT (Double shaft)

Motor Model: PK268-02B Weight 2.21lb. (Mass 1kg)



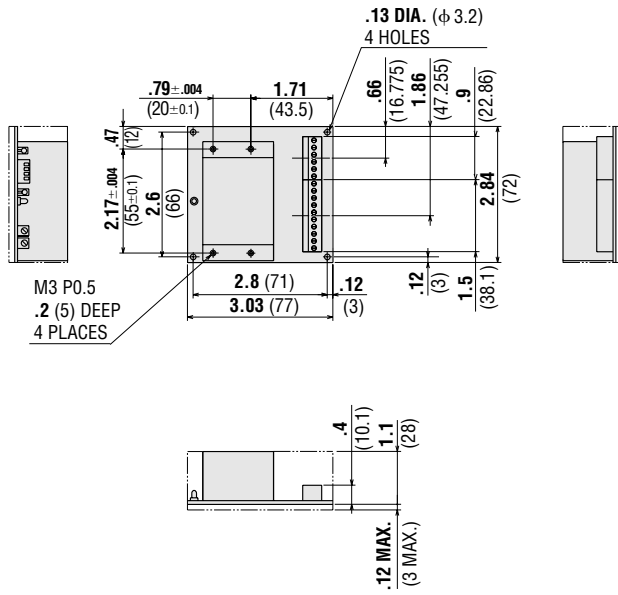
• These external appearance drawings are for double shaft models. For a single shaft, ignore the colored areas.

See page B-36 for information on motor installation.

■ **DIMENSIONS** scale 1/4, unit = inch (mm)

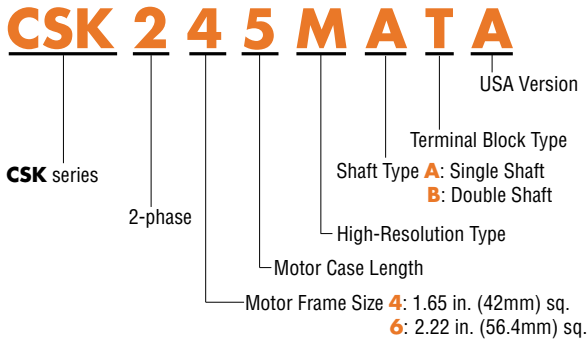
● **Driver**

Driver: CSD2109-T (For **CSK243** model)
 CSD2112-T (For **CSK244** and **CSK245** models)
 CSD2120-T (For **CSK264**, **CSK266** and **CSK268** models)
 Weight: 0.29lb. (Mass 0.13kg)



See page B-38 for information on driver installation.

■ PRODUCT NUMBER CODE



■ SPECIFICATIONS HIGH-RESOLUTION TYPE (Full Step Angle 0.9°)

Package Model	Single Shaft	CSK243MATA	CSK244MATA	CSK245MATA	CSK264MAT	CSK266MAT	CSK268MAT
	Double Shaft	CSK243MBTA	CSK244MBTA	CSK245MBTA	CSK264MBT	CSK266MBT	CSK268MBT
Maximum Holding Torque	oz-in	22.2	36.1	44.4	54.1	124	187
	N · m	0.16	0.26	0.32	0.39	0.9	1.35
Rotor Inertia	oz-in ²	0.192	0.296	0.372	0.66	1.64	2.63
	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 [266°F (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 (2 phase excitation): 0.9°/step ● Half Step (1-2 phase excitation): 0.45°/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 step command signal at 2-pulse input mode) Pulse width: 5μs minimum, Pulse rise/fall: 2μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	● Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal Photocoupler ON: CW, Photocoupler OFF: CCW (CCW step command signal at 2-pulse input mode, Pulse width: 5μs minimum, Pulse rise/fall: 2μs 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 switch 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, Step angle switch, Pulse input mode switch, Power supply voltage switch						
Driver Cooling Method	Natural Ventilation						
Weight (Mass)	Motor lb. (kg)	0.47 (0.21)	0.6 (0.27)	0.78 (0.35)	1 (0.45)	1.55 (0.7)	2.21 (1)
	Driver lb. (kg)	0.29 (0.13)					
Insulation Resistance	Motor	100MΩ minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.					
Dielectric Strength	Motor	Sufficient to withstand 1.0kV (0.5kV for CSK24□M type), 60Hz applied between the motor coils and casing for one minute, under normal ambient temperature and humidity.					
Ambient Temperature Range	Motor	+14°F~+122°F (-10°C~+50°C)					
	Driver	+32°F~+104°F (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%.

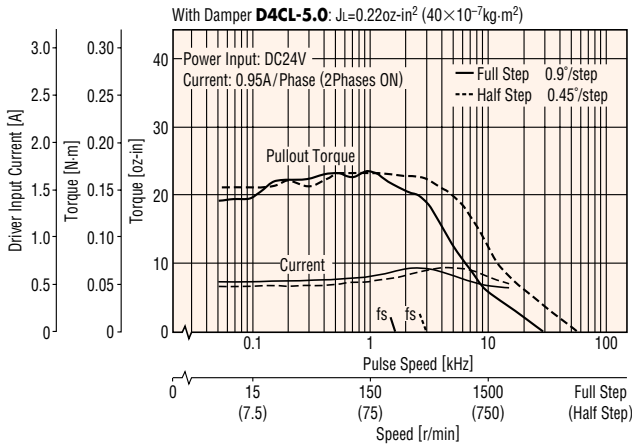
● The power source input current value represents the maximum current. (The input current varies according to the pulse frequency.)

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

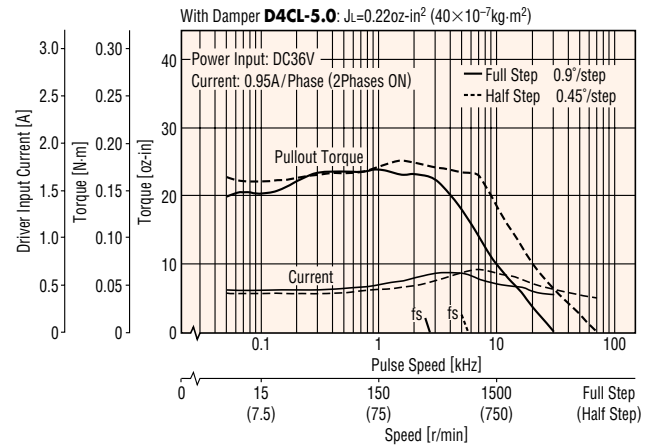
SPEED vs. TORQUE CHARACTERISTICS

fs : Maximum Starting Pulse Rate

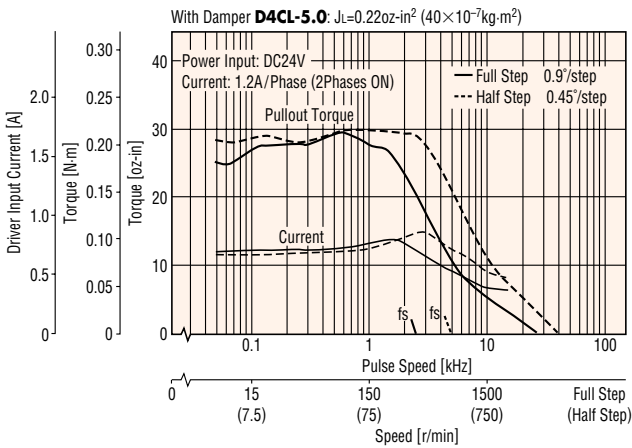
DC24V CSK243MBTA



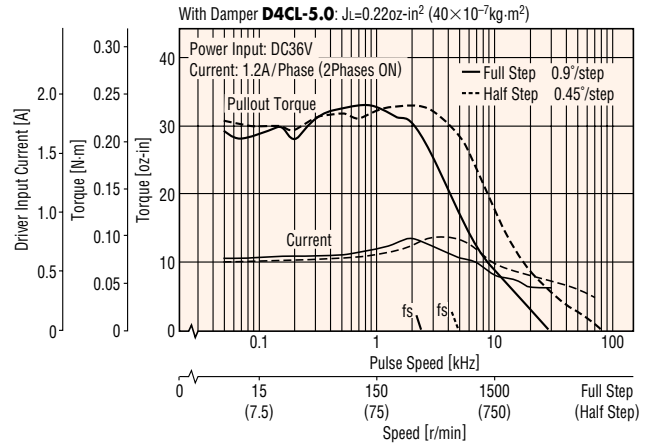
DC36V CSK243MBTA



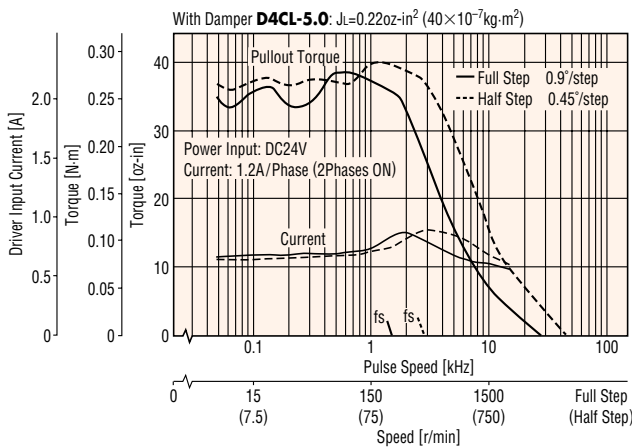
CSK244MBTA



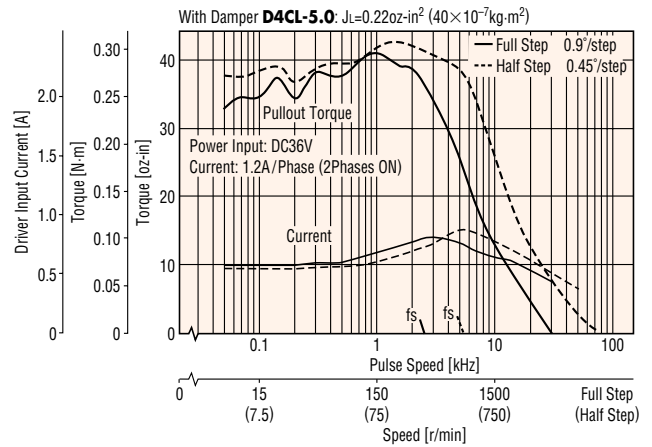
CSK244MBTA



CSK245MBTA



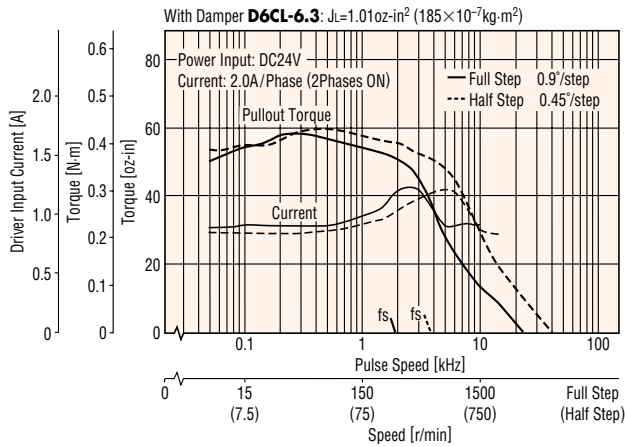
CSK245MBTA



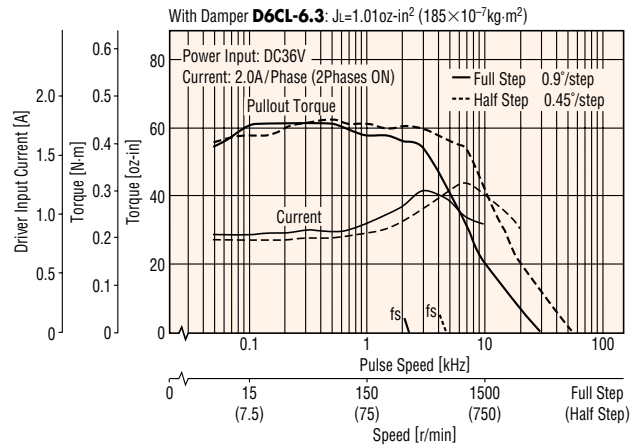
Note:

- 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 212°F (100°C).
- 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%.

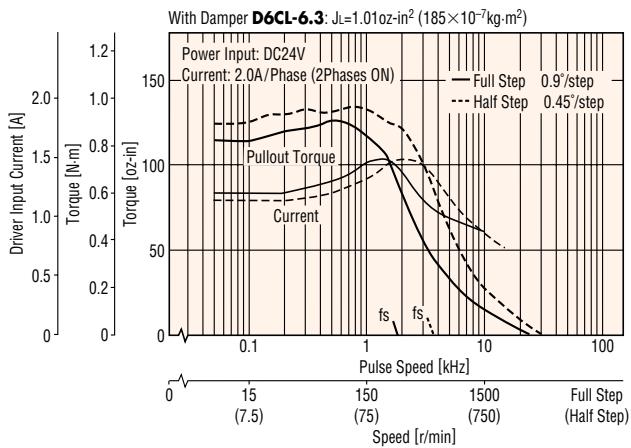
●DC24V
CSK264MBT



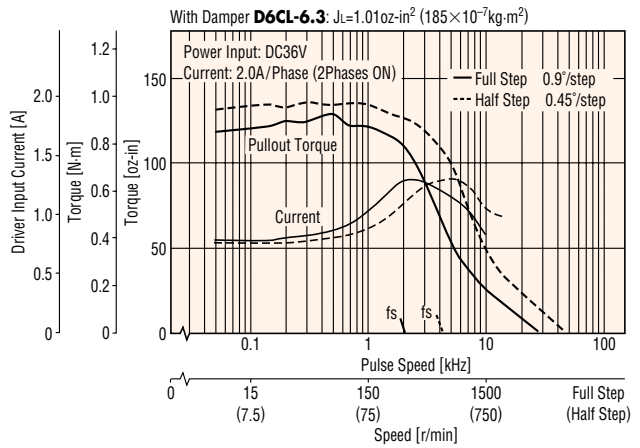
●DC36V
CSK264MBT



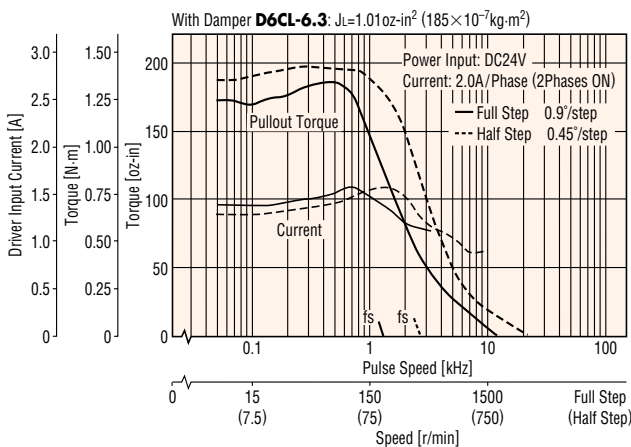
CSK266MBT



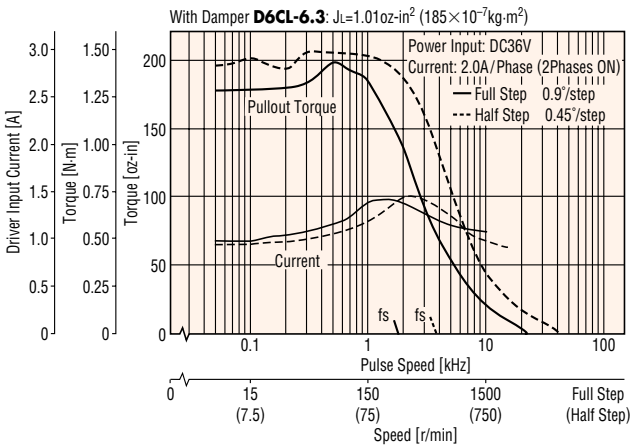
CSK266MBT



CSK268MBT



CSK268MBT



Note:

- 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 212°F (100°C).
- 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%.

DIMENSIONS scale 1/4, unit = inch (mm)

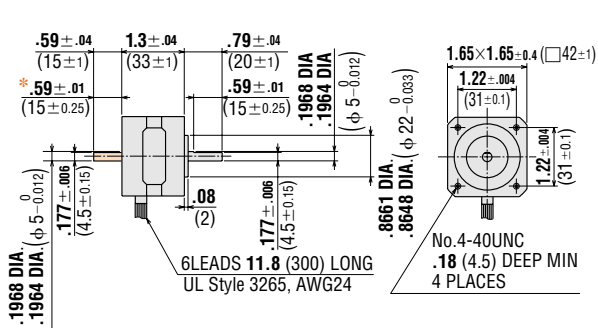
Motor

CSK243MATA (Single shaft)

Motor Model: PK243MAA Weight 0.47lb. (Mass 0.21kg)

CSK243MBTA (Double shaft)

Motor Model: PK243MBA Weight 0.47lb. (Mass 0.21kg)



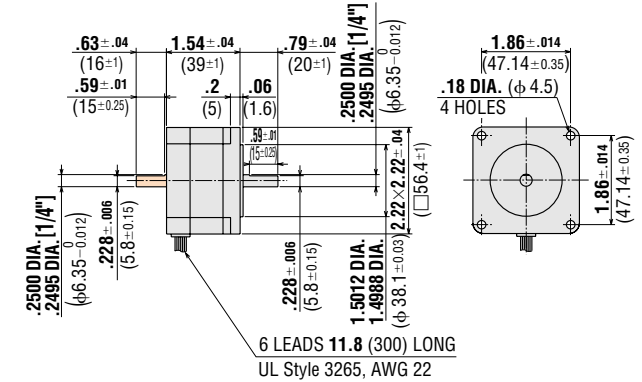
* .59 ± .01 (15 ± 0.25) indicates the length of milling on motor shaft.

CSK264MAT (Single shaft)

Motor Model: PK264MA Weight 1lb. (Mass 0.45kg)

CSK264MBT (Double shaft)

Motor Model: PK264MB Weight 1lb. (Mass 0.45kg)

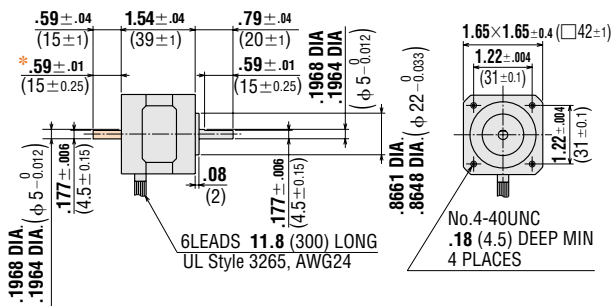


CSK244MATA (Single shaft)

Motor Model: PK244MAA Weight 0.6lb. (Mass 0.27kg)

CSK244MBTA (Double shaft)

Motor Model: PK244MBA Weight 0.6lb. (Mass 0.27kg)



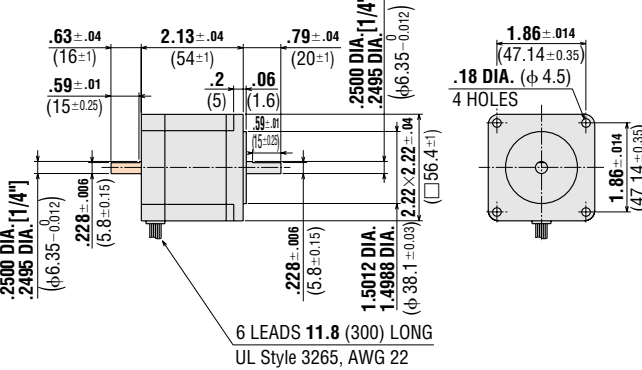
* .59 ± .01 (15 ± 0.25) indicates the length of milling on motor shaft.

CSK266MAT (Single shaft)

Motor Model: PK266MA Weight 1.55lb. (Mass 0.7kg)

CSK266MBT (Double shaft)

Motor Model: PK266MB Weight 1.55lb. (Mass 0.7kg)

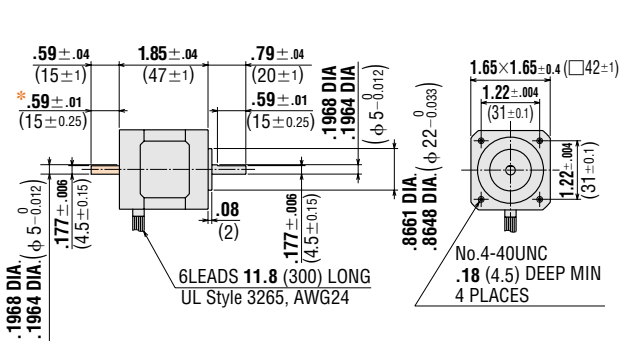


CSK245MATA (Single shaft)

Motor Model: PK245MAA Weight 0.78lb. (Mass 0.35kg)

CSK245MBTA (Double shaft)

Motor Model: PK245MBA Weight 0.78lb. (Mass 0.35kg)



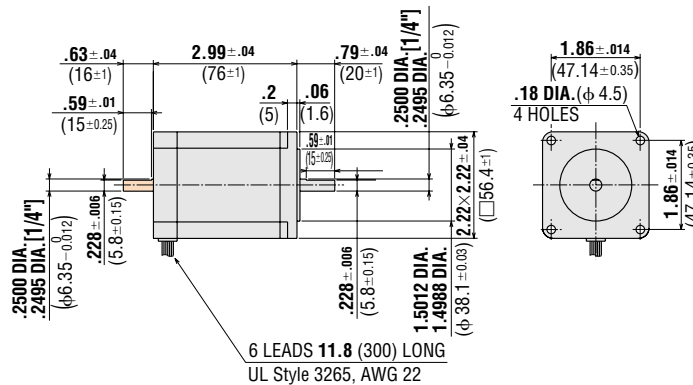
* .59 ± .01 (15 ± 0.25) indicates the length of milling on motor shaft.

CSK268MAT (Single shaft)

Motor Model: PK268MA Weight 2.21lb. (Mass 1kg)

CSK268MBT (Double shaft)

Motor Model: PK268MB Weight 2.21lb. (Mass 1kg)

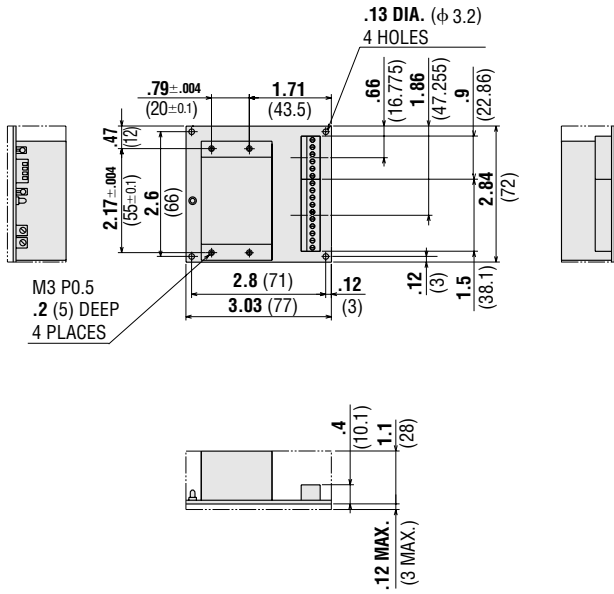


• These external appearance drawings are for double shaft models. For a single shaft, ignore the colored areas.

See page B-36 for information on motor installation.

● Driver

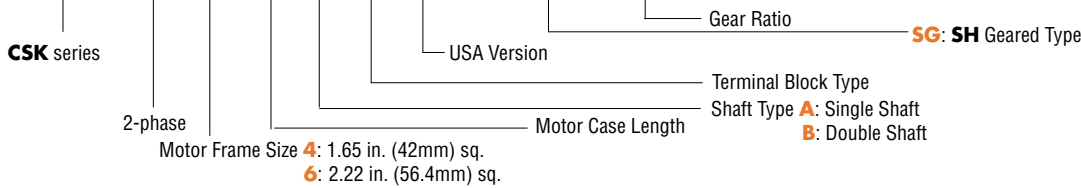
Driver: CSD2109-T (For **CSK243M** model)
 CSD2112-T (For **CSK244M** and **CSK245M** models)
 CSD2120-T (For **CSK264M**, **CSK266M** and **CSK268M** models)
 Weight: 0.29lb. (Mass 0.13kg)



See page B-38 for information on driver installation.

■ PRODUCT NUMBER CODE

CSK 2 6 4 A T A - SG 10



■ SPECIFICATIONS SH GEARED TYPE

Package Model	Single Shaft	CSK243ATA-SG3.6	CSK243ATA-SG7.2	CSK243ATA-SG9	CSK243ATA-SG10	CSK243ATA-SG18	CSK243ATA-SG36
	Double Shaft	CSK243BTA-SG3.6	CSK243BTA-SG7.2	CSK243BTA-SG9	CSK243BTA-SG10	CSK243BTA-SG18	CSK243BTA-SG36
Maximum Holding Torque	lb-in N · m	1.73 0.2	3.47 0.4	4.33 0.5	4.86 0.56	6.94 0.8	6.94 0.8
Rotor Inertia	oz-in ² kg · m ²	0.192 35×10 ⁻⁷					
Rated Current	A/phase	0.95					
Basic Step Angle		0.5°	0.25°	0.2°	0.18°	0.1°	0.05°
Gear Ratio		3.6:1	7.2:1	9:1	10:1	18:1	36:1
Permissible Torque	lb-in N · m	1.73 0.2	3.47 0.4	4.33 0.5	4.86 0.56	6.94 0.8	6.94 0.8
Permissible Thrust Load	lb. (N)	3.3 (15)					
Permissible Overhung Load	lb. (N)	4.4 (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 [266°F (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 step command signal at 2-pulse input mode) Pulse width: 5μs minimum, Pulse rise/fall: 2μs maximum* Motor moves when the photocoupler state changes from ON to OFF.					
	● Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal, Photocoupler ON: CW, Photocoupler OFF: CCW (CCW step command signal at 2-pulse input mode, Pulse width: 5μs minimum, Pulse rise/fall: 2μs 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 switch 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, Step angle switch, Pulse input mode switch, Power supply voltage switch					
Driver Cooling Method		Natural Ventilation					
Weight (Mass)	Motor lb. (kg)	0.78 (0.35)					
	Driver lb. (kg)	0.29 (0.13)					
Insulation Resistance	Motor	100MΩ minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.					
Dielectric Strength	Motor	Sufficient to withstand 0.5kV, 60Hz applied between the motor coils and casing for one minute, under normal ambient temperature and humidity.					
Ambient Temperature Range	Motor	+14°F~+122°F (-10°C~+50°C)					
	Driver	+32°F~+104°F (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 power source input current value represents the maximum current. (The input current varies according to the pulse frequency.)

● 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 0.39in. (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 ratio 3.6:1, 7.2:1, 9:1 and 10:1. They are opposite for 18:1 and 36:1 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.)

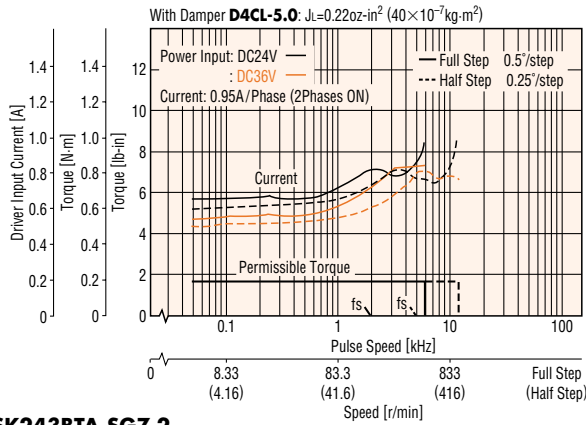
Package Model	Single Shaft	CSK264ATA-SG3.6	CSK264ATA-SG7.2	CSK264ATA-SG9	CSK264ATA-SG10	CSK264ATA-SG18	CSK264ATA-SG36	
	Double Shaft	CSK264BTA-SG3.6	CSK264BTA-SG7.2	CSK264BTA-SG9	CSK264BTA-SG10	CSK264BTA-SG18	CSK264BTA-SG36	
Maximum Holding Torque	lb-in N·m	8.67 1	17.3 2	21.6 2.5	23.4 2.7	26 3	34.7 4	
Rotor Inertia	oz-in ² kg·m ²	0.66		120×10 ⁻⁷				
Rated Current	A/phase	2.0						
Basic Step Angle		0.5°	0.25°	0.2°	0.18°	0.1°	0.05°	
Gear Ratio		3.6:1	7.2:1	9:1	10:1	18:1	36:1	
Permissible Torque	lb-in N·m	8.67 1	17.3 2	21.6 2.5	23.4 2.7	26 3	34.7 4	
Permissible Thrust Load	lb. (N)	6.61 (30)						
Permissible Overhung Load	lb. (N)	11 (50)				26.4 (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 [266°F (130°C)]						
Power Source		DC24V±10% 2.8A Maximum or DC36V±10% 2.8A Maximum						
Output Current	A/phase	2.0						
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 step command signal at 2-pulse input mode) Pulse width: 5μs minimum, Pulse rise/fall: 2μs maximum* Motor moves when the photocoupler state changes from ON to OFF.						
	● Rotation Direction Signal (CCW Pulse Signal)	Rotation direction signal, Photocoupler ON: CW, Photocoupler OFF: CCW (CCW step command signal at 2-pulse input mode, Pulse width: 5μs minimum, Pulse rise/fall: 2μs 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 switch 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, Step angle switch, Pulse input mode switch, Power supply voltage switch						
Driver Cooling Method		Natural Ventilation						
Weight (Mass)	Motor lb. (kg)	1.66 (0.75)						
	Driver lb. (kg)	0.29 (0.13)						
Insulation Resistance	Motor	100MΩ minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.						
Dielectric Strength	Motor	Sufficient to withstand 1.0kV, 60Hz applied between the motor coils and casing for one minute, under normal ambient temperature and humidity.						
Ambient Temperature Range	Motor	+14°F~+122°F (-10°C~+50°C)						
	Driver	+32°F~+104°F (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 power source input current value represents the maximum current. (The input current varies according to the pulse frequency.)
- 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 0.39in. (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 ratio 3.6:1, 7.2:1, 9:1 and 10:1. They are opposite for 18:1 and 36:1 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.)

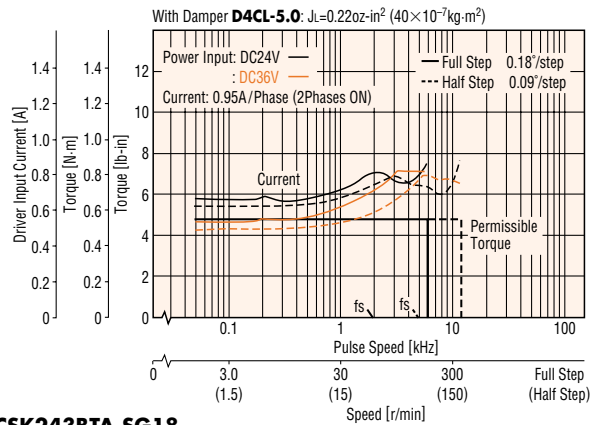
SPEED vs. TORQUE CHARACTERISTICS

fs : Maximum Starting Pulse Rate

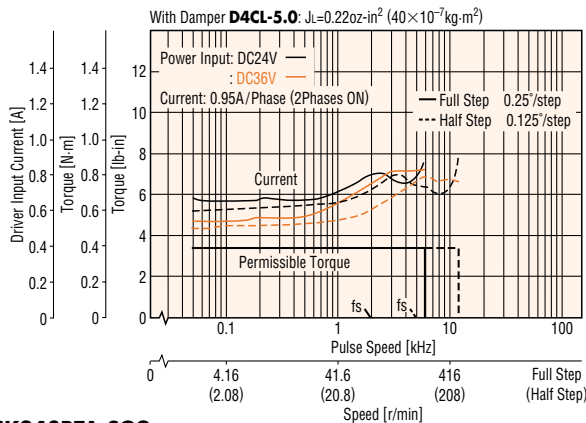
CSK243BTA-SG3.6



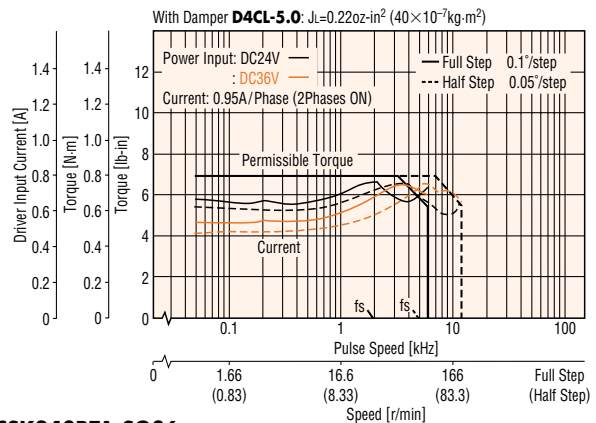
CSK243BTA-SG10



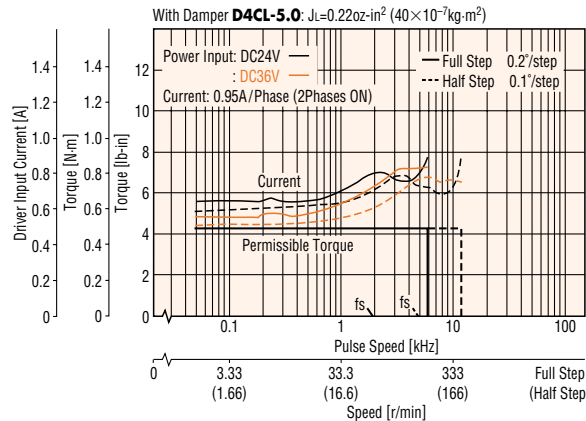
CSK243BTA-SG7.2



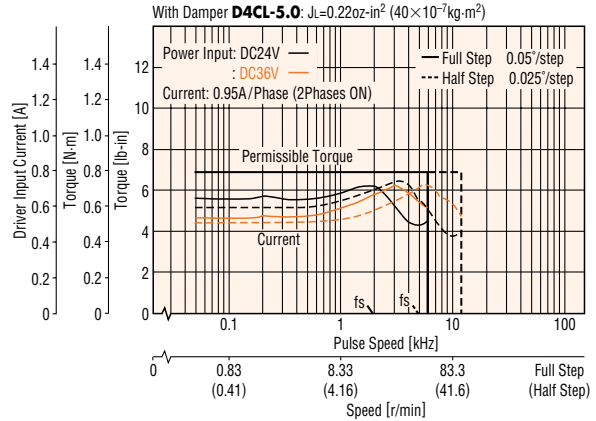
CSK243BTA-SG18



CSK243BTA-SG9



CSK243BTA-SG36



Note:

- 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 212°F (100°C).
- 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:

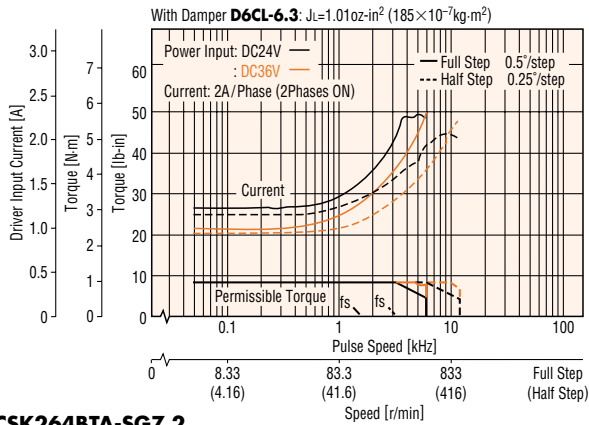
1. Do not exceed the maximum permissible torque:

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.

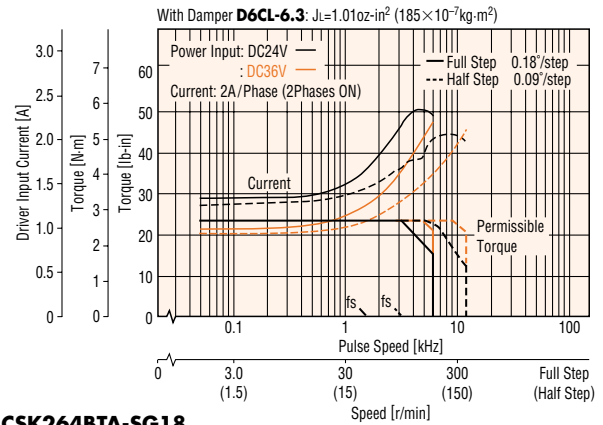
2. Do not exceed the permissible speed range:

Do not exceed the maximum output speed of the gearhead indicated in the specifications on page B-248, 249. The speed affects the life of the gearhead. Be sure to use the gear unit within the maximum permissible speed range.

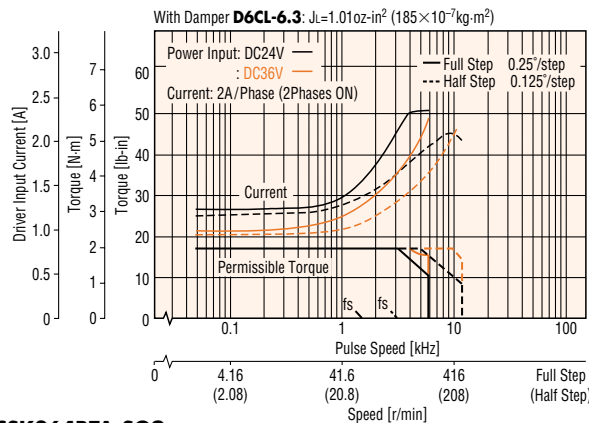
CSK264BTA-SG3.6



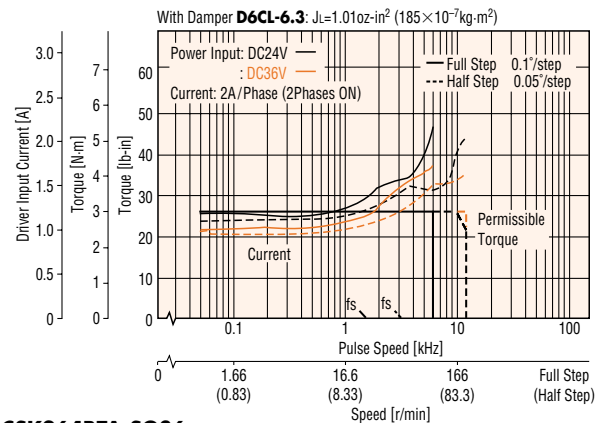
CSK264BTA-SG10



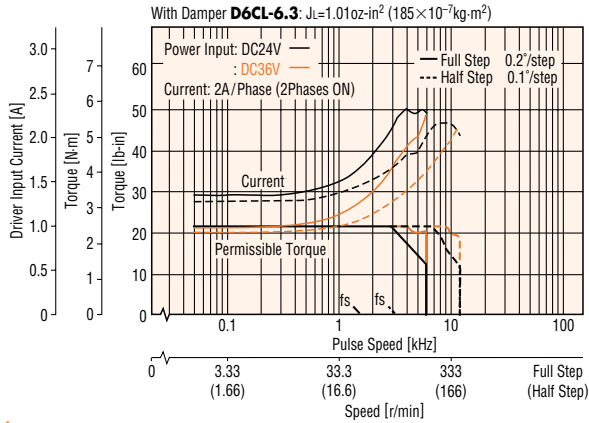
CSK264BTA-SG7.2



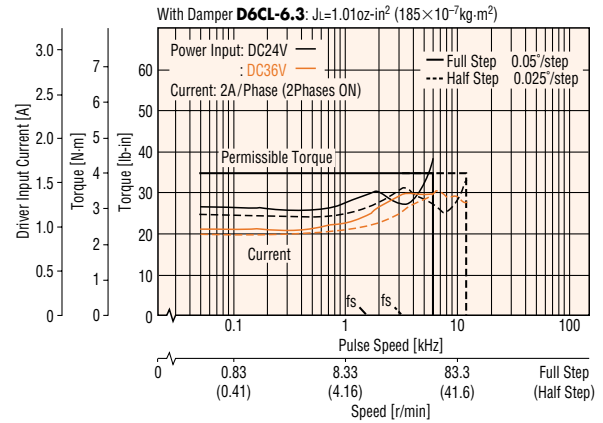
CSK264BTA-SG18



CSK264BTA-SG9



CSK264BTA-SG36



Note:

- 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 212°F (100°C).
- 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. Typical backlash amount is 1-2 degrees.

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 - 3.6:1, 7.2:1, 9:1 or 10:1 - Same as motor shaft
 Gear ratio - 18:1 or 36:1 - Opposite of motor shaft

DIMENSIONS scale 1/4, unit = inch (mm)

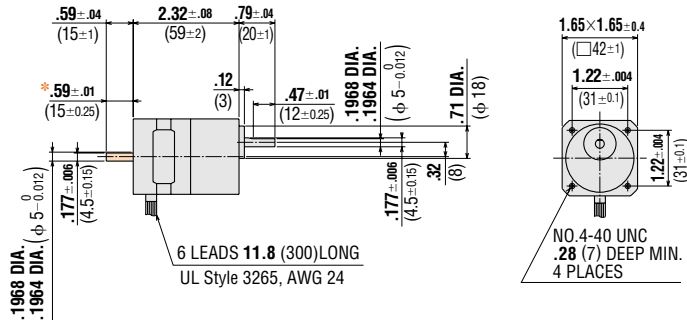
Motor

CSK243ATA-SG (Single shaft)

Motor Model: PK243A1A-SG Weight 0.78lb. (Mass 0.35kg)

CSK243BTA-SG (Double shaft)

Motor Model: PK243B1A-SG Weight 0.78lb. (Mass 0.35kg)



- Screws (included)
4-No. 4-40 UNC. length .39 (10)

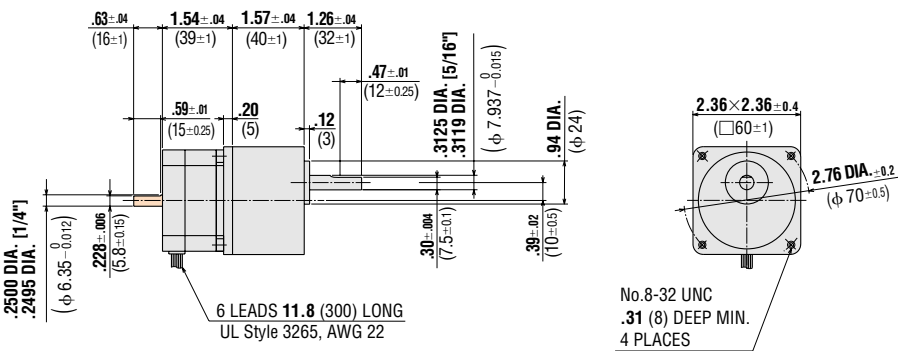
* .59 ± .01 (15 ± 0.25) indicates the length of milling on motor shaft.

CSK264ATA-SG (Single shaft)

Motor Model: PK264A2A-SG Weight 1.66lb. (Mass 0.75kg)

CSK264BTA-SG (Double shaft)

Motor Model: PK264B2A-SG Weight 1.66lb. (Mass 0.75kg)



- Screws (included)
4-No. 8-32 UNC. length .59 (15)

● These external appearance drawings are for double shaft models. For a single shaft, ignore the colored areas.

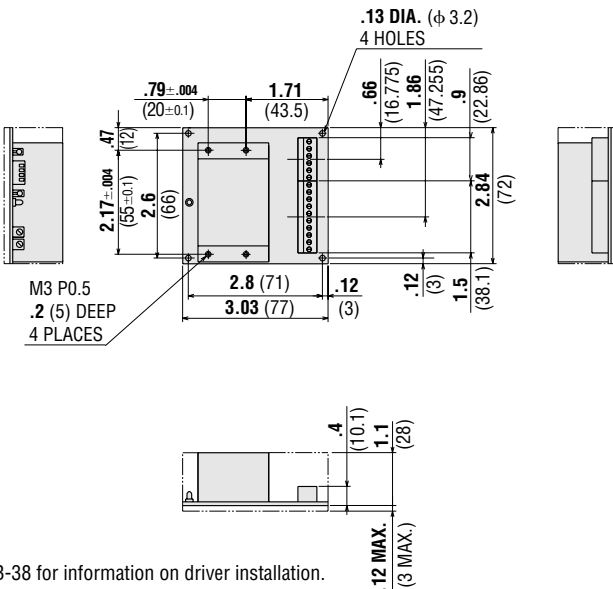
See page B-36 for information on motor installation.

Driver

Driver: CSD2109-T (For **CSK243-SG** model)

CSD2120-T (For **CSK264-SG** model)

Weight: 0.29lb. (Mass 0.13kg)



See page B-38 for information on driver installation.

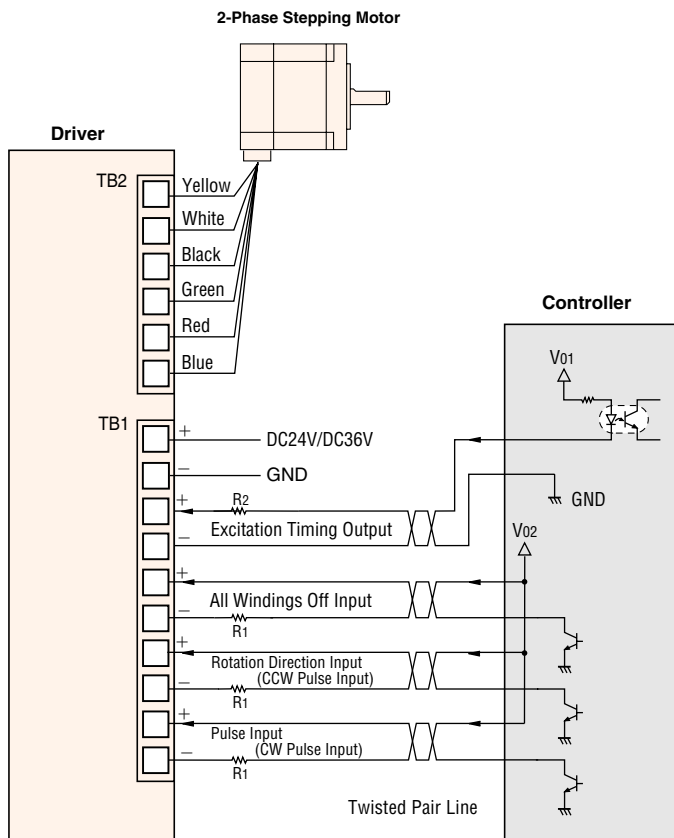
■ LIST OF MOTOR AND DRIVER COMBINATIONS

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

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

WIRING DIAGRAM

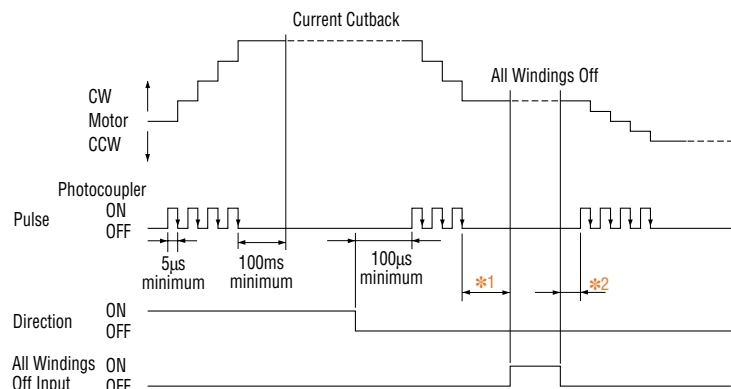
Use connector TB1 and TB2 when connecting.



Note:

- Keep the voltage V_{01} and V_{02} between DC 5V and DC 24V. When they are equal to DC 5V, the external resistances R_1 and R_2 are not necessary. When they are above DC 5V, connect R_1 to keep the current below 20mA, and connect R_2 to keep the current below 10mA.
- Use twisted-pair wire of $3.1 \times 10^{-4} \text{ in}^2$ (0.2mm²) or thicker and 6.6 feet (2m) or less in length for the signal line.
- Use wire $7.8 \times 10^{-4} \text{ in}^2$ (0.5mm²) or thicker for motor lines (when extended) and power supply lines, and use $1.2 \times 10^{-3} \text{ in}^2$ (0.75mm²) or thicker for the wire for the grounding line.
- Use spot grounding for the grounding of the driver and external controller.
- Signal lines should be kept away at least 3.94 in. (10cm) from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.

TIMING CHART



INPUT/OUTPUT SIGNALS

Pulse Input

1-Pulse Input Mode

Pulse Signal

"Pulse" signal is input to the PULSE/CW-terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step. The direction of rotation is determined by the following rotation direction signal.

Rotation Direction Signal

The "Rotation Direction" signal is input to the DIR./CCW-terminal. A "photocoupler ON" signal input commands a clockwise direction rotation. A "photocoupler OFF" signal input commands a counterclockwise direction rotation.

2-Pulse Input Mode

CW Pulse Signal

"Pulse" signal is input to the PULSE/CW-terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in a clockwise direction.

CCW Pulse Signal

"Pulse" signal is input to the DIR./CCW-terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in a counterclockwise direction.

All Windings Off (C.OFF) Input

When the "All windings Off" (C.OFF) signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand.

This signal is used when moving the motor by external force or manual home position is desired.

Excitation-Timing (TIMING) Output

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 electrical one cycle as the motor shaft rotates 7.2°. A signal is output every 4 pulses in full step mode (1.8°/step) and every 8 pulses in half step mode (0.9°/step).

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 (insufficient torque)
- Motor startup and stopping is slow.

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 a step pulse signal immediately after switching the "All windings Off" signal to the "photocoupler ON" state or the motor may lose synchronism. In general, an interval of 100ms (minimum) is required.

■ SWITCHING AND SETTING FUNCTIONS



(1) Automatic Current Cutback at motor standstill

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

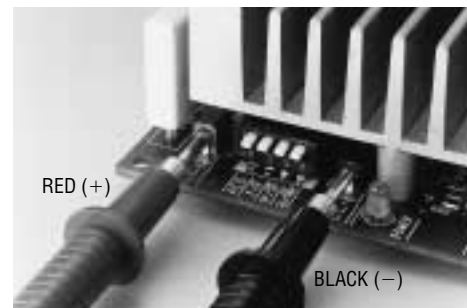
1. Adjustment Method

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 0.18 in. diameter (φ 2.1mm)] as shown below.

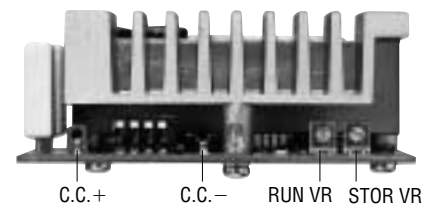
The current value for one phase is equivalent to the voltage shown by the voltmeter. (ex : voltmeter voltage 1V=1A/Phase)



2. Adjusting the Motor Operating Current

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

- (1) Adjust the motor operating current with the RUN potentiometer. It can be adjusted from 0.3A/phase to the rated value of the driver.
- (2) 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):

- (1) 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).
- (2) 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.

$$\text{Holding Torque} = \frac{\text{Rated Holding Torque} \times \text{Current at Motor Standstill [A]}}{\text{Motor Rated Current [A]}}$$

