

2-Phase Stepping Motor and Driver Package CSK Series

Introduction

Motor & Driver Packages	
AS	Closed Loop <i>Q527P</i>
AS PLUS	AC Input DC Input
ASC	DC Input
RK	5-Phase Microstep AC Input DC Input
CRK II	DC Input
CSK	5-Phase Full/Half DC Input
PMC	DC Input
UMK	2-Phase Full/Half AC Input DC Input
CSK	DC Input
PK/PV	2-Phase Stepping Motors without Encoder
PK	with Encoder
UI2120G	Driver with Indexer
EMP401	Controllers
EMP402	
SG8030J	
SMK	Low-Speed Synchronous Motors
Accessories	
Before Using a Stepping Motor	

Additional Information

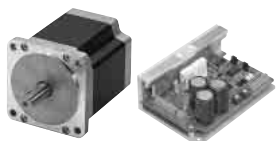
Technical ReferenceF-1
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2-Phase Stepping Motor and Driver Package

CSK Series

The CSK Series combines a 2-phase stepping motor with a 24 VDC or 36 VDC* input board level driver providing high torque, high resolution and low vibration in a compact package. High resolution and geared models are available.

* **CSK29**□ models are 24 VDC input only.



Motor Frame Size : □3.35 in. (□85 mm)



■ Features

● High Torque

Maximum holding torque values are as follows:

CSK24□ : 22 oz-in (0.16 N·m) ~ 45 oz-in (0.32 N·m)

CSK26□ : 55 oz-in (0.39 N·m) ~ 191 oz-in (1.35 N·m)

CSK29□ : 310 oz-in (2.2 N·m) ~ 930 oz-in (6.6 N·m)

● Powerful Gearheads

The spur (**SH**) geared models provide high torque. There are six gear ratios: 3.6:1, 7.2:1, 9:1, 10:1, 18:1, and 36:1.

● High-Resolution Models

High-resolution models are available where 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 models can also be run in half-step mode to provide 800 steps per revolution. (Not available for **CSK29**□ models)

● Compact Driver

The drivers produce a high output of 2A/phase at 24/36 VDC. They are compact in size W 3.03 in. (77 mm) × D 2.83 in. (72 mm) × H 1.22 in. (31 mm), due to a custom IC, surface mount technology and FET output stage.

● 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. Internal switches can be used to set the step angle and pulse input type.

● Highly Reliable Photocoupler Input

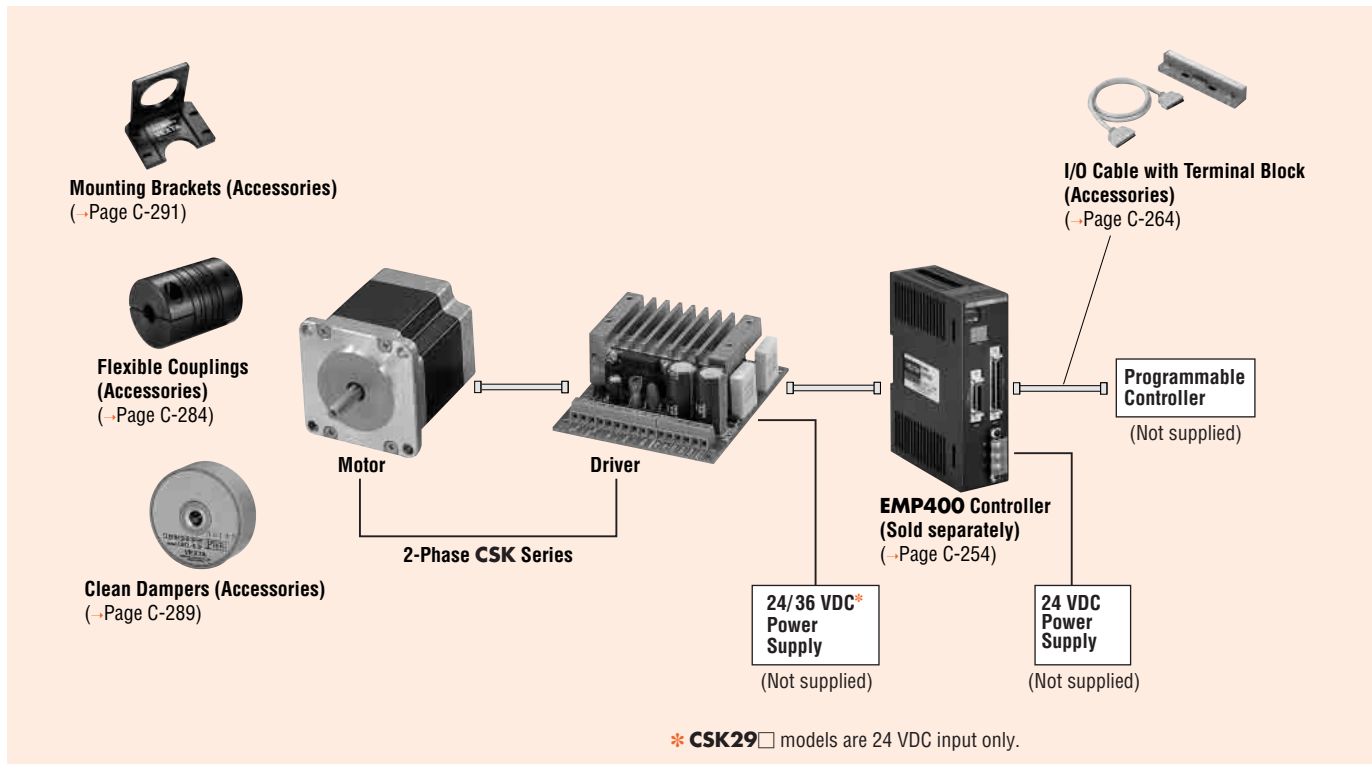
Photocouplers are used in the input/output signal section because they are not easily effected by external noise.

■ Product Line

Type	Power Supply Voltage	Maximum Holding Torque		
		□1.65 in. (□42 mm)	□2.22 in. (□56.4 mm) SH Geared: □2.36 in. (60 mm)	□3.35 in. (□85 mm)
Standard	24/36 VDC*	22~45 oz-in (0.16~0.32 N·m)	55~191 oz-in (0.39~1.35 N·m)	310~930 oz-in (2.2~6.6 N·m)
High-Resolution		22~45 oz-in (0.16~0.32 N·m)	55~191 oz-in (0.39~1.35 N·m)	—
SH Geared		1.77~7 lb-in (0.2~0.8 N·m)	8.8~35 lb-in (1~4 N·m)	—

* **CSK29**□ models are 24 VDC input only.

System Configuration

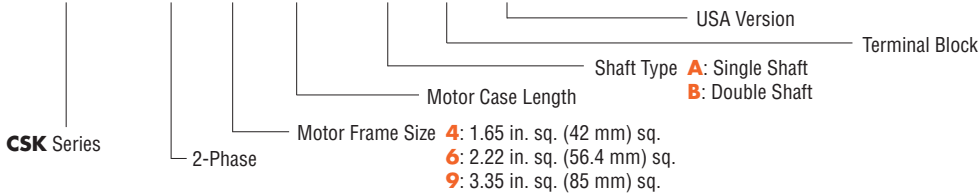


An example of a single-axis system configuration with the **EMP400** Series controller.

Product Number Code

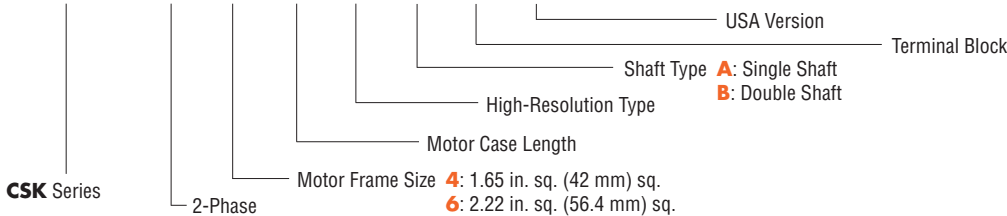
Standard Type

CSK 2 4 5 - A T A



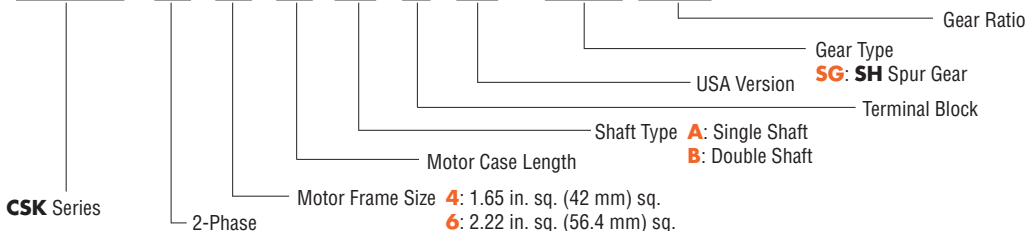
High-Resolution Type

CSK 2 4 5 M A T A



SH Geared Type

CSK 2 6 4 A T A - SG 10



Standard Type Motor Frame Size: □ 1.65 in. (□ 42 mm), □ 2.22 in. (□ 56.4 mm)

Specifications

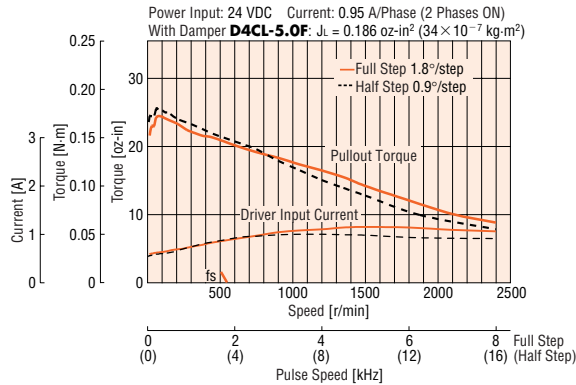
Model	Single Shaft	CSK243-ATA	CSK244-ATA	CSK245-ATA	CSK264-AT	CSK266-AT	CSK268-AT
	Double Shaft	CSK243-BTA	CSK244-BTA	CSK245-BTA	CSK264-BT	CSK266-BT	CSK268-BT
Maximum Holding Torque	oz-in (N·m)	22 (0.16)	36 (0.26)	45 (0.32)	55 (0.39)	127 (0.9)	191 (1.35)
Rotor Inertia J	oz-in ² (kg·m ²)	0.191 (35×10 ⁻⁷)	0.3 (54×10 ⁻⁷)	0.37 (68×10 ⁻⁷)	0.66 (120×10 ⁻⁷)	1.64 (300×10 ⁻⁷)	2.6 (480×10 ⁻⁷)
Rated Current	A/phase	0.95	1.2		2		
Basic Step Angle		1.8°					
Power Source		24 VDC ±10% 1.4 A 36 VDC ±10% 1.4 A	24 VDC ±10% 1.6 A 36 VDC ±10% 1.6 A		24 VDC ±10% 2.8 A 36 VDC ±10% 2.8 A		
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 					
Weight	Motor lb. (kg)	0.46 (0.21)	0.59 (0.27)	0.77 (0.35)	0.99 (0.45)	1.5 (0.7)	2.2 (1)
	Driver lb. (kg)	0.29 (0.13)					
Dimension No.	Motor	1			2		
	Driver	6					

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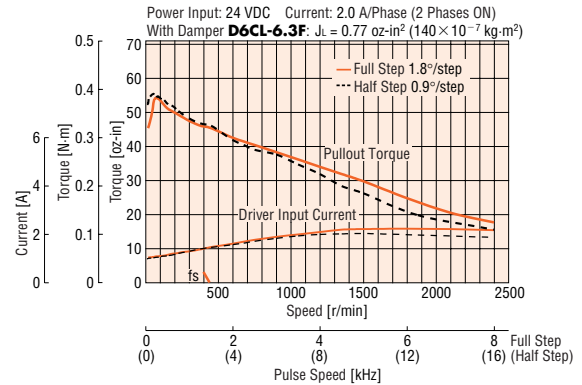
Speed — Torque Characteristics How to Read Speed-Torque Characteristics → Page C-10

24 VDC

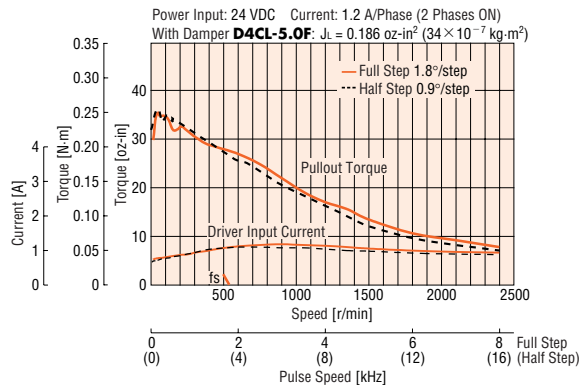
CSK243-BTA



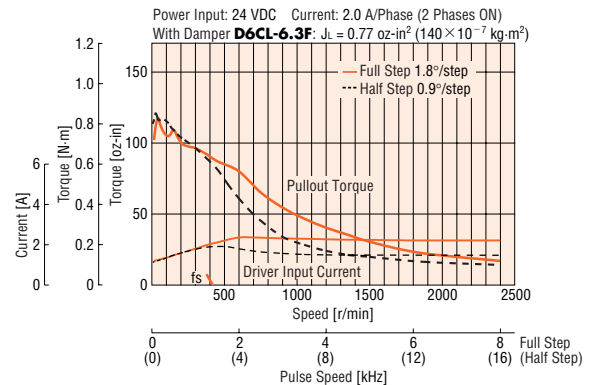
CSK264-BT



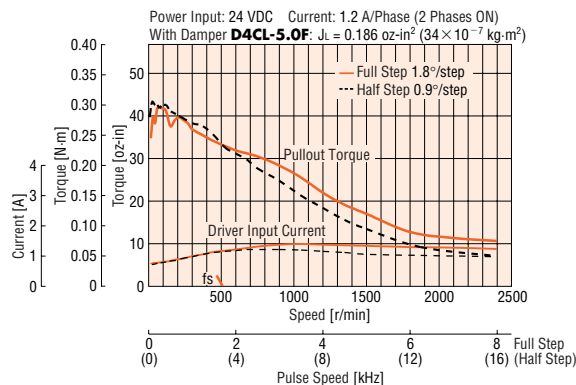
CSK244-BTA



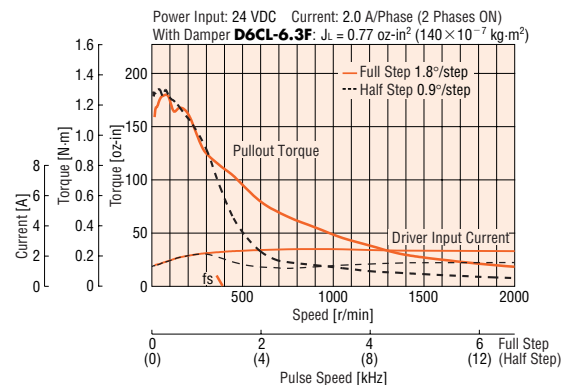
CSK266-BT



CSK245-BTA



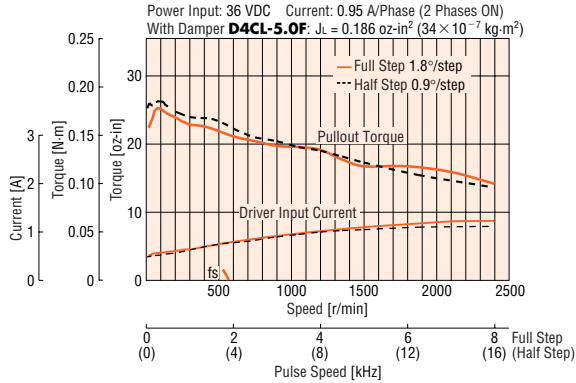
CSK268-BT



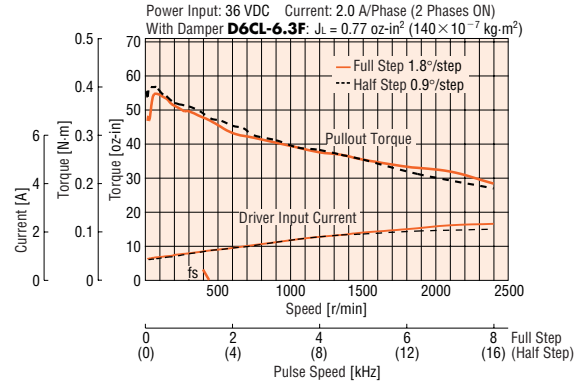
Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

● 36 VDC

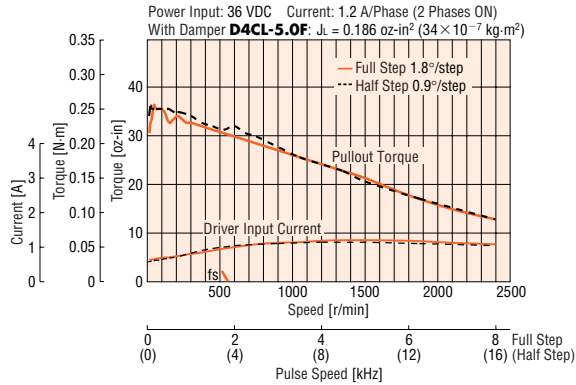
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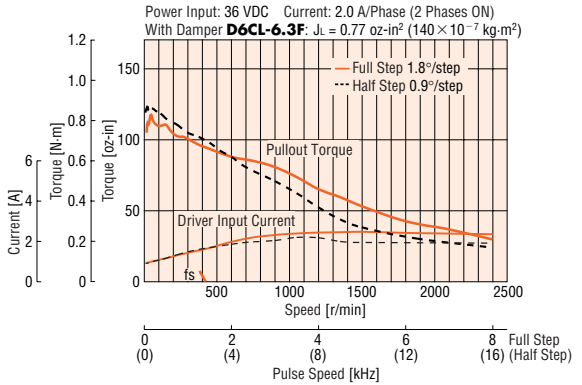
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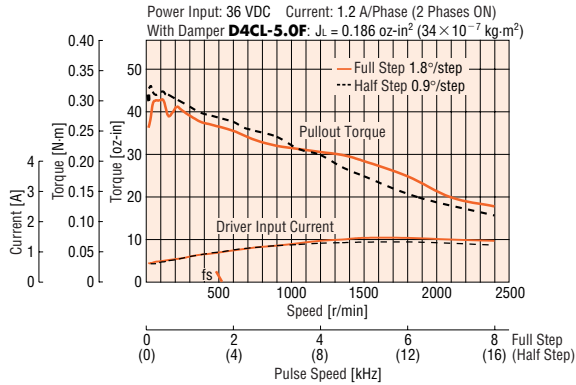
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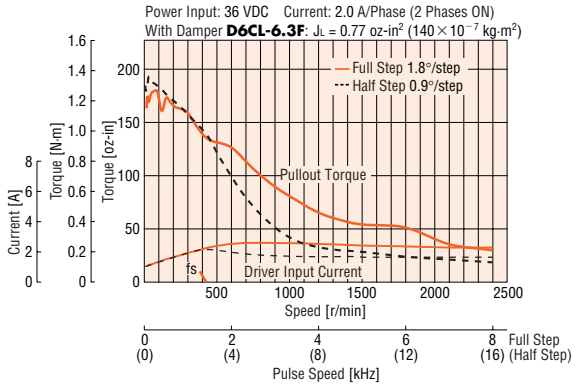
CSK266-BT



CSK245-BTA



CSK268-BT



Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

Introduction	Motor & Driver Packages	
AS	Closed Loop <i>Q527P</i>	5-Phase Microstep
AS PLUS	AC Input	DC Input
ASC	DC Input	5-Phase Full/Half
ASC	DC Input	DC Input
RK	AC Input	DC Input
CRK II	DC Input	DC Input
CSK	DC Input	DC Input
PMC	DC Input	DC Input
UMK	AC Input	2-Phase Full/Half
UMK	DC Input	DC Input
CSK	DC Input	2-Phase Full/Half
PK/PV	Encoder	without Encoder
PK	Encoder	with Encoder
UI2120G	with Indexer	Driver
EMP401	Controllers	Controllers
EMP402	Controllers	Controllers
SG8030J	Controllers	Controllers
SMK	Low-Speed Synchronous Motors	Low-Speed Synchronous Motors
Accessories	Before Using a Stepping Motor	Before Using a Stepping Motor

Standard Type

Motor Frame Size: 3.35 in. (85 mm)

Specifications

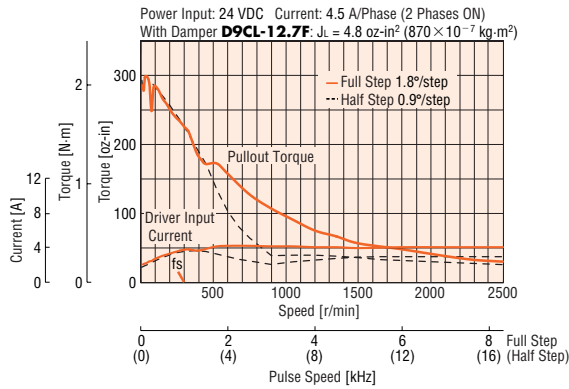
Model	Single Shaft		CSK296-ATA	CSK299-ATA	CSK2913-ATA
	Double Shaft		CSK296-BTA	CSK299-BTA	CSK2913-BTA
Maximum Holding Torque	oz-in (N·m)		310 (2.2)	620 (4.4)	930 (6.6)
Rotor Inertia J	oz-in ² (kg·m ²)		7.7 (1400×10 ⁻⁷)	14.8 (2700×10 ⁻⁷)	22 (4000×10 ⁻⁷)
Rated Current	A/phase		4.5		4
Basic Step Angle			1.8°		
Power Source			24 VDC±10% 5.5 A		24 VDC±10% 5 A
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 		
Weight	Motor	lb. (kg)	3.7 (1.7)	6.2 (2.8)	8.4 (3.8)
	Driver	lb. (kg)			
Dimension No.	Motor		3		
	Driver		7		

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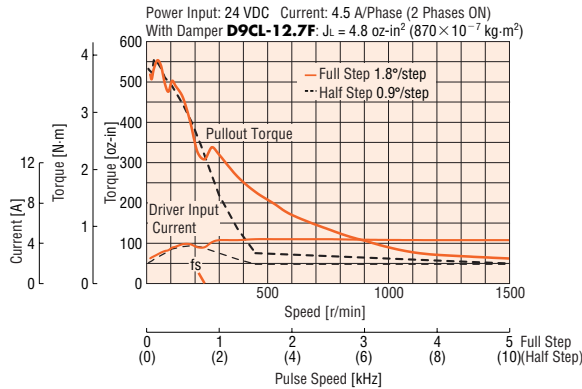
Speed — Torque Characteristics

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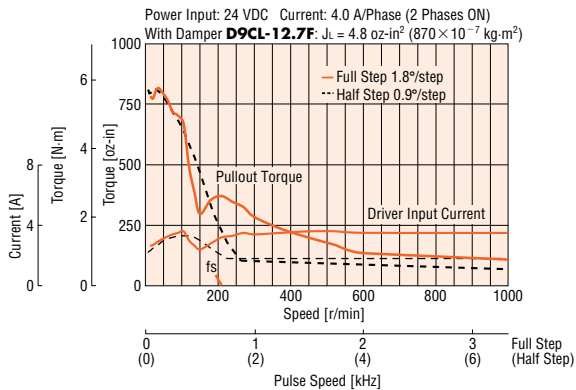
CSK296-BTA



CSK299-BTA



CSK2913-BTA



Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

High-Resolution Type

Motor Frame Size: □ 1.65 in. (□ 42 mm), □ 2.22 in. (□ 56.4 mm)

Specifications

Model	Single Shaft	CSK243MATA	CSK244MATA	CSK245MATA	CSK264MAT	CSK266MAT	CSK268MAT
	Double Shaft	CSK243MBTA	CSK244MBTA	CSK245MBTA	CSK264MBT	CSK266MBT	CSK268MBT
Maximum Holding Torque	oz-in (N·m)	22 (0.16)	36 (0.26)	45 (0.32)	55 (0.39)	127 (0.9)	191 (1.35)
Rotor Inertia J	oz-in ² (kg·m ²)	0.191 (35×10 ⁻⁷)	0.3 (54×10 ⁻⁷)	0.37 (68×10 ⁻⁷)	0.66 (120×10 ⁻⁷)	1.64 (300×10 ⁻⁷)	2.6 (480×10 ⁻⁷)
Rated Current	A/phase	0.95	1.2		2		
Basic Step Angle		0.9°					
Power Source		24 VDC ±10% 1.4 A 36 VDC ±10% 1.4 A	24 VDC ±10% 1.6 A 36 VDC ±10% 1.6 A		24 VDC ±10% 2.8 A 36 VDC ±10% 2.8 A		
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 					
Weight	Motor lb. (kg)	0.53 (0.24)	0.66 (0.3)	0.81 (0.37)	0.99 (0.45)	1.5 (0.7)	2.2 (1)
	Driver lb. (kg)	0.29 (0.13)					
Dimension No.	Motor	1			2		
	Driver	6					

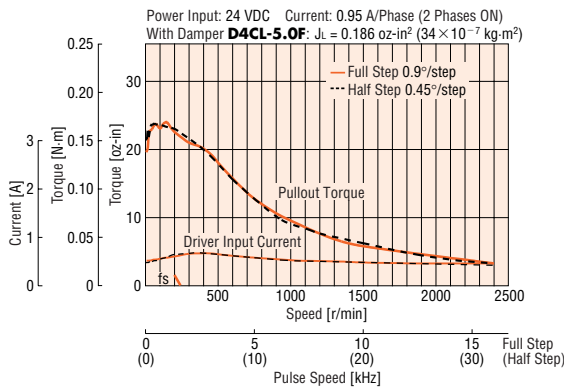
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Speed — Torque Characteristics

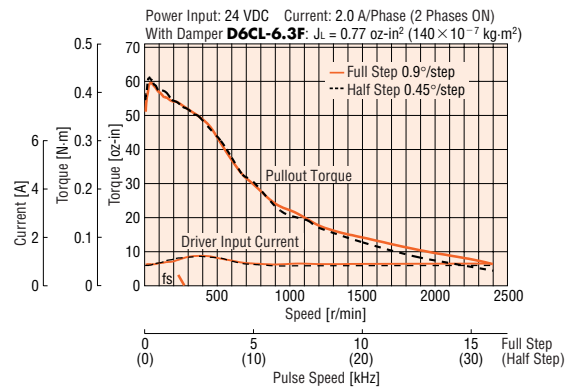
How to Read Speed-Torque Characteristics →Page C-10

24 VDC

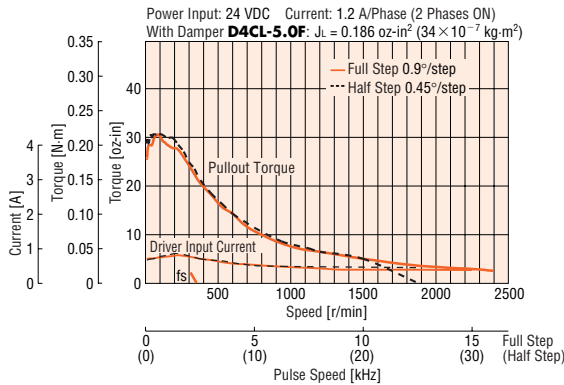
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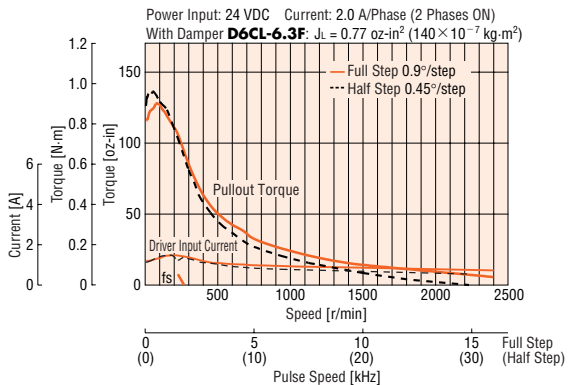
CSK264MBT



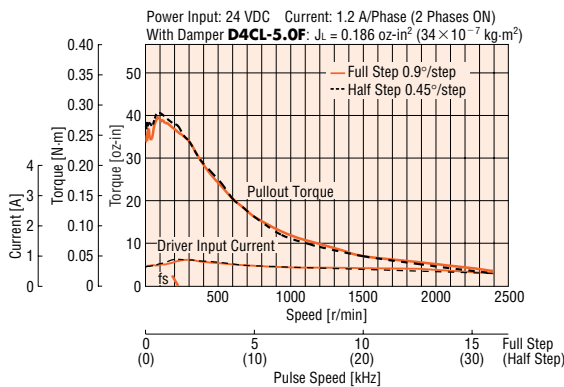
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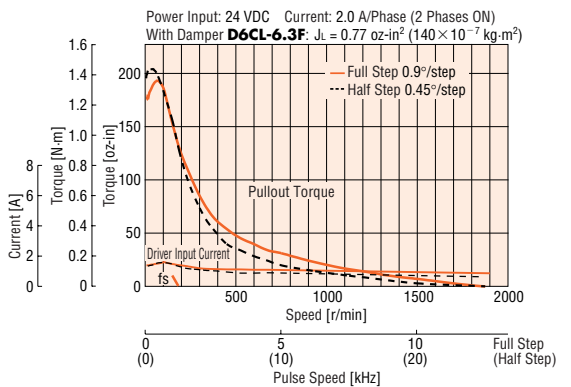
CSK266MBT



CSK245MBTA



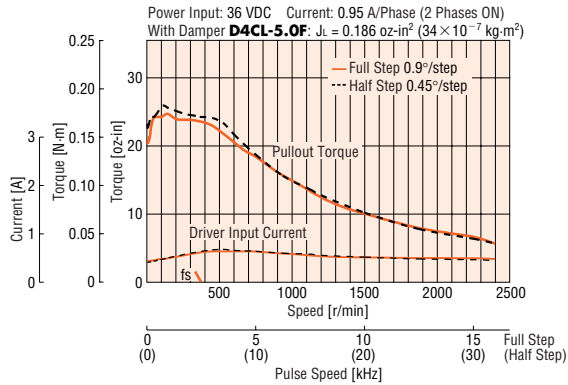
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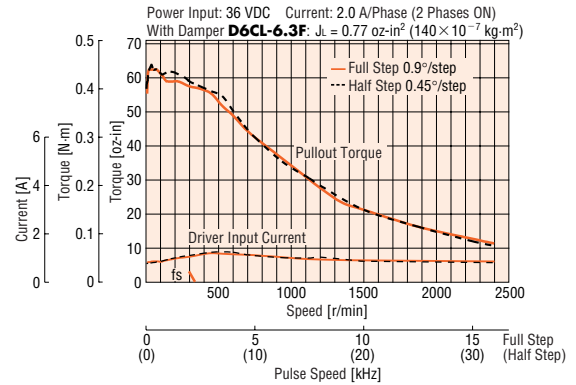
Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

● 36 VDC

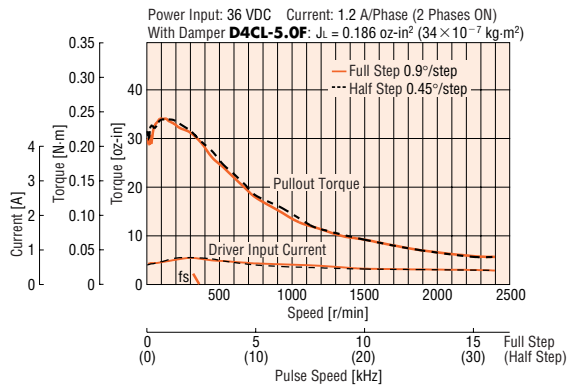
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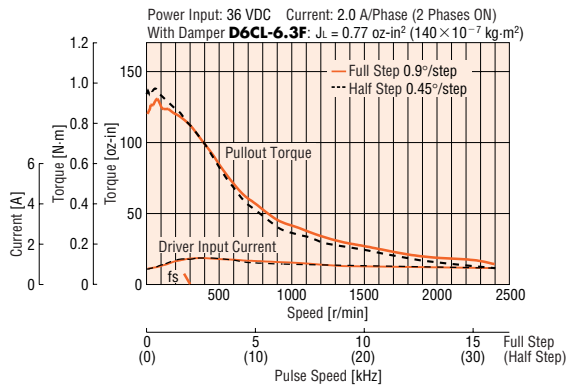
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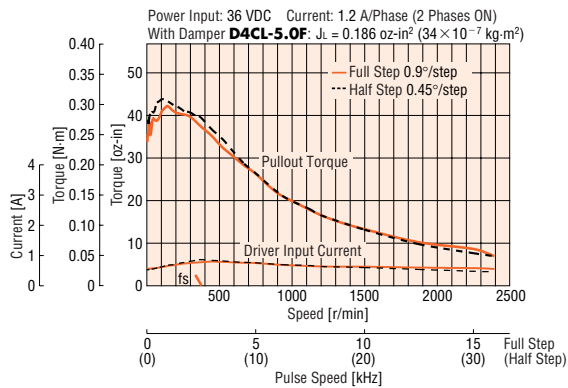
CSK244MBTA



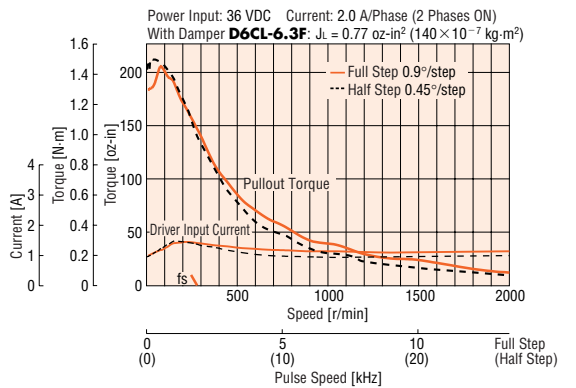
CSK266MBT



CSK245MBTA



CSK268MBT



Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

SH Geared Type Motor Frame Size: □ 1.65 in. (□ 42 mm)

Specifications

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)	1.77 (0.2)	3.5 (0.4)	4.4 (0.5)	4.9 (0.56)	7 (0.8)	7 (0.8)
Rotor Inertia J	oz-in ² (kg·m ²)	0.191 (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)	1.77 (0.2)	3.5 (0.4)	4.4 (0.5)	4.9 (0.56)	7 (0.8)	7 (0.8)
Permissible Speed Range (Gear Output Shaft Speed)	r/min	0~500	0~250	0~200	0~180	0~100	0~50
Power Source		24 VDC ±10% 1.4 A or 36 VDC ±10% 1.4 A					
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
Weight	Motor lb. (kg)	0.77 (0.35)					
	Driver lb. (kg)	0.29 (0.13)					
Dimension No.	Motor	4					
	Driver	6					

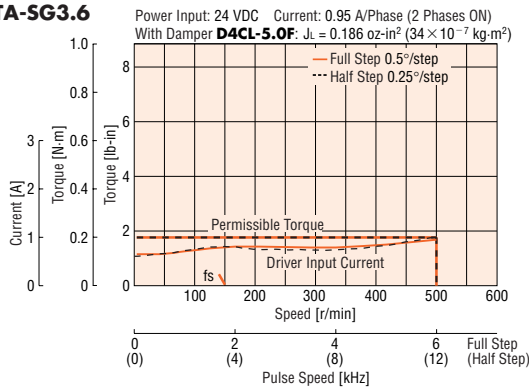
How to Read Specifications Table → Page C-9

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

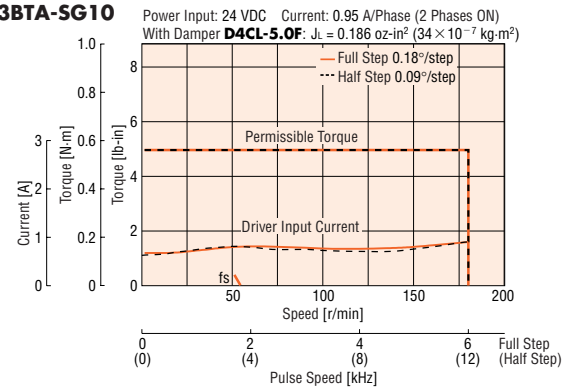
Speed — Torque Characteristics How to Read Speed-Torque Characteristics → Page C-10

24 VDC

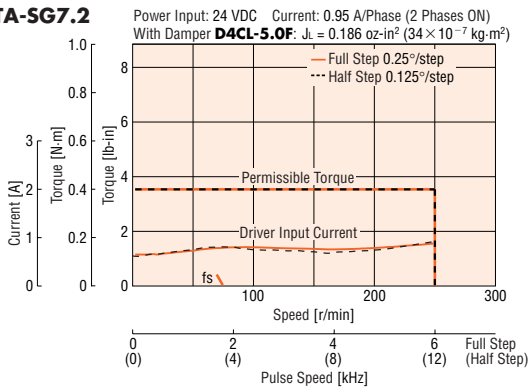
CSK243BTA-SG3.6



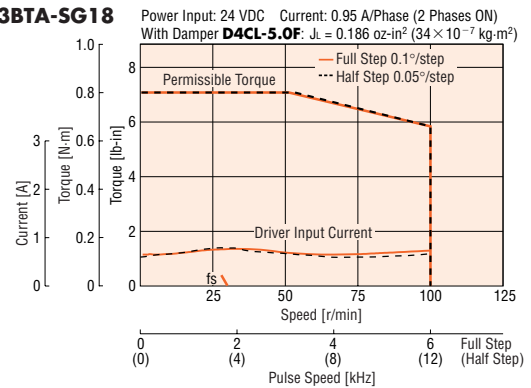
CSK243BTA-SG10



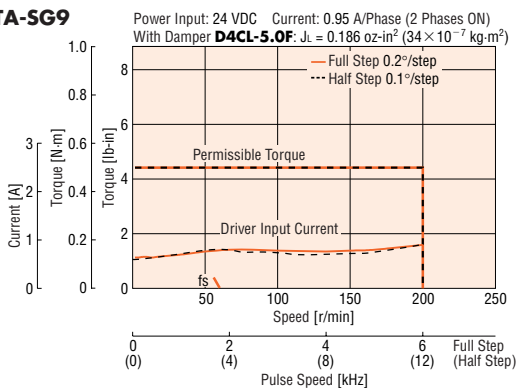
CSK243BTA-SG7.2



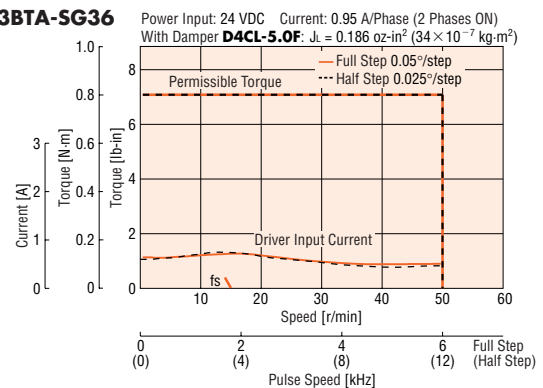
CSK243BTA-SG18



CSK243BTA-SG9



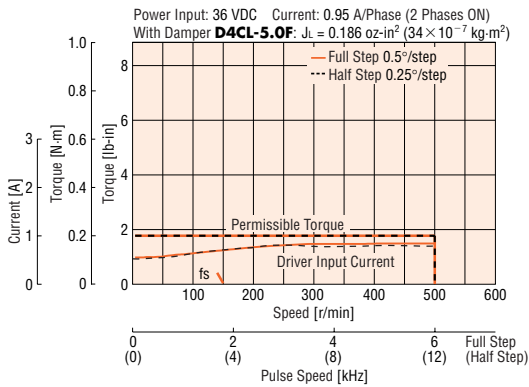
CSK243BTA-SG36



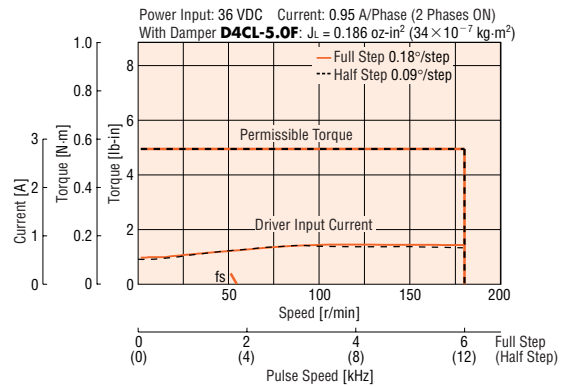
Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

● 36 VDC

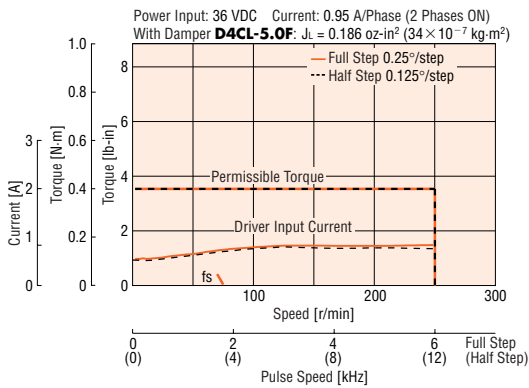
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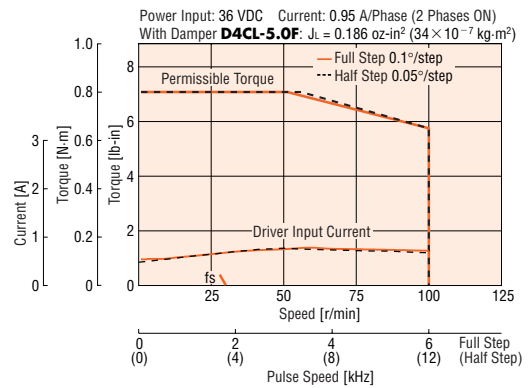
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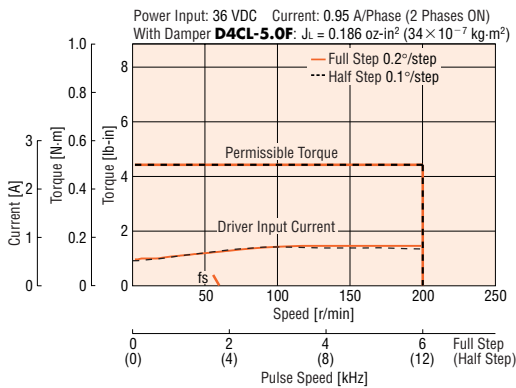
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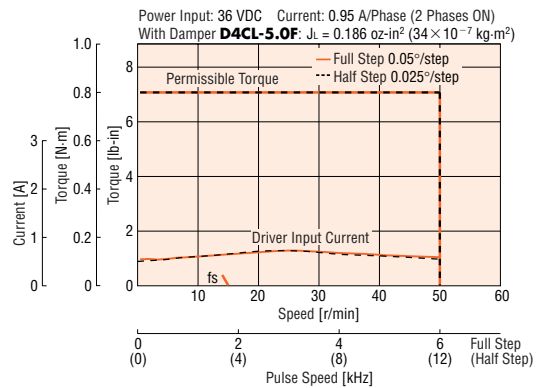
CSK243BTA-SG18



CSK243BTA-SG9



CSK243BTA-SG36



Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

SH Geared Type Motor Frame Size: □ 2.36 in. (□ 60 mm)

Specifications

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)	8.8 (1)	17.7 (2)	22 (2.5)	23 (2.7)	26 (3)	35 (4)
Rotor Inertia J	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)	8.8 (1)	17.7 (2)	22 (2.5)	23 (2.7)	26 (3)	35 (4)
Permissible Speed Range (Gear Output Shaft Speed)	r/min	0~500	0~250	0~200	0~180	0~100	0~50
Power Source		24 VDC ± 10% 2.8 A or 36 VDC ± 10% 2.8 A					
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
Weight	Motor lb. (kg)	1.7 (0.75)					
	Driver lb. (kg)	0.29 (0.13)					
Dimension No.	Motor	5					
	Driver	6					

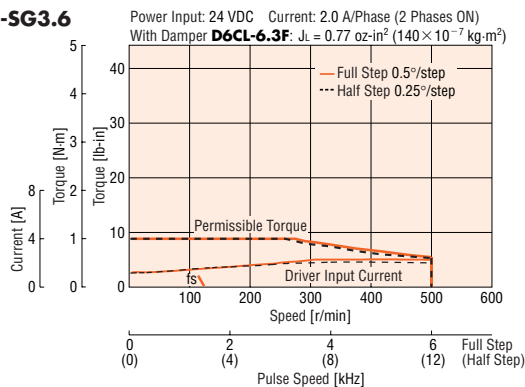
How to Read Specifications Table → Page C-9

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

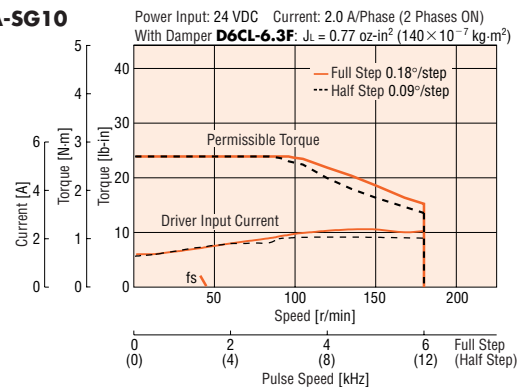
Speed — Torque Characteristics How to Read Speed-Torque Characteristics → Page C-10

24 VDC

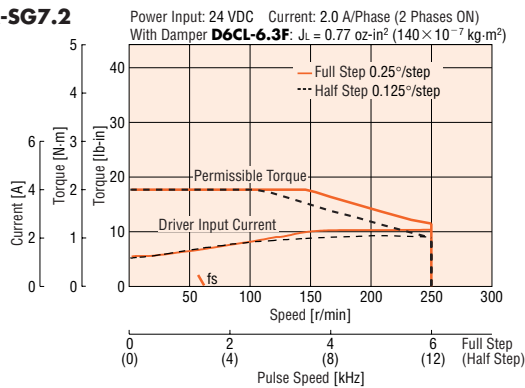
CSK264BTA-SG3.6



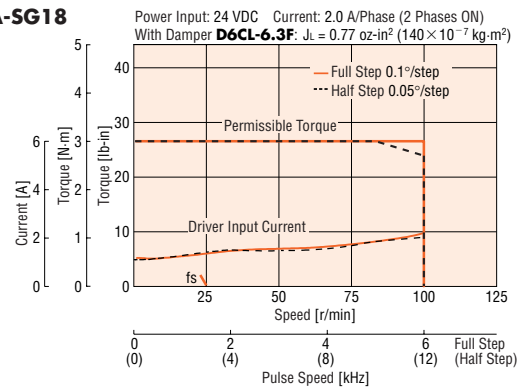
CSK264BTA-SG10



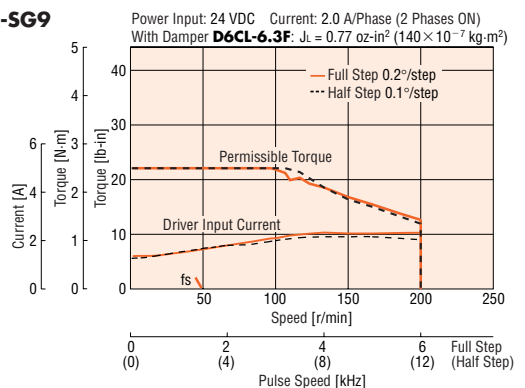
CSK264BTA-SG7.2



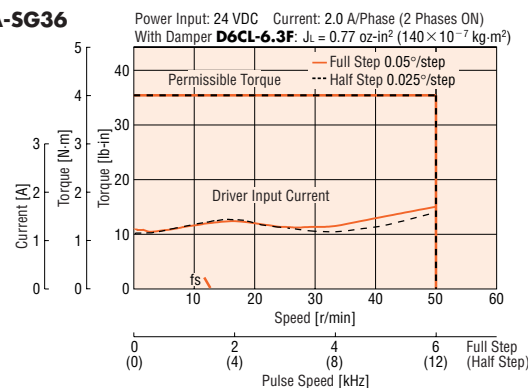
CSK264BTA-SG18



CSK264BTA-SG9



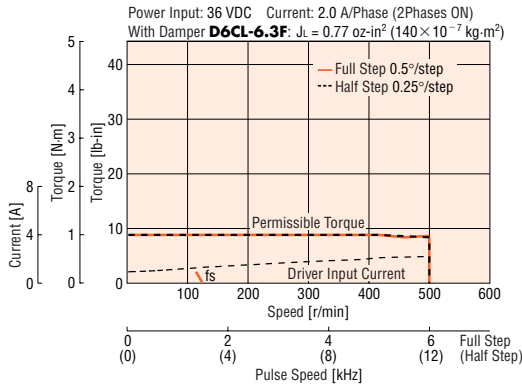
CSK264BTA-SG36



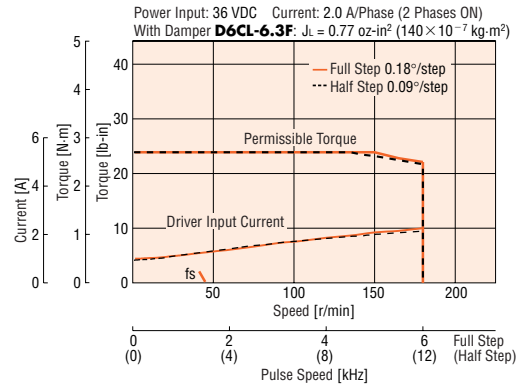
Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

● 36 VDC

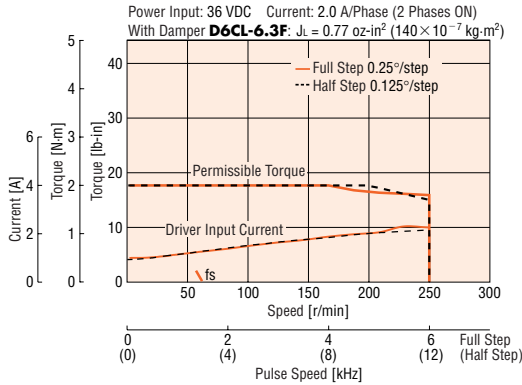
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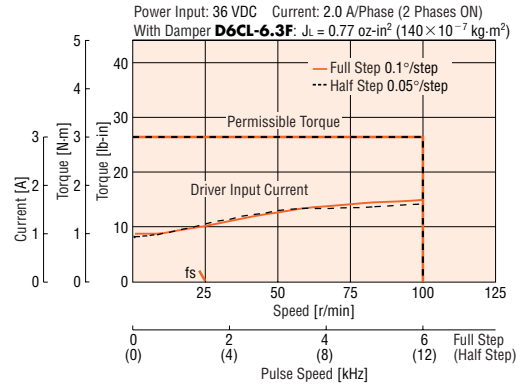
CSK264BTA-SG10



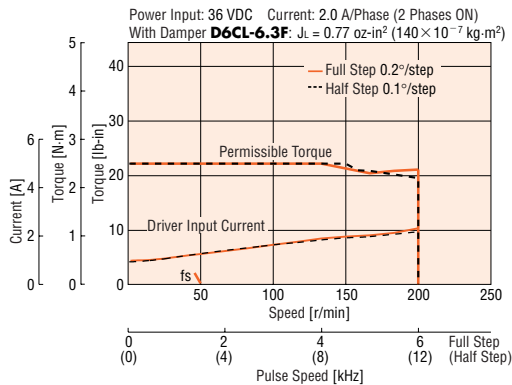
CSK264BTA-SG7.2



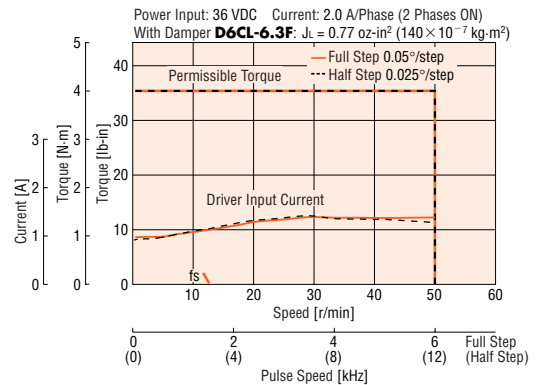
CSK264BTA-SG18



CSK264BTA-SG9



CSK264BTA-SG36



Note: The pulse input circuit responds up to approximately 10 kHz with a pulse duty of 50%.

Common Specifications

Input Signal Circuit	Photocoupler input, Input resistance 220 Ω, Input current 10~20 mA maximum Signal voltage Photocoupler ON: +4.5~+5 V, Photocoupler OFF: 0~+1 V (Voltage between terminals)
Input Signals	<ul style="list-style-type: none"> ● Pulse Signal (CW Pulse Signal)* Step command pulse signal (CW step command pulse signal in 2-pulse input mode*) Pulse width: 5 μs minimum, Pulse rise/fall: 2 μs maximum, Pulse duty : Max 50% Motor moves when the photocoupler state changes from ON to OFF. Maximum input frequency : 10 kHz (20 kHz for CSK29□) (when the pulse duty is 50 %) Negative logic pulse input.
	<ul style="list-style-type: none"> ● Rotation Direction Signal (CCW Pulse Signal)* Rotation direction signal Photocoupler ON: CW, Photocoupler OFF: CCW (CCW step command signal in 2-pulse input mode*: Pulse width: 5 μs minimum, Pulse rise/fall: 2 μs maximum.) Pulse duty : Max 50% Motor moves when the photocoupler state changes from ON to OFF. Maximum input frequency : 10 kHz (20 kHz for CSK29□) (when the pulse duty is 50 %) Negative logic pulse input.
	<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 switch is supplied to the motor.
Output Signal Circuit	Photocoupler, Open-Collector Output External use condition: 24 VDC maximum, 10 mA maximum
Output Signals	<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 output every 4 pulses, Half step: signal output every 8 pulses
	Functions
Driver Cooling Method	Natural ventilation

* **CSK29□** driver is 1-pulse input mode only.

General Specifications

Specifications		Motor	Driver
Insulation Class		Class B [266°F (130°C)]	—
Insulation Resistance		100 MΩ minimum under normal temperature and humidity, when measured by a 500 VDC megger between the motor coils and the motor case.	—
Dielectric Strength		Sufficient to withstand 1.0 kV (0.5 kV for CSK24□ , CSK24□M), 60 Hz applied between the motor coils and casing for one minute, under normal ambient temperature and humidity.	—
Operating Environment	Ambient Temperature	14°F~122°F (-10°C~+50°C) (nonfreezing)	32°F~104°F (0°C~+40°C)(nonfreezing)
	Ambient Humidity	85% or less (non-condensing)	
	Atmosphere	No corrosive gases, dust, water or oil.	
Temperature Rise		Temperature rise of the coil measured by the Change Resistance Method is 144°F (80°C) or less. (at standstill, two phases energized)	—
Static Angle Error *1		±3 arc minutes (±0.05°)	—
Shaft Runout		0.002 inch (0.05 mm) T.I.R at top of output shaft *4	—
Radial Play *2		0.001 inch (0.025 mm) max. of 1.12 lb. (5 N)	—
Axial Play *3		0.003 inch (0.075 mm) max. of 2.2 lb. (10 N)	—
Concentricity		0.003 inch (0.075 mm) T.I.R *4	—
Perpendicularity		0.003 inch (0.075 mm) T.I.R *4	—

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

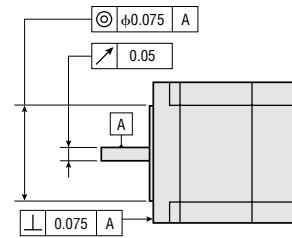
*2 Radial Play: Displacement in shaft position in the radial direction, when a 1.12 lb. (5 N) load is applied in the vertical direction to the tip of the motor's shaft.

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

*4 T.I.R. (Total Indicator Reading): Total dial gauge reading when the measured section is rotated one revolution centered on a reference axis.

Note:

- Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.



Permissible Overhung Load and Permissible Thrust Load

Unit = Upper values: lb./Lower values: N

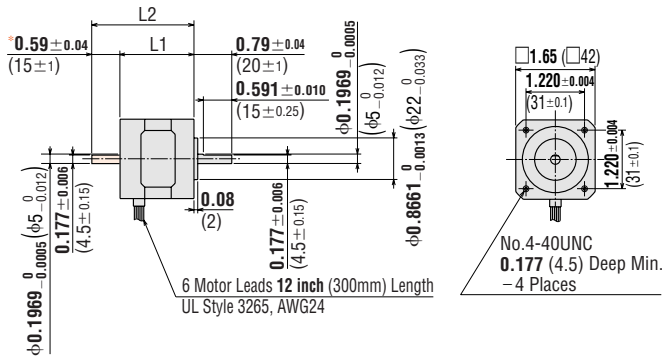
Model	Overhung Load Distance from Shaft End [inch (mm)]					Thrust Load	
	0	0.2 (5)	0.39 (10)	0.59 (15)	0.79 (20)		
CSK24□ , CSK24□M	4.5	5.6	7.6	11.7	—	The permissible thrust load [lb. (N)] shall be no greater than the motor mass.	
	20	25	34	52	—		
CSK26□ , CSK26□M	12.1	15	20	29	—		
	54	67	89	130	—		
CSK29□	58	65	76	87	108		
	260	290	340	390	480		
CSK243SG3.6~36	2.2	3.3	4.5	6.7	—		3.3
	10	15	20	30	—		15
CSK264SG3.6~10	6.7	9	11.2	13.5	15.7		6.7
	30	40	50	60	70		
CSK264SG18, 36	18	22	27	31	36		30
	80	100	120	140	160		

Dimensions Scale 1/4, Unit = inch (mm)

● Motor

◆ Standard Type, High-Resolution Type

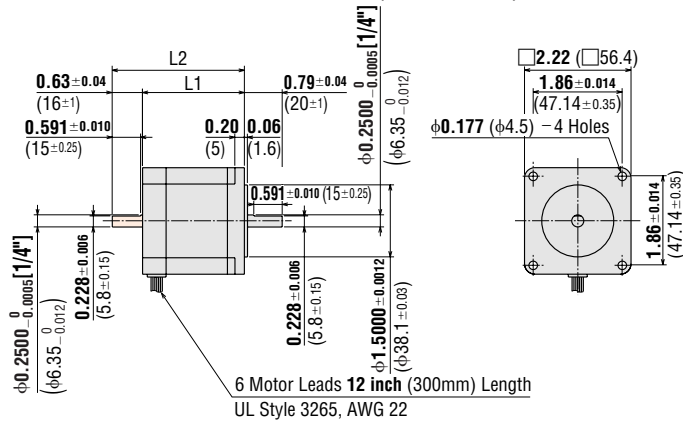
1 Motor Frame Size □1.65 in. (□42 mm)



* The length of machining on double shaft model is 0.591 ± 0.010 (15±0.25).

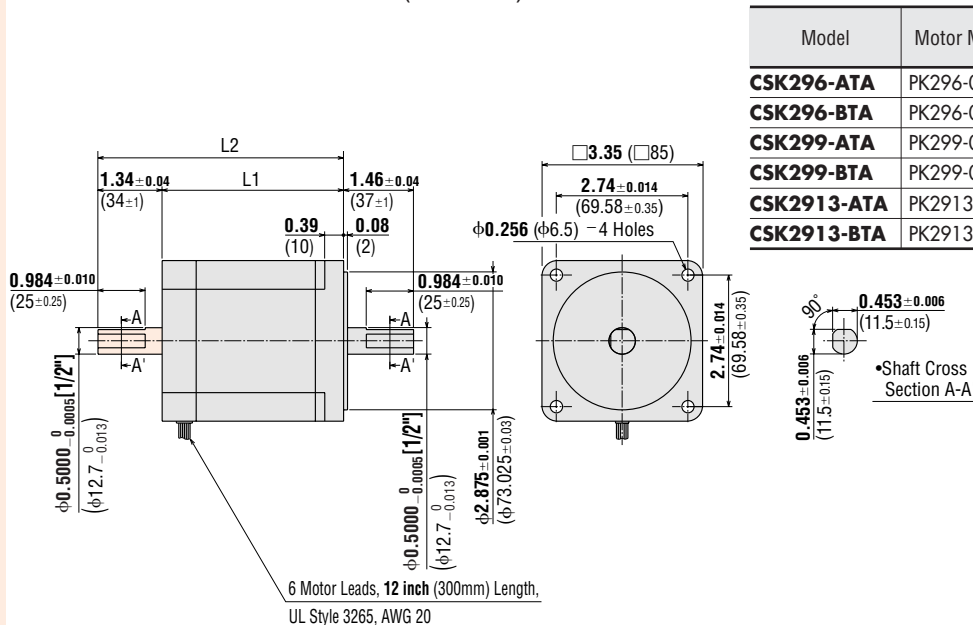
Model	Motor Model	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
CSK243-ATA	PK243-01AA	1.3 (33)	—	0.46 (0.21)	B081U
CSK243MATA	PK243MAA		—	0.53 (0.24)	
CSK243-BTA	PK243-01BA		1.89 (48)	0.46 (0.21)	
CSK243MBTA	PK243MBA		—	0.53 (0.24)	
CSK244-ATA	PK244-01AA	1.54 (39)	—	0.59 (0.27)	B082U
CSK244MATA	PK244MAA		—	0.66 (0.3)	
CSK244-BTA	PK244-01BA		2.13 (54)	0.59 (0.27)	
CSK244MBTA	PK244MBA		—	0.66 (0.3)	
CSK245-ATA	PK245-01AA	1.85 (47)	—	0.77 (0.35)	B083U
CSK245MATA	PK245MAA		—	0.81 (0.37)	
CSK245-BTA	PK245-01BA		2.44 (62)	0.77 (0.35)	
CSK245MBTA	PK245MBA		—	0.81 (0.37)	

2 Motor Frame Size □2.22 in. (□56.4 mm)



Model	Motor Model	L1 inch (mm)	L2 inch (mm)	Weight lb. (kg)	DXF
CSK264-AT	PK264-02A	1.54 (39)	—	0.99 (0.45)	B084
CSK264MAT	PK264MA		—		
CSK264-BT	PK264-02B		2.17 (55)		
CSK264MBT	PK264MB	—	—	1.5 (0.7)	B085
CSK266-AT	PK266-02A	2.13 (54)	—		
CSK266MAT	PK266MA		—		
CSK266-BT	PK266-02B		2.76 (70)		
CSK266MBT	PK266MB	—	—	2.2 (1.0)	B086
CSK268-AT	PK268-02A	2.99 (76)	—		
CSK268MAT	PK268MA		—		
CSK268-BT	PK268-02B		3.62 (92)		
CSK268MBT	PK268MB	—	—	—	—

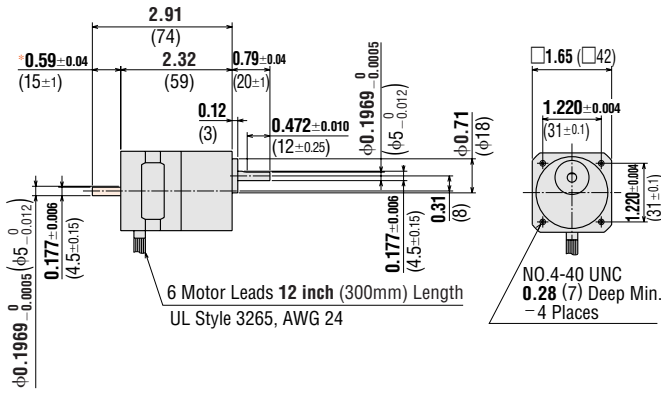
3 Motor Frame Size □3.35 in. (□85 mm)



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

◆ SH Geared Type

4 Motor Frame Size □1.65 in. (□42 mm)

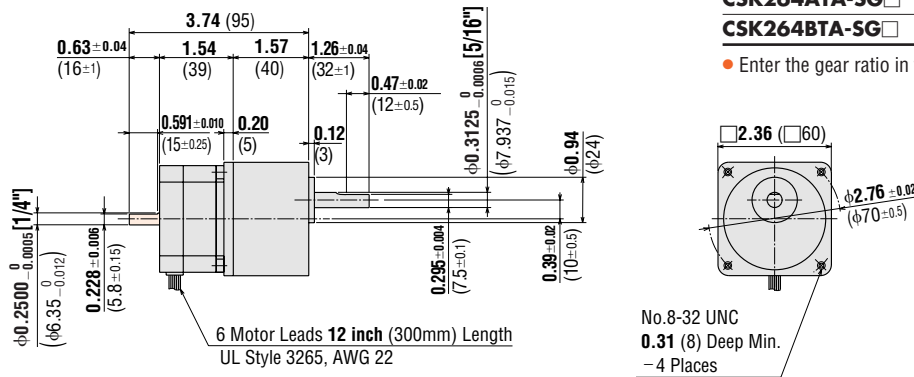


* The length of machining on double shaft model is 0.591±0.010 (15±0.25).

Model	Motor Model	Weight lb. (kg)	DXF
CSK243ATA-SG□	PK243A1A-SG□	0.77 (0.35)	B091U
CSK243BTA-SG□	PK243B1A-SG□		

• Enter the gear ratio in the box (□) within the model number.

5 Motor Frame Size □2.36 in. (□60 mm)



• These dimensions are for double shaft models. For single shaft models, ignore the shaded areas.

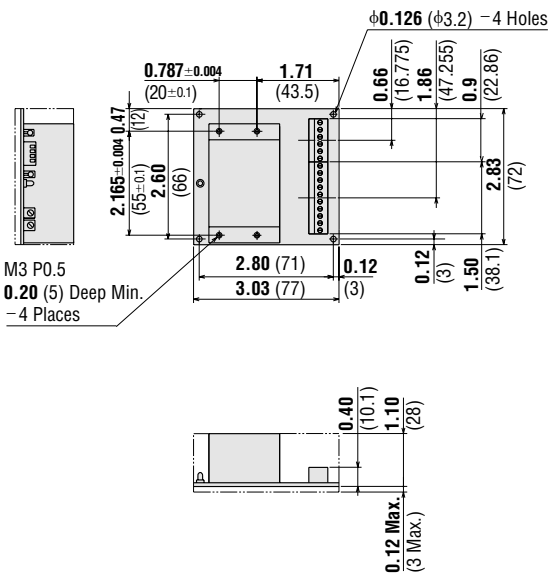
Model	Motor Model	Weight lb. (kg)	DXF
CSK264ATA-SG□	PK264A2A-SG□	1.7 (0.75)	B092U
CSK264BTA-SG□	PK264B2A-SG□		

• Enter the gear ratio in the box (□) within the model number.

● Driver

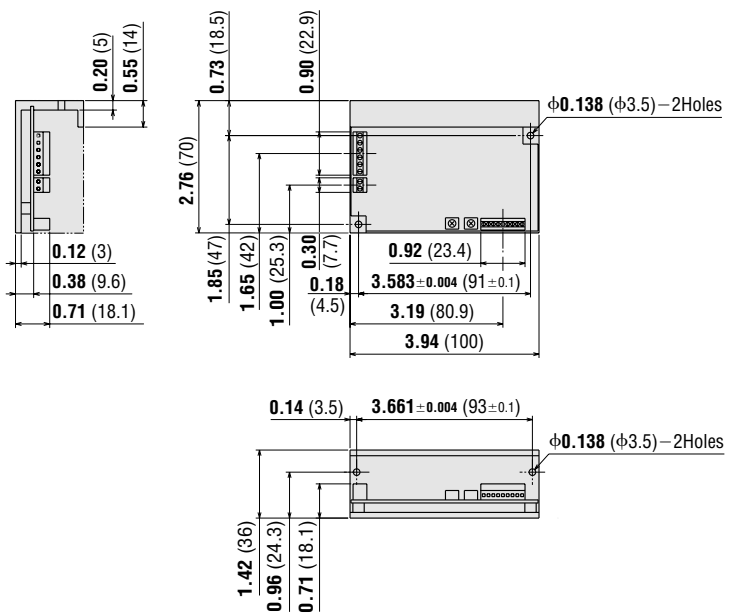
6 CSD2109-T, CSD2112-T, CSD2120-T

Weight: 0.29 lb. (0.13 kg) DXF B807U



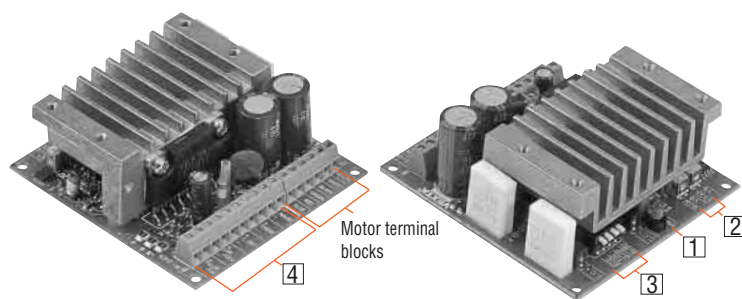
7 CSD2140T, CSD2145T

Weight: 0.44 lb. (0.2 kg) DXF B810U



Connection and Operation

CSK24□, CSK26□
CSK24□M, CSK26□M



1 Signal Monitor Display

Indicator	Color	Function
POWER	Green	Power input display

2 Current Adjustment Potentiometers

Indicator	Name of Potentiometer	Function
RUN VR	Motor run current potentiometer	For adjusting the motor running current.
STOP VR	Motor stop current potentiometer	For adjusting the motor current at standstill.

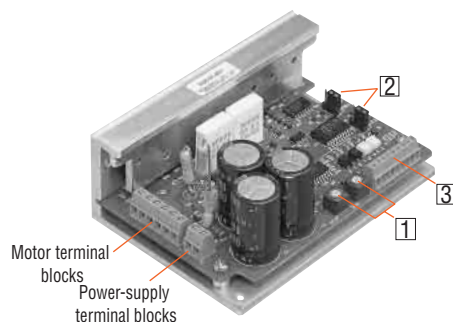
3 Function Select Switches

Indicator	Switch Name	Function
ACD	Automatic current cutback function select	Automatically decreases output current to motor at motor standstill.
F/H	Step angle select	Switches the motor's step angle. F (Full Step): 1.8°/step, H (Half Step): 0.9°/step (F: 0.9°/step, H: 0.45°/step for High-Resolution Type)
1P/2P	Pulse input mode	Switches between 1-pulse input mode and 2-pulse input mode.
24/36V	Power supply voltage select	Changes power supply voltage. For 24 VDC and 36 VDC

4 Input/Output Signals (TB1)

Indication	Input/Output	Signal Name
+POWER	Input	+24 VDC±10% or +36 VDC±10%
-POWER		GND
+TIMING	Output	Timing Signal
-TIMING		
+C.OFF	Input	All Windings OFF Signal
-C.OFF		
+DIR./CCW	Input	Rotation Direction Signal (CCW Pulse Signal)
-DIR./CCW		
+PLS/CW	Input	Pulse Signal (CW Pulse Signal)
-PLS/CW		

CSK29□



1 Current Adjustment Potentiometers

Indicator	Name of Potentiometer	Function
RUN VR	Motor run current potentiometer	For adjusting the motor running current.
STOP VR	Motor stop current potentiometer	For adjusting the motor current at standstill.

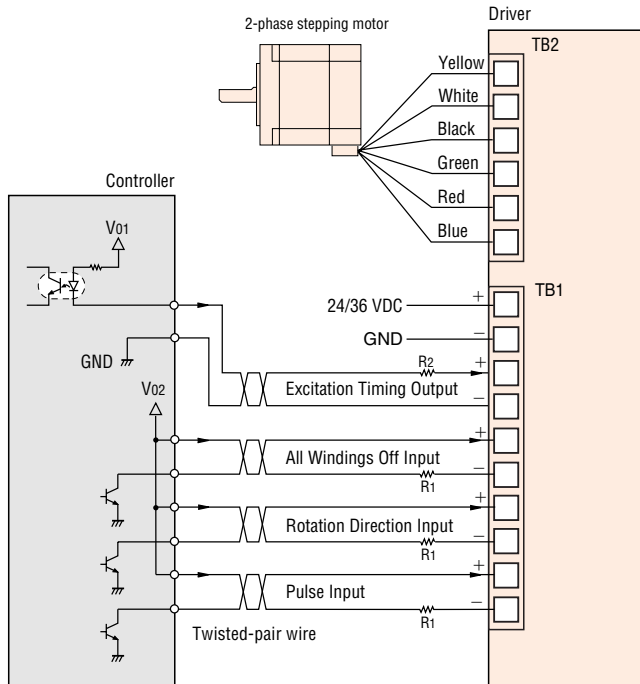
2 Function Select Switches

Indicator	Switch Name	Function
ACD	Automatic current cutback function select	Automatically decreases output current to motor at motor standstill.
F/H	Step angle select	Switches the motor's step angle. F (Full Step): 1.8°/step, H (Half Step): 0.9°/step

3 Input/Output Signals (TB3)

Terminal No.	Indication	Input/Output	Signal Name
1	+PLS	Input	Pulse Signal
2	-PLS		
3	+DIR.	Input	Rotation Direction Signal
4	-DIR.		
5	+C.OFF	Input	All Windings OFF Signal
6	-C.OFF		
7	+TIMING	Output	Timing Signal
8	-TIMING		
9	NC	-	-

● Connection Diagrams
 ◆ CSK24□, CSK26□
 CSK24□M, CSK26□M



◆ Power Supply

Keep the input power voltage to 24 VDC \pm 10% or 36 VDC \pm 10%. Use a power supply that provides sufficient input current.

Notes:

- Keep the voltage V_{01} and V_{02} between 5 VDC and 24 VDC. When they are equal to 5 VDC, the external resistance R_1 is not necessary. When they are above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA, and connect R_2 to keep the current below 10 mA.
- Use twisted-pair wire of AWG 24 or thicker and 6.6 feet (2 m) or less in length for the signal line.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decrease.
(→ Technical Reference Page F-36)
- Suitable wire size for the TB1, TB2 and TB3 connector is between AWG 20 and 26. Use AWG 20 or thicker for motor lines (when extended) and power supply line.
- Signal lines should be kept at least 3.9 inches (10 cm) away from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
- Use spot grounding to ground the driver and external controller.
- If noise generated by the motor lead wire causes a problem, try shielding the motor lead wires with conductive tape or wire mesh.
- Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning power on.

● Description of Input/Output Signals
Pulse (CW) Input and Rotation Direction (CCW) Input Signal

1-Pulse Input Mode

Pulse Input 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 rotation direction signal.

Rotation Direction Input 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 Input 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 Input 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 Input Signal

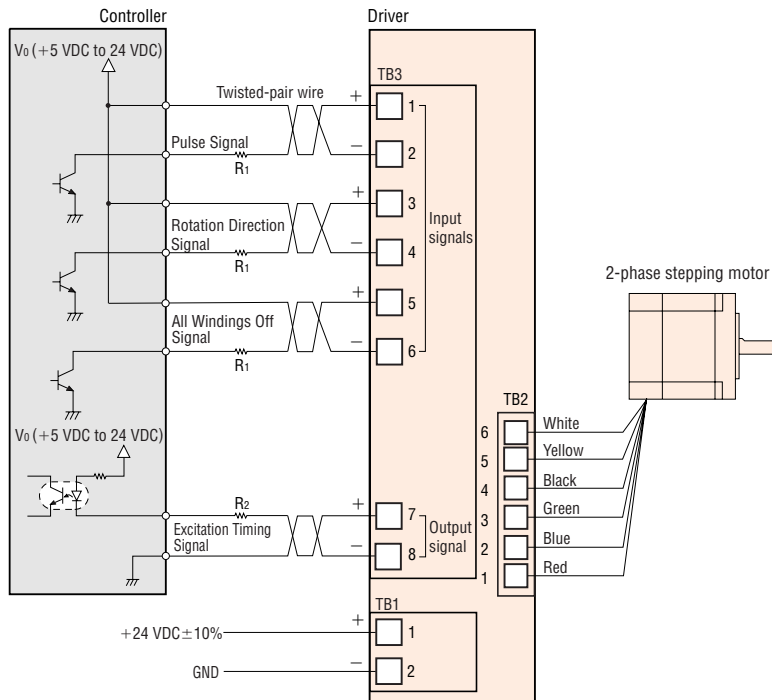
When the "All Windings Off" (A.W. OFF) signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand. This signal is used when moving the motor by external force or to the manual home position.

Excitation Timing Output Signal

The Excitation Timing signal is output once each time the excitation sequence returns to step "0" in synchronization with input pulse. The excitation sequence is designed to complete one cycle as the motor shaft rotates 7.2° .

A signal is output every 4 pulses in full step mode and every 8 pulses in half step mode. (When the "excitation timing" signal is output, the transistor turns ON.)

◆ CSK29□



◆ Power Supply

Keep the input power voltage at $24 \text{ VDC} \pm 10\%$. Use a power supply that provides sufficient input current.

Notes:

- Keep the voltage V_o between 5 VDC and 24 VDC. When V_o is equal to 5 VDC, the external resistance R_1 is not necessary. When V_o is above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA, and connect R_2 to keep the current below 10 mA.
- Use twisted-pair wire of AWG 24 or thicker and 6.6 feet (2 m) or less in length for the signal line.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decrease.
(→ Technical Reference Page F-36)
- Suitable wire size for the TB1, TB2 and TB3 connector is between AWG 20 and AWG 26. Use AWG 20 or thicker for motor lines (when extended) and power supply line.
- Signal lines should be kept at least 3.9 inches (10 cm) away from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
- Use spot grounding to ground the driver and external controller.
- If noise generated by the motor lead wire causes a problem, try shielding the motor lead wires with conductive tape or wire mesh.
- Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning power on.

● Description of Input/Output Signals

Pulse Input Signal

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

Rotation Direction Input Signal

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

All Windings Off Input Signal

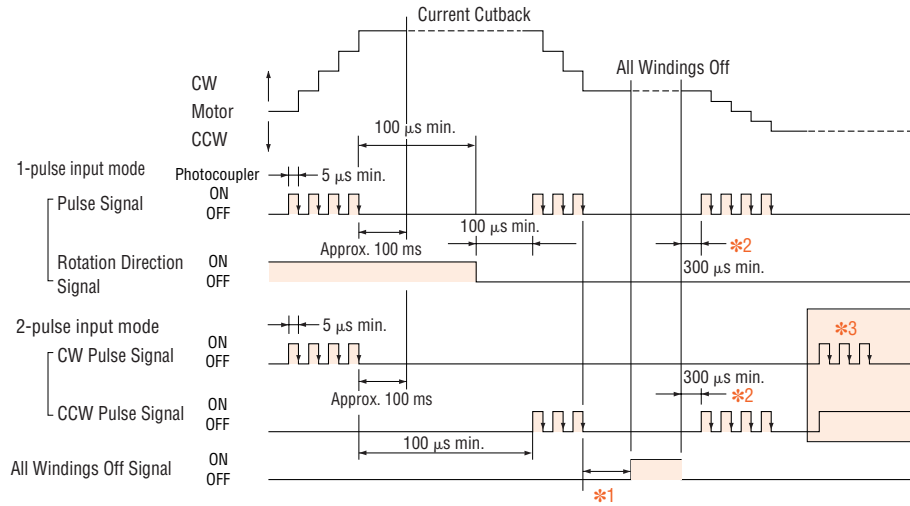
When the "All Windings Off" (A.W. OFF) signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand. This signal is used when moving the motor by external force or to the manual home position.

Excitation Timing Output Signal

The signal is output once each time the excitation sequence returns to step "0" in synchronization with input pulse. The excitation sequence is designed to complete one cycle as the motor shaft rotates 7.2° . A signal is output every 4 pulses in full step mode and every 8 pulses in half step mode. (When the "excitation timing" signal is output, the transistor turns ON.)

● Timing Chart

◆ CSK24□, CSK26□ CSK24□M, CSK26□M

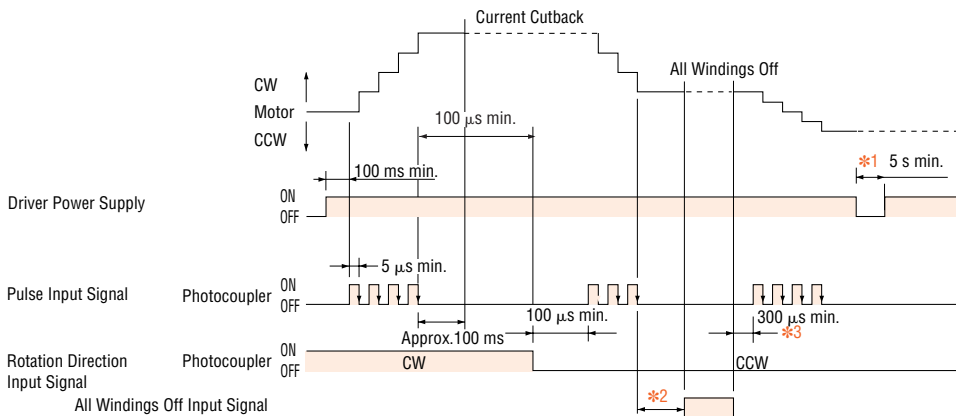


Note: 100 μ s or more is the standard interval time for switching from CW to CCW. Note that the interval time varies greatly depending on the motor and load inertia.

- *1 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. The signal input must be stopped before the motor stops.
- *2 Never input a step pulse signal immediately after switching the "All Windings Off" input signal to the "photocopier OFF" state or the motor may lose synchronism. In general, a minimum interval of 300 ms is required.
- *3 The motor will not operate properly if a pulse signal is input when either the CW or CCW pulse is in the "photocopier ON" state.

The shaded area indicates when the photocopier is ON.

◆ CSK29□



Note: 100 μ s or more is the standard interval time for switching from CW to CCW. Note that the interval time varies greatly depending on the motor and load inertia.

- *1 After turning off the power supply, wait at least 5 seconds before turning it on again.
- *2 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. The signal input must be stopped before the motor stops.
- *3 Never input a step pulse signal immediately after switching the "All Windings Off" signal to "photocopier OFF" state, or the motor may lose synchronism. In general, a minimum interval of 300 ms is required.

The shaded area indicates when the photocopier is ON.

Introduction

AS

AS PLUS

ASC

RK

CKII

CSK

PMC

UMK

CSK

PK/PV

PK

U12120G

EMP401

EMP402

SG8030J

SMK

Accessories

Before Using a Stepping Motor

Controllers

Low-Speed Synchronous Motors

Accessories

Before Using a Stepping Motor

● Adjusting the Output Current

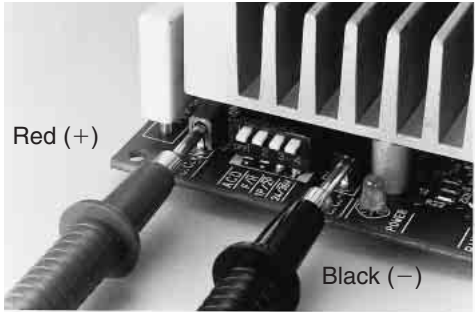
◆ CSK24□, CSK26□ CSK24□M, CSK26□M

◆ 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

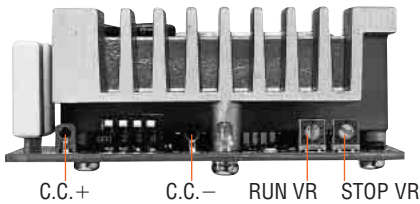
Insert the voltmeter test probes [approximately $\phi 0.18$ inch ($\phi 2.1$ mm)] as shown below. The current value for one phase is equivalent to the voltage shown by the voltmeter. (ex: voltmeter voltage 1 V = 1 A/Phase)



Adjusting the Motor Running 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 0.3 A/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.

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 50% of the run operating current (0.3 A 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.

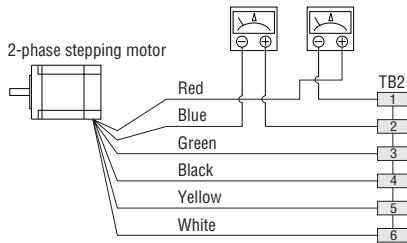
$$\text{Holding torque [oz-in (N·m)]} = \frac{\text{Maximum holding torque [oz-in (N·m)]} \times \text{Current at motor standstill [A]}}{\text{Motor rated current [A]}}$$

◆ CSK29 □

◆ Adjusting Method

Connecting an Ammeter

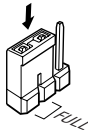
Connect the driver, motor and DC ammeter.



Motor Running Current

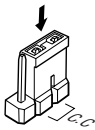
1. Set the step angle to full step.

Set the jumper socket for the step angle switch (FULL/HALF) to "FULL".



2. Disable the automatic current cutback function.

Set the jumper socket for automatic current cutback function (C.C/A.C.D) to "C.C".

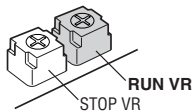


3. Turn on the power supply.

Wait until the motor reaches its operating current.

4. Manipulate the potentiometer for adjusting the motor operating current (RUN VR).

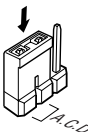
Adjust the potentiometer using an insulated screwdriver. The sum of the two DC ammeter readings indicates the current per motor phase. Be sure to adjust the current to the motor's rated current or below.



Example: When the DC ammeter readings indicate 1.05 A and 0.95 A respectively, the output current per motor phase is 2.0 A.

5. Turn off the power supply.

6. Set the jumper socket for automatic current cutback function (C.C/A.C.D) to "A.C.D." again.

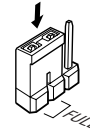


This completes the adjustment of the motor running current.

Motor Standstill Current

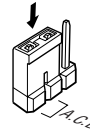
1. Set the step angle to full step.

Set the jumper socket for the step angle switch (FULL/HALF) to "FULL".



2. Enable the automatic current cutback function.

Set the jumper socket for automatic current cutback function (C.C/A.C.D.) to "A.C.D.".

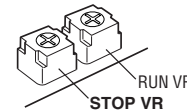


3. Turn on the power supply.

Wait until the motor reaches its standstill current.

4. Manipulate the potentiometer for adjusting the motor standstill current (STOP VR).

Adjust the potentiometer using an insulated screwdriver. The sum of the two DC ammeter readings indicates the current per motor phase. Be sure to adjust the current to 40 percent of the motor's rated current or below.



5. Turn off the power supply.

This completes the adjustment of the motor standstill current.

List of Motor and Driver Combinations

Type	Model	Motor Model	Driver Model
Standard	CSK243-□TA	PK243-01□A	CSD2109-T
	CSK244-□TA	PK244-01□A	CSD2112-T
	CSK245-□TA	PK245-01□A	
	CSK264-□T	PK264-02□	CSD2120-T
	CSK266-□T	PK266-02□	
	CSK268-□T	PK268-02□	
		CSK296-□TA	PK296-03□A
CSK299-□TA		PK299-03□A	
	CSK2913-□TA	PK2913-02□A	CSD2140T
High-Resolution	CSK243M□TA	PK243M□A	CSD2109-T
	CSK244M□TA	PK244M□A	CSD2112-T
	CSK245M□TA	PK245M□A	
	CSK264M□T	PK264M□	CSD2120-T
	CSK266M□T	PK266M□	
CSK268M□T	PK268M□		
SH Geared	CSK243□TA-SG3.6	PK243□1A-SG3.6	CSD2109-T
	CSK243□TA-SG7.2	PK243□1A-SG7.2	
	CSK243□TA-SG9	PK243□1A-SG9	
	CSK243□TA-SG10	PK243□1A-SG10	
	CSK243□TA-SG18	PK243□1A-SG18	
	CSK243□TA-SG36	PK243□1A-SG36	
	CSK264□TA-SG3.6	PK264□2A-SG3.6	CSD2120-T
	CSK264□TA-SG7.2	PK264□2A-SG7.2	
	CSK264□TA-SG9	PK264□2A-SG9	
	CSK264□TA-SG10	PK264□2A-SG10	
	CSK264□TA-SG18	PK264□2A-SG18	
	CSK264□TA-SG36	PK264□2A-SG36	

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