

# Closed Loop Stepper Systems

E -Series



## High Performance Steppers

The new eCL series introduces simple and precise closed loop control to Parker's microstepping product platform. Available in two driver form factors, standard (4Arms) and mini (2Arms), the eCL system optimizes performance with a wide array of stepper motors with integrated encoder feedback (Nema8, 11, 14, 17, 23, 60mm).

The eCL system maintains the inherent advantages of stepper control (high torque, stiffness, responsiveness, stability, no dither, simplicity) while eliminating common disadvantages (stalling, energy usage, motor temp, high speed operation, positional accuracy) through the addition of an innovative closed loop control algorithm.

## Contact Information:

Parker Hannifin Corporation  
**Electromechanical & Drives Division**  
5500 Business Park Drive  
Rohnert Park, CA 94928

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email: emn\_support@parker.com

www.parkermotion.com

## Drive Specifications

Part Number	eCLD-2DC-SD	eCLD-4DC-SD
Output Current, amps	2	4
Drive Input Voltage	24VDC +/-10%	
Current Consumption	500mA (excluding motor current)	
Control Method	Closed Loop Control	
Command Signal	Type	Step & Direction (1-pulse) or CW/CCW (2-Pulse) Selectable via DIP switch 5V TTL or 12-24V open collector
	Input Rate	500kHz maximum
Rotational Direction	CW/CCW (Selectable via DIP switch)	
Resolution	16 Selectable choices : 500, 1000, 1600, 2000, 3200, 3600, 4000, 5000, 6400, 8000, 10000, 20000, 25000, 36000, 40000, 50000 (Selectable via DIP switches)	
I/O	Inputs	Enable, Alarm reset 5-24VDC opto-isolated
	Outputs	In-position, Alarm 5-24VDC opto-isolated
Protective Functions	Overcurrent, Over speed, Position Tracking Error, Over Load, Over Temperature, Over Voltage, Motor Connection Error, Encoder Connection Error, Motor Voltage Error, In-Position Error, ROM Error, Position Overflow Error	
LED Display	Power status, In-Position status, Enable status, Alarm status	
Environmental	0 - 50 °C ( 32 - 122 °F ) 35 -85% non-condensing	
Standards	CE (EMC) RoHS	



ENGINEERING YOUR SUCCESS.

# e-Series Closed Loop Steppers

## Closed Loop System

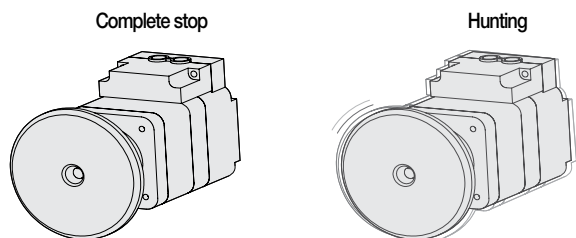
The eCL system is an innovative closed loop stepper motor and controller that utilizes motor mounted feedback to constantly monitor shaft position. Actual motor shaft position data is updated every 25 microseconds allowing the drive to compensate for sudden load changes ensuring accurate position control.

- In-position output signals controller that move is complete
- Prevents stalls thru position monitoring
- Alarm signal to controller if overload results in motor stalling
- Reduced motor heating and energy usage

## No Tuning, no hunting

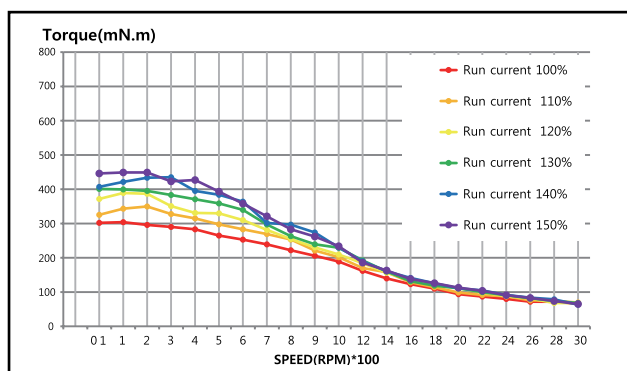
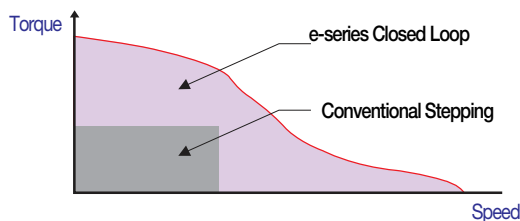
Unlike traditional closed loop servo systems, the eCL system requires no tuning. Gains have been optimized for the motor/drive combination to insure smooth and stable motion.

Once the eCL motor reaches its target position, the rotor locks into place at a perfect standstill. Traditional servo motors typically hunt between encoder pulses at standstill which could adversely affect applications requiring zero vibration.



## Better Performance

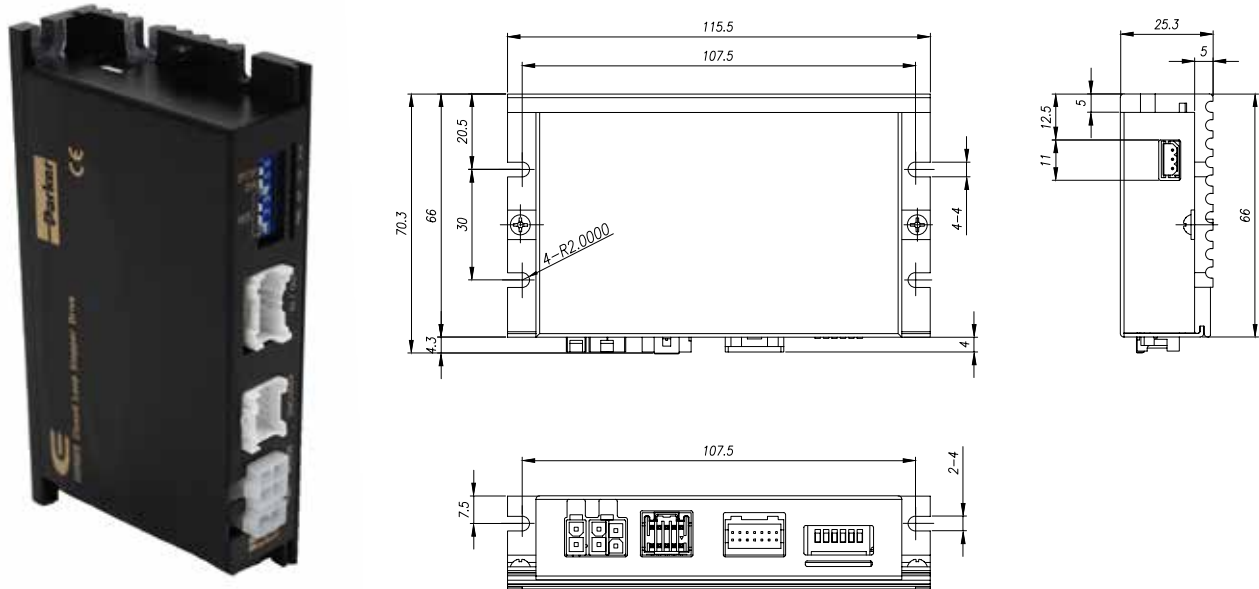
Synchronization errors and motor stalling that plague traditional stepper systems are eliminated with the eCL's closed loop control algorithm allowing for higher torque and speed performance.



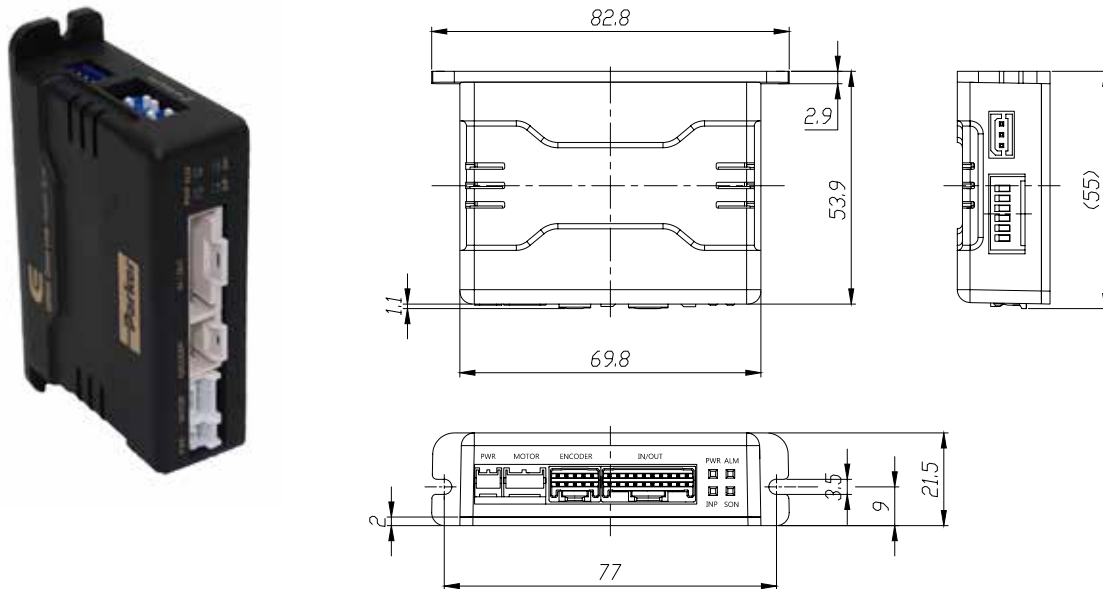
The eCL also incorporates a "Peak Torque Boost" feature that increases available torque for starting and stopping by as much as 50%.

# e-Series Stepper Drives

## eCLD-4DC-SD 4 Amp Drive Dimensions



## eCLD-2DC-SD 2 Amp Drive Dimensions

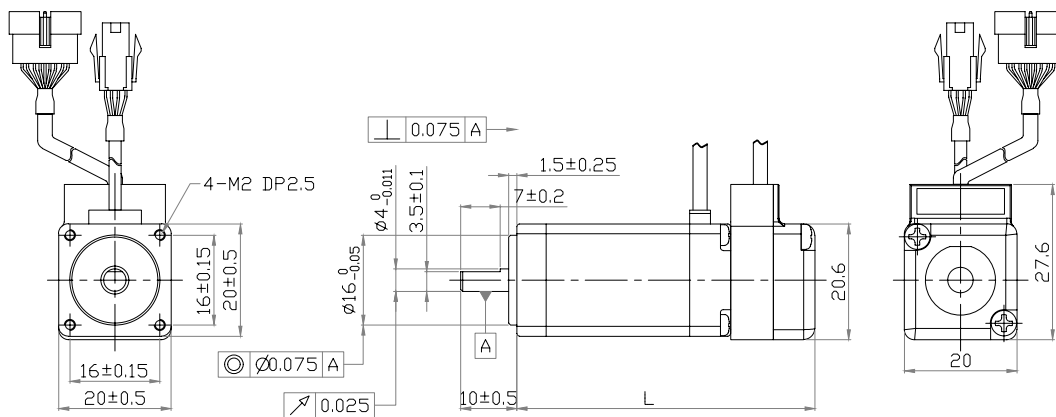


# e-Series Stepper Motors

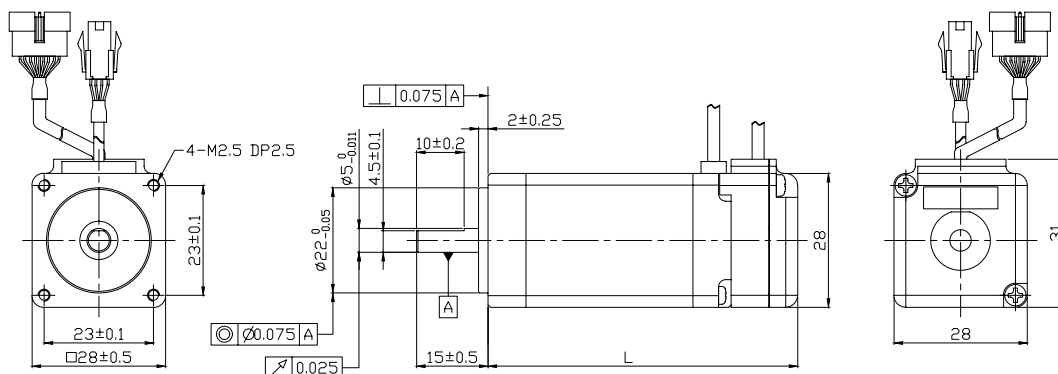
## Specifications

		eCLM-S082F	eCLM-S083F	eCLM-S111F	eCLM-S112F	eCLM-S113F
Motor Frame Size		NEMA8		NEMA11		
Static Torque	N-m	0.018	0.037	0.069	0.098	0.118
	oz-in	2.5	5.2	9.8	13.9	16.7
Rated Current	Arms	0.6	0.6	0.67	0.67	0.67
Encoder Resolution	ppr	4000	4000	4000	4000	4000
Rotor Inertia	kg-cm <sup>2</sup>	0.0025	0.0033	0.009	0.013	0.018
	oz-in <sup>2</sup>	0.01	0.02	0.05	0.07	0.10
Weight	kg	0.070	0.080	0.11	0.14	0.20
	lb	0.15	0.18	0.24	0.31	0.44
Motor Length (L)	mm	48	53	46	59	65
	in	1.30	1.50	1.26	1.77	2.01

### eCLM-S08x NEMA8 Motor Dimensions



### eCLM-S1xx NEMA11 Motor Dimensions

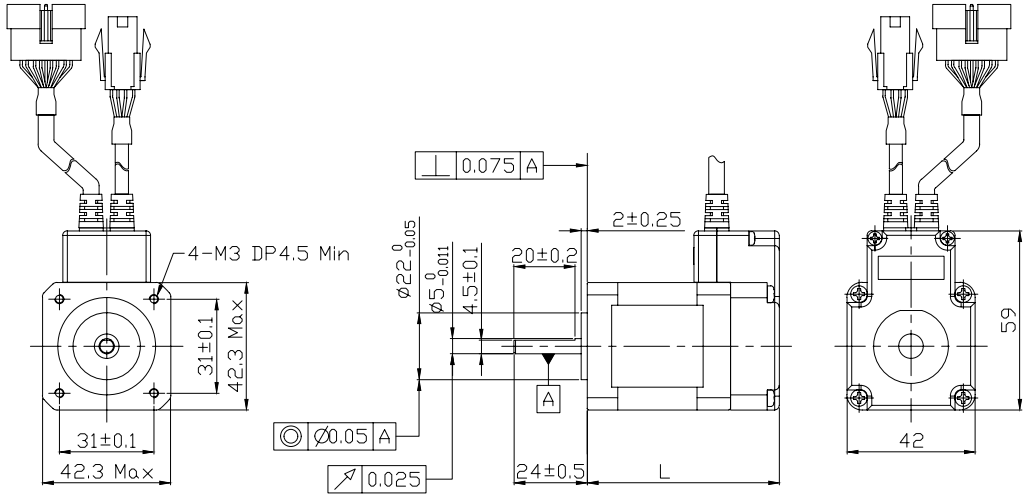


# e-Series Stepper Motors

## Specifications

		eCLM-S171F	eCLM-S172F	eCLM-S173F	eCLM-S174F
Motor Frame Size		NEMA17			
Static Torque	N-m	0.216	0.353	0.431	0.650
	oz-in	30.6	50	61	92
Rated Current	Arms	1.33	1.68	1.68	1.2
Encoder Resolution	ppr	4000	4000	4000	4000
Rotor Inertia	kg-cm <sup>2</sup>	0.035	0.054	0.077	0.114
	oz-in <sup>2</sup>	0.19	0.30	0.42	0.62
Weight	kg	0.22	0.28	0.35	0.5
	lb	0.49	0.62	0.77	1.10
Motor Length (L)	mm	49	55	63	76
	in	1.93	2.17	2.48	2.99

eCLM-S17x NEMA17 Motor Dimensions

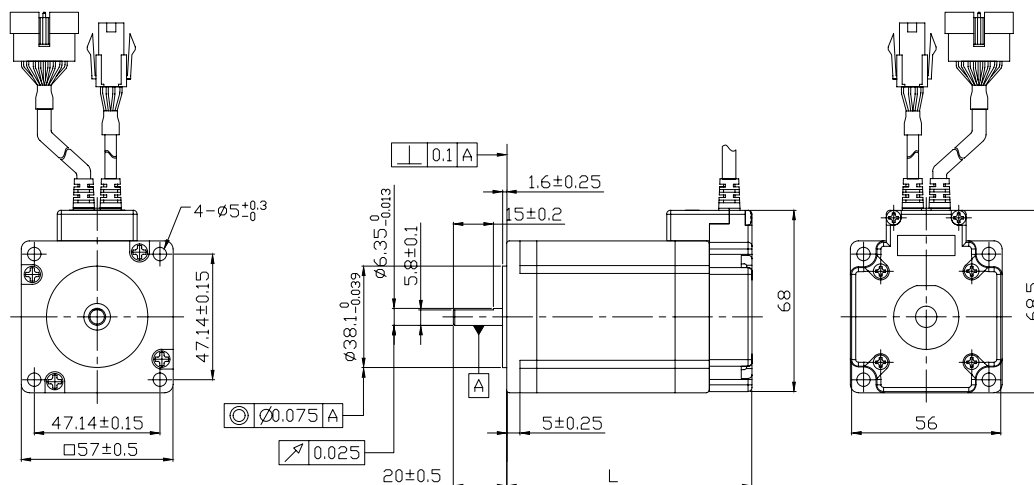


# e-Series Stepper Motors

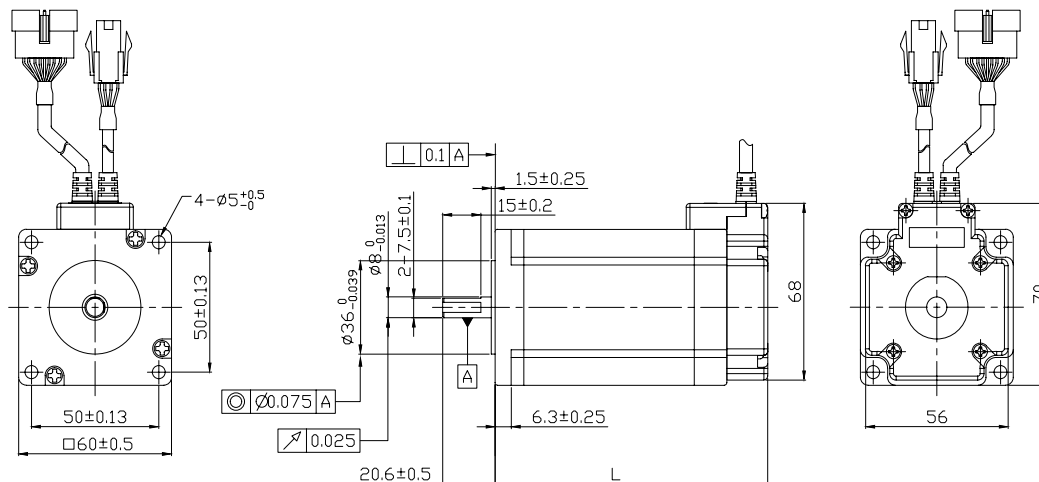
## Specifications

		eCLM-S231F	eCLM-S232F	eCLM-S233F	eCLM-S601F	eCLM-S602F	eCLM-S603F
Motor Frame Size		NEMA23			60mm		
Static Torque	N-m	0.54	1.0	1.72	0.88	1.28	2.4
	oz-in	76	142	243	125	181	340
Rated Current	Arms	2.8	2.8	2.8	4	4	4
Encoder Resolution	ppr	4000	4000	4000	4000	4000	4000
Rotor Inertia	kg-cm <sup>2</sup>	0.18	0.28	0.52	0.24	0.49	0.69
	oz-in <sup>2</sup>	0.98	1.53	2.84	1.31	2.68	3.77
Weight	kg	0.47	0.7	1.0	0.6	1.0	1.3
	lb	1.04	1.54	2.21	1.32	2.21	2.87
Motor Length (L)	mm	57	72	92	63	72	101
	in	2.24	2.83	3.62	2.48	2.83	3.98

### eCLM-S23x NEMA23 Motor Dimensions

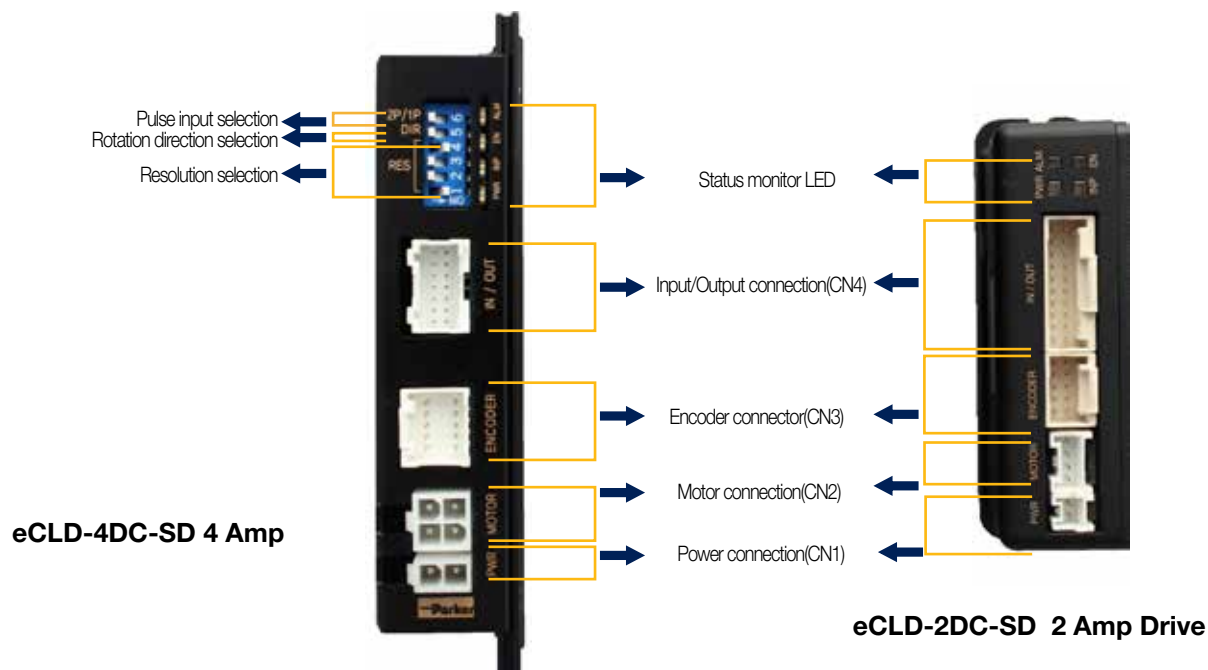


### eCLM-S60x 60mm Motor Dimensions



# e-Series Stepper Drives

## Operation and Settings

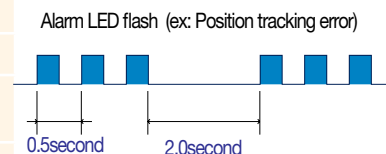


### LED Status

Name	Color	Function	ON/OFF Condition
PWR	Green	Power Input Indication	ON : power is applied
INP	Yellow	Complete Positioning Motion	ON : Position Deviation located within preset value from target position, after Position Command Pulse Input is completed
EN	Orange	Motor Enable Status	ON: Drive Enable OFF: Drive Disabled
ALM	Red	Alarm Indication	ON : Flashes when protection function is activated. Number of flashes indicates the alarm type

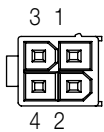
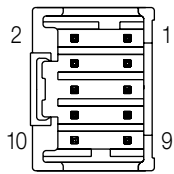
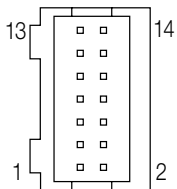
### Alarm Indication

# of Flashes	Protection	Condition
1	Over Current	Current through power devices exceeds the limit
2	Over Speed	Motor speed exceeds 3000rpm
3	Position Tracking	Position error value exceeds 90° in motor run state
4	Over Load	Motor continuous operation for more than 5 seconds exceeding max. torque
5	Over Temperature	Inside temperature of drive exceeds 85° C
6	Over Regenerated Voltage	Back-EMF more than 48V
7	Motor Connect	Power is ON without connection of motor cable
8	Encoder Connect	Encoder Cable connection error
9	Motor Voltage	Motor voltage less than 20V
10	In-Position Error	After operation is finished, a position error occurs
12	ROM Error	Error occurs in parameter storage device(ROM)
15	Position Overflow	Position error value exceeds 90° in motor idle state



## Connector Pin-outs

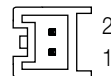
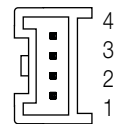
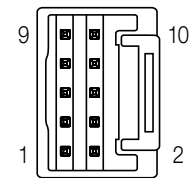
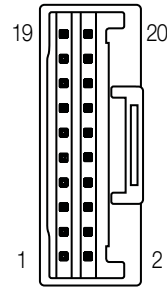
eCLD-4DC-SD 4 Amp Drive



## I/O Connector (CN4)

eCLD-4DC	CN4		eCLD-2DC
Pin #	Function		Pin #
12	CW+(Pulse+)	Input	1
11	CW-(Pulse-)	Input	2
14	CCW+(Dir+)	Input	3
13	CCW-(Dir-)	Input	4
3	24GND(EXT)	Input	19
4	24V(EXT)	Input	20
6	Enable	Input	13
5	Alarm Reset	Input	14
9	Open Collector Input	Input	15
7	Alarm		11
8	In-Position		12
2	Brake+		16
1	Brake-		17
10	F.GND	---	

eCLD-2DC-SD 2 Amp Drive



## Encoder Connection (CN3)

eCLD-4DC	CN2	eCLD-2DC
Pin #	Function	Pin #
1	A+	1
2	A-	2
3	B+	3
4	B-	4
5	NC	5
6	NC	6
7	5VDC	7
8	5GND	8
9	F. GND	9
10	F. GND	10

## Motor Connection (CN2)

eCLD-4DC	CN2	eCLD-2DC
Pin #	Function	Pin #
1	A Phase	4
2	B Phase	1
3	/A Phase	3
4	/B Phase	2

## Power Connection (CN1)

Pin #	Function	Pin #
1	24VDC ±10%	1
2	GND	2



# e-Series Stepper Drives

## Operation and Settings

### Resolution Selection (SW1)

Position (SW1)				Pulses/ Revolution
1	2	3	4	
ON	ON	ON	ON	500
ON	ON	ON	OFF	1,000
ON	ON	OFF	ON	1,600
ON	ON	OFF	OFF	2,000
ON	OFF	ON	ON	3,200
ON	OFF	ON	OFF	3,600
ON	OFF	OFF	ON	4,000*
ON	OFF	OFF	OFF	5,000
OFF	ON	ON	ON	6,400
OFF	ON	ON	OFF	8,000
OFF	ON	OFF	ON	10,000
OFF	ON	OFF	OFF	20,000
OFF	OFF	ON	ON	25,000
OFF	OFF	ON	OFF	36,000
OFF	OFF	OFF	ON	40,000



### Direction and Pulse Input Mode

Name	#	Function	Switch Position	
			OFF	ON
DIR	5	Rotational Direction Select	CW (+Direction)	CCW (+Direction)
2P/1P	6	Pulse Input Mode Select	2-Pulse Mode (CW/CCW Signal)	1 Pulse Mode (Pulse/Direction Signal)

Direction selection  
switch : ON

CCW Dir.

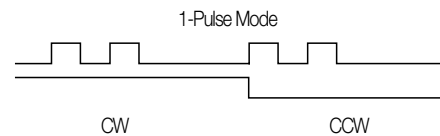
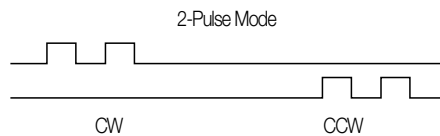


Direction selection  
switch : OFF

CW Dir.

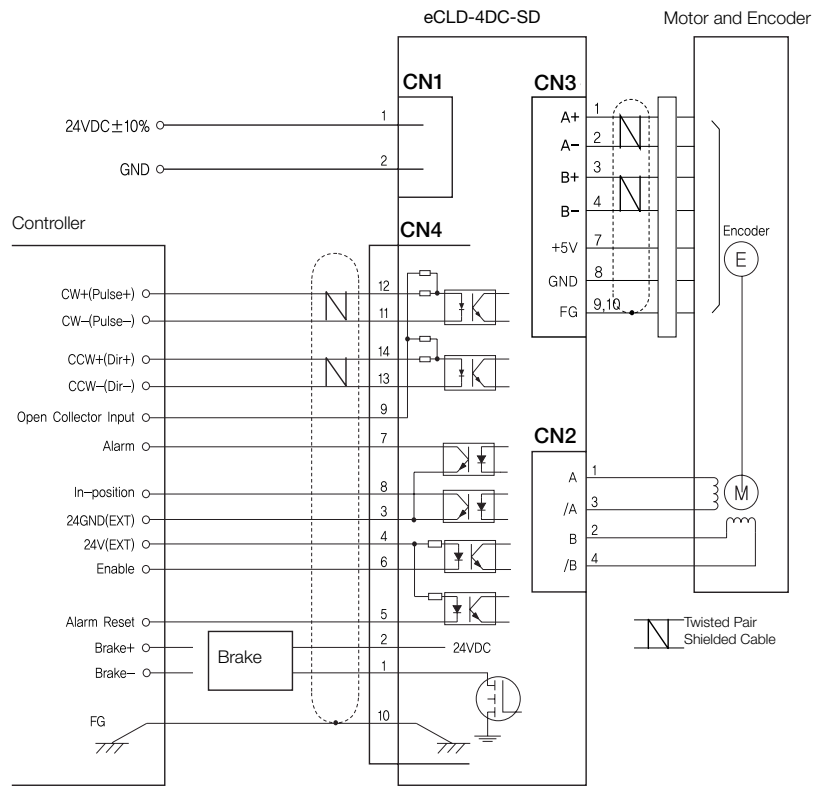


CW(Pulse) Pin  
CCW(Dir) Pin  
Rotational Direction



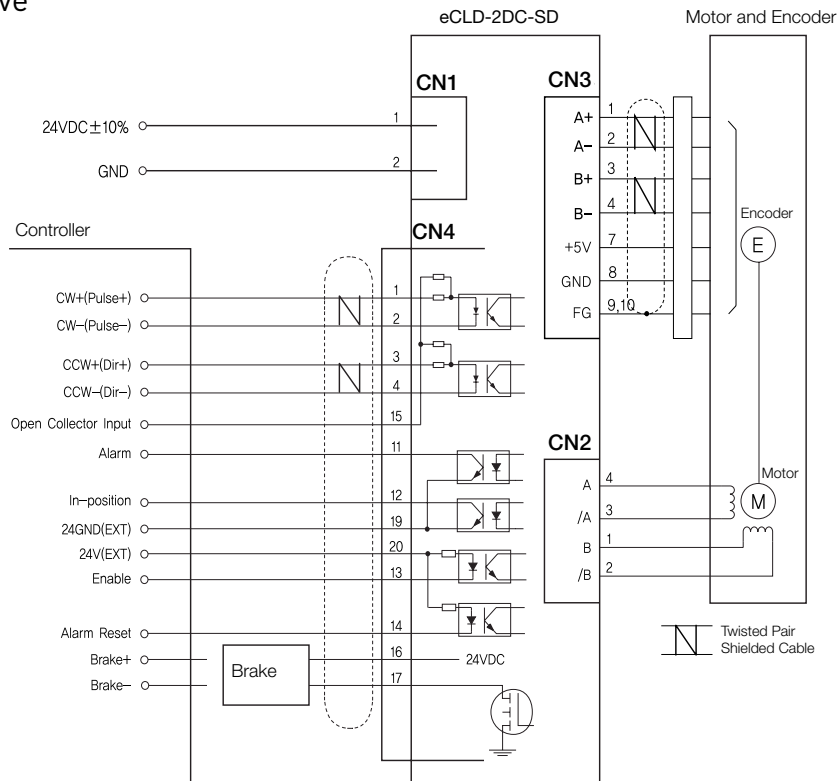
# eCLD-4DC-SD 4 Amp Drive

## Wiring Schematic



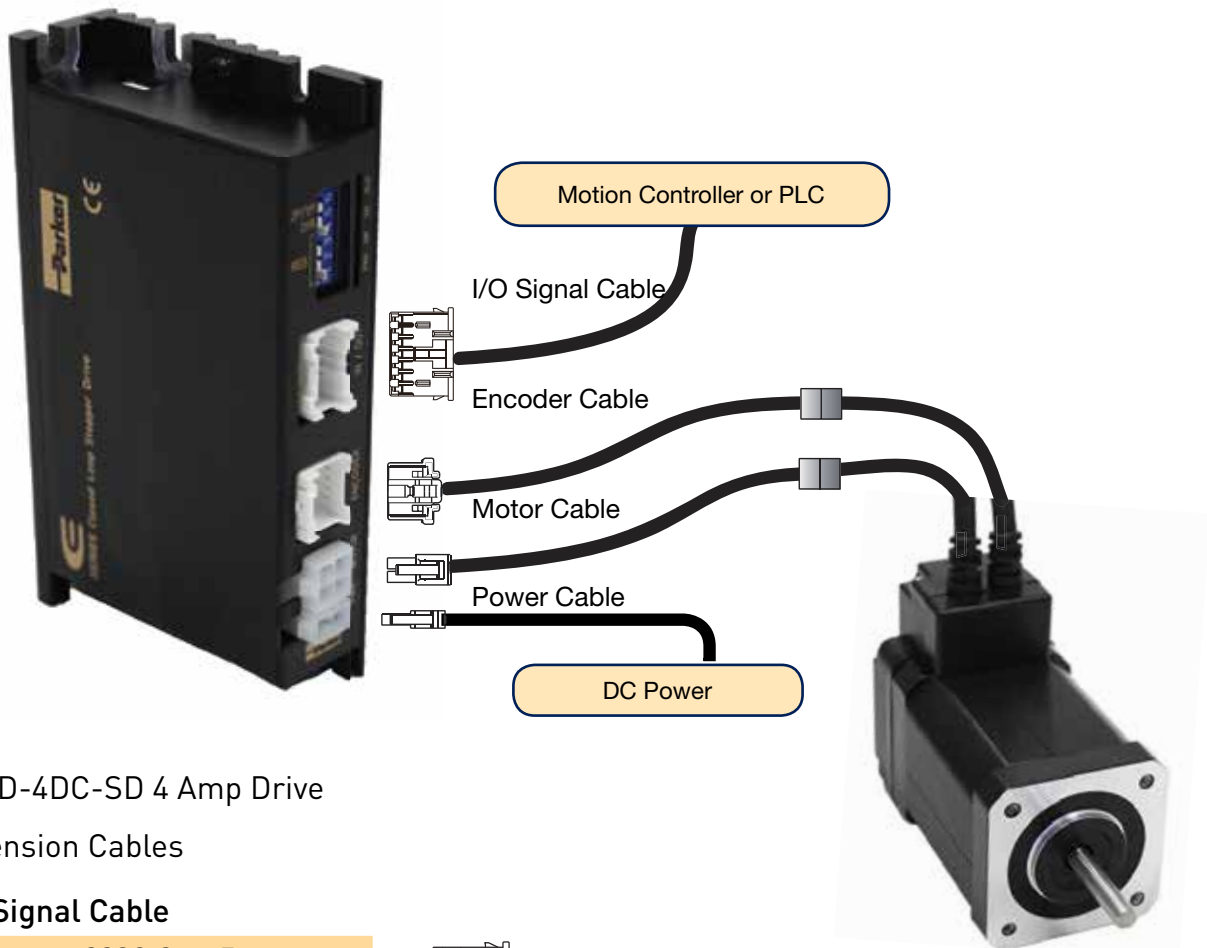
# eCLD-2DC-SD 2 Amp Drive

## Wiring Schematic



# e-Series Stepper Systems

## System Configuration and Cables

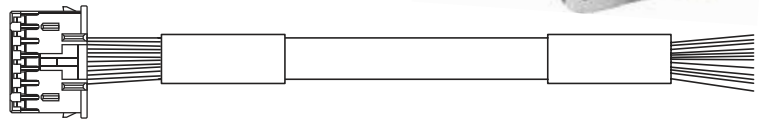


eCLD-4DC-SD 4 Amp Drive

Extension Cables

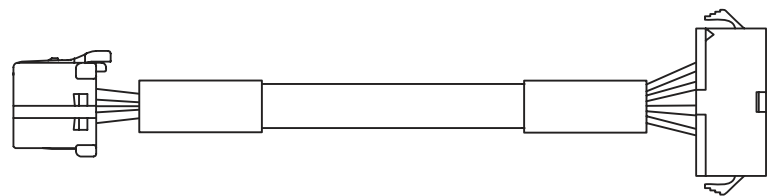
### I/O Signal Cable

CSSO-S-xxxF
xxx= Length in Meters
Available Length : 001, 003



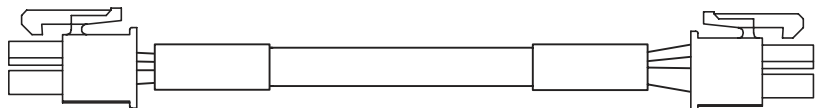
### Encoder Extension Cable

CSVO-E-xxxF
xxx= Length in Meters
Available Length : 001, 003, 005, 010



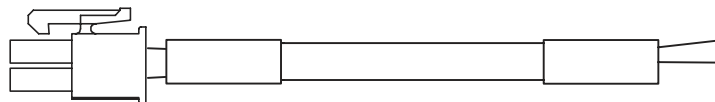
### Motor Extension Cable

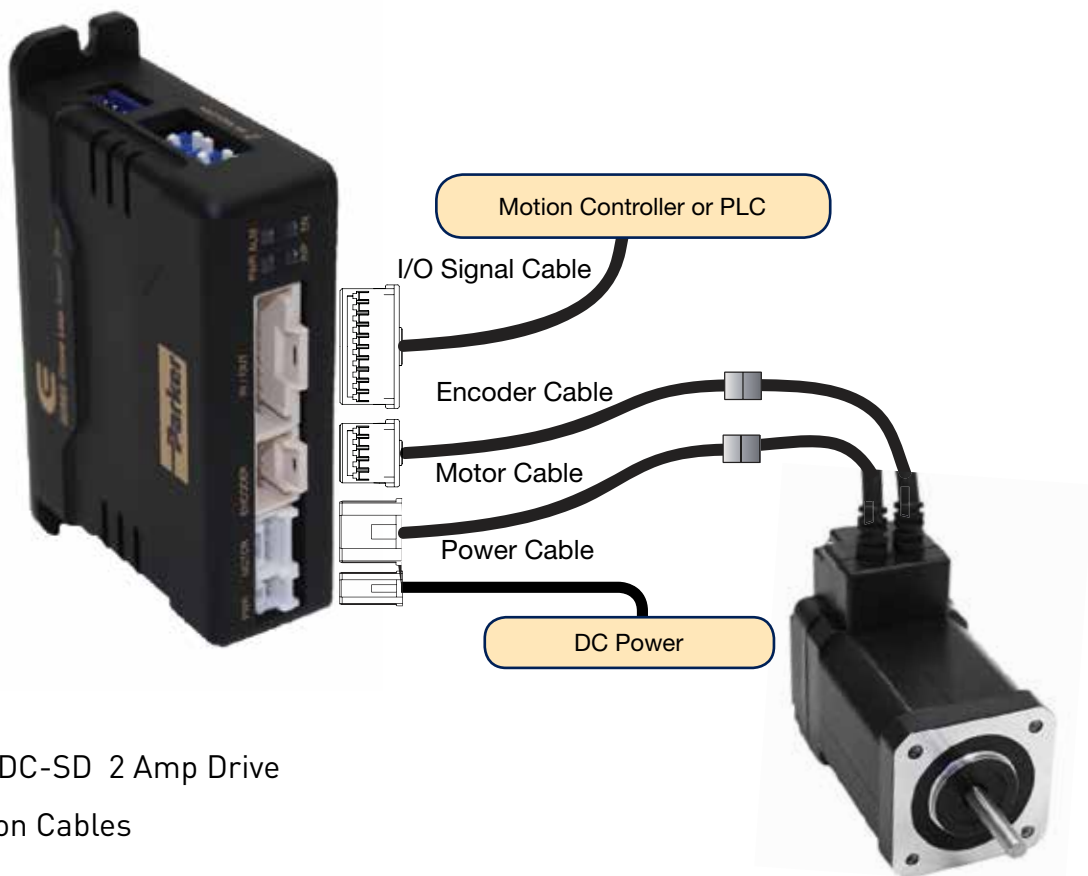
CSVO-M-xxxF
xxx= Length in Meters
Available Length : 001, 003, 005, 010



### Drive Power Cable

CSVO-P-xxxF
xxx= Length in Meters
Available Length : 001, 002

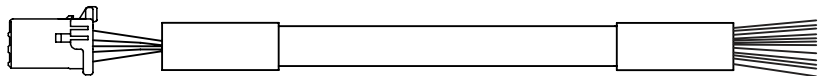




eCLD-2DC-SD 2 Amp Drive  
Extension Cables

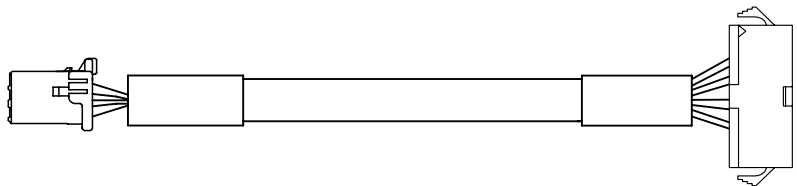
**I/O Signal Cable**

CSSM-S-xxxF
xxx= Length in Meters Available Length : 001, 003



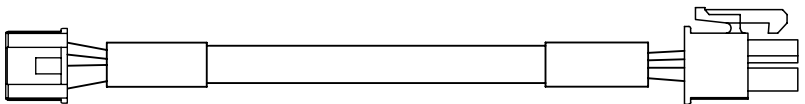
**Encoder Extension Cable**

CSVI-E-xxxF
xxx= Length in Meters Available Length : 001, 003, 005, 010



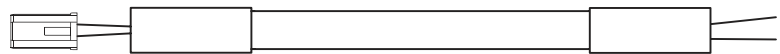
**Motor Extension Cable**

CMNB-M-xxxF
xxx= Length in Meters Available Length : 001, 003, 005, 010



**Drive Power Cable**

CMNB-P-xxxF
xxx= Length in Meters Available Length : 001, 002



# e Series Ordering Information

Select an option from each numbered field to create a complete model order code.

## Drive

Order Example : ① ② ③ ④ ⑤ ⑥

	①	②	③	④	⑤	⑥
Order Example :	eCLD	-	4DC	SD	23	1 F

①	②	③	④	⑤	⑥
Series	Form Factor	Control	Motor Frame	Motor Length	Encoder Resolution
eCLD	2DC- 2Amp, 24VDC 4DC - 4Amp, 24VDC	SD-Step/Direction	08 - NEMA8	1	F – 4000
			11 - NEMA11	2	
			17 - NEMA17	3	
			23 – NEMA23	4	
			60 – 60mm		

## Motor

Order Example : ① ② ③ ④ ⑤

	①	②	③	④	⑤
Order Example :	eCLM	-	S	23	1 F

①	②	③	④	⑤
Series	Drive Type	Frame Size	Motor Length	Feedback
eCLM	S-Step/Direction	08 - NEMA8	1	F – 4000
		11 - NEMA11	2	
		17 - NEMA17	3	
		23 – NEMA23	4	
		60 – 60mm		

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