Emax®

ELECTROMECHANICAL ACTUATORS

SOLUTIONS FOR INDUSTRIAL AUTOMATION

CATALOG 2K

Series EC Cantilever Slides

Series FS Motors & Controls

Series EGP Grippers

1-800-624-8511

OVER 40 YEARS OF AUTOMATION SOLUTIONS

phd® SOLUTIONS FOR INDUSTRIAL AUTOMATION

(219) 747-6151 • Fax (219) 747-6754 • P.O. Box 9070 • Fort Wayne, IN 46899

SERIES EC CANTILEVER SLIDES

Series EC Electric Cantilever Slides as a complete package with motors, controllers, and programming software. Series EC Slides provide programmable, multiple position linear motion. Units move smoothly, while providing rugged, precise movement of tool plate and attached load. Standard travel lengths to 24 in [610 mm].

SERIES FS MOTORS & CONTROLS

Series FS motor and controller packages include motor, choice of controller (stepper or servo) and a Windows-based programming software for fast point-and-click programming. The software uses a powerful, yet easy-to-use programming language. To program or edit an existing program, simply select the appropriate icons and respond to prompting dialog boxes. For added flexibility, standard NEMA frames (17, 23, 34, and 42) are also available for mounting other motor brands of your choice.

EXTREMELY easy to program, see page 65

SERIES EGP GRIPPERS

Series EGP Electric Parallel Grippers are ideal for handling small parts in confined areas when the preferred power source is 24 volt DC. These slim profile, low cost grippers are very compact, yet they provide gripping forces up to 80 lb [356 N] and total jaw travel up to .55 in [14 mm].

Emaximum® Flexibility

Any Way You Want It!

Complete Motion Package

PHD's new Emax® Electromechanical actuators provide maximum design and application flexibility to fit your industrial automation needs. Whether you're looking for a gripper or a slide, Emax® delivers rugged and precise positioning for a wide range of motion control applications. Emax® products can be used individually or combined in a modular configuration with other Emax® or pneumatic actuators from PHD. Best of all, Emax® products are offered at a surprisingly low price. Call today for a FREE motion control package catalog.

1-800-624-8511
www.phdinc.com

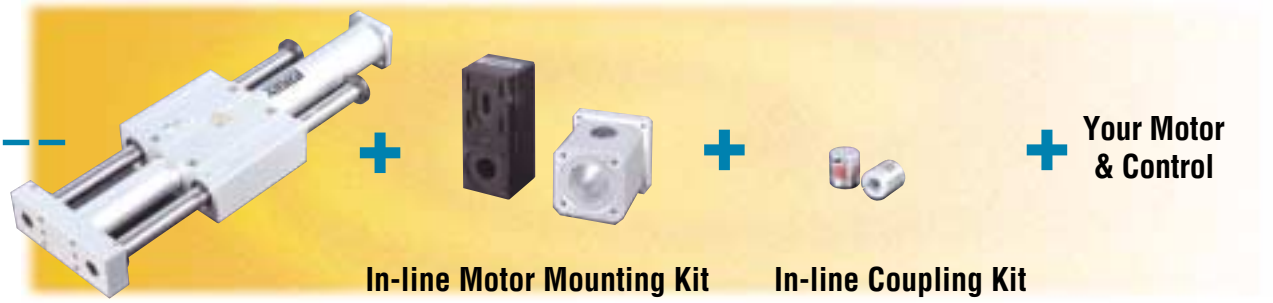
NOTES

Emax® SERIES EC
ELECTROMECHANICAL CANTILEVER SLIDE

INDEX:

PRODUCT SELECTION IS EASY…

ORDER A SLIDE ONLY
and use your own motor & controls…



Series EC Slide
pages 25 to 49

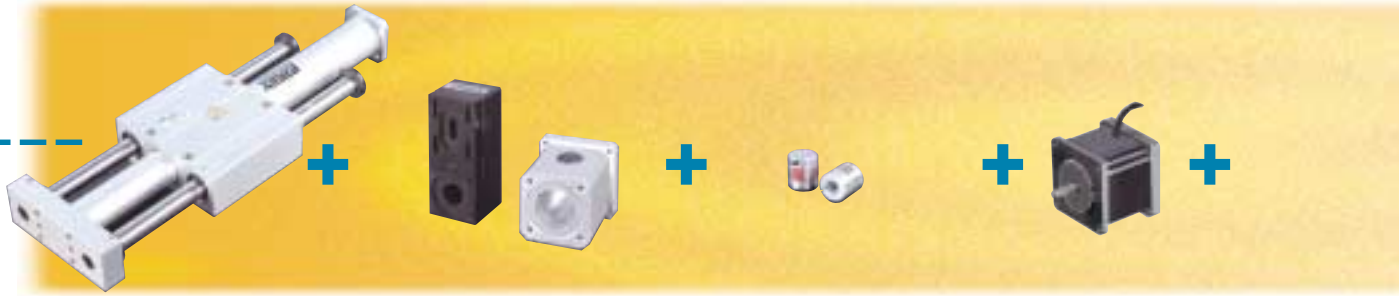
In-line Motor Mounting Kit
pages 32 and 33
Fold-back Motor Mounting Kit
pages 34 and 35

In-line Coupling Kit
pages 32 and 33
Fold-back Pulley Kit
pages 34 and 35
(Coupling and pulley kits sold separately)

Your Motor & Control

or

ORDER A STEPPER PACKAGE



Series EC Slide
pages 25 to 49

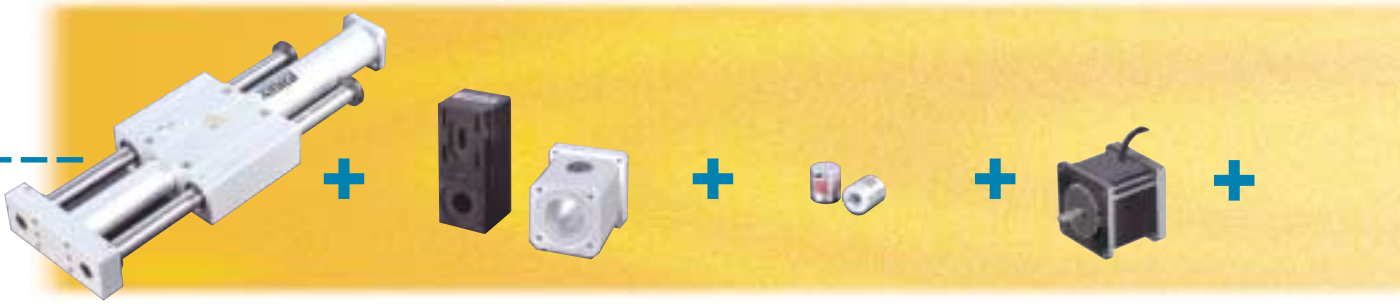
In-line Motor Mounting Kit
pages 32 and 33
Fold-back Motor Mounting Kit
pages 34 and 35

In-line Coupling Kit
pages 32 and 33
Fold-back Pulley Kit
pages 34 and 35
(Coupling and pulley kits sold separately)

Brake (optional)
pages 60 and 61

or

ORDER A SERVO PACKAGE



Series EC Slide
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In-line Motor Mounting Kit
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Fold-back Motor Mounting Kit
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(Coupling and pulley kits sold separately)

Brake (optional)
pages 60 and 61

Application Data Fax Sheet

See the back of this catalog

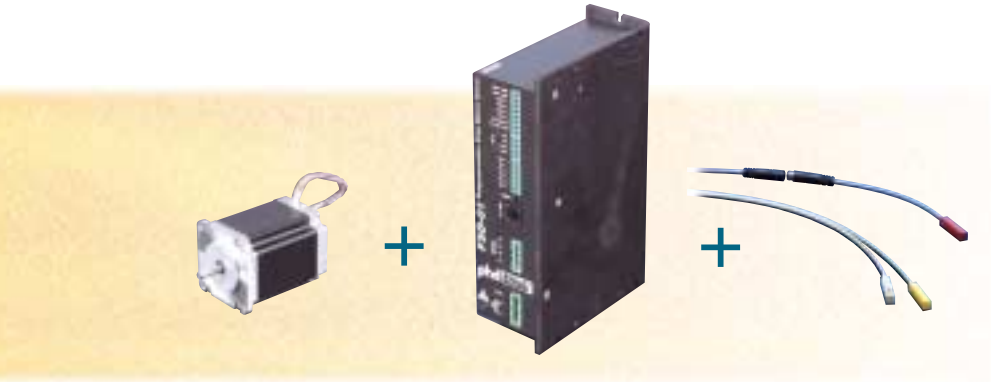
FREE SIZING SOFTWARE

For fast and easy product selection while eliminating the risk!

Call us at **1-800-624-8511** or download from our website at **www.phdinc.com / sizing**

request part number CAT-CD-DR

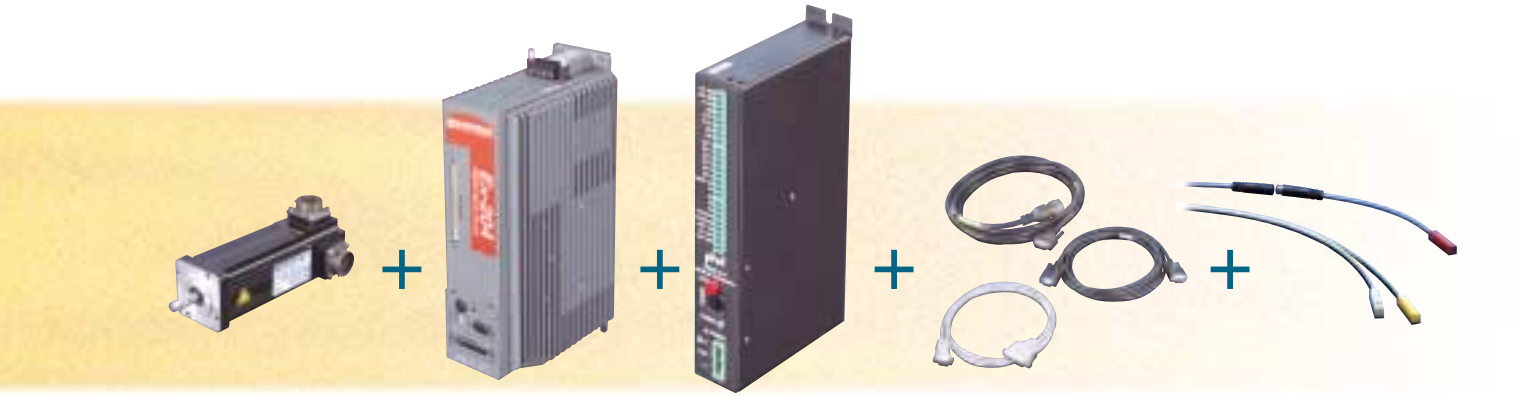
EXTREMELY easy to program,
see page 65



Stepper Motor
page 32
(Screw kit sold separately-
In-line screw kit pages 12 and 13
Fold-back screw kit pages 14 and 15)

***Motion Controller/Drive**
page 32

Switches
page 23



Servo Motor
page 32
(Screw kit sold separately-
In-line screw kit pages 12 and 13
Fold-back screw kit pages 14 and 15)

***Servo Drive**
page 32

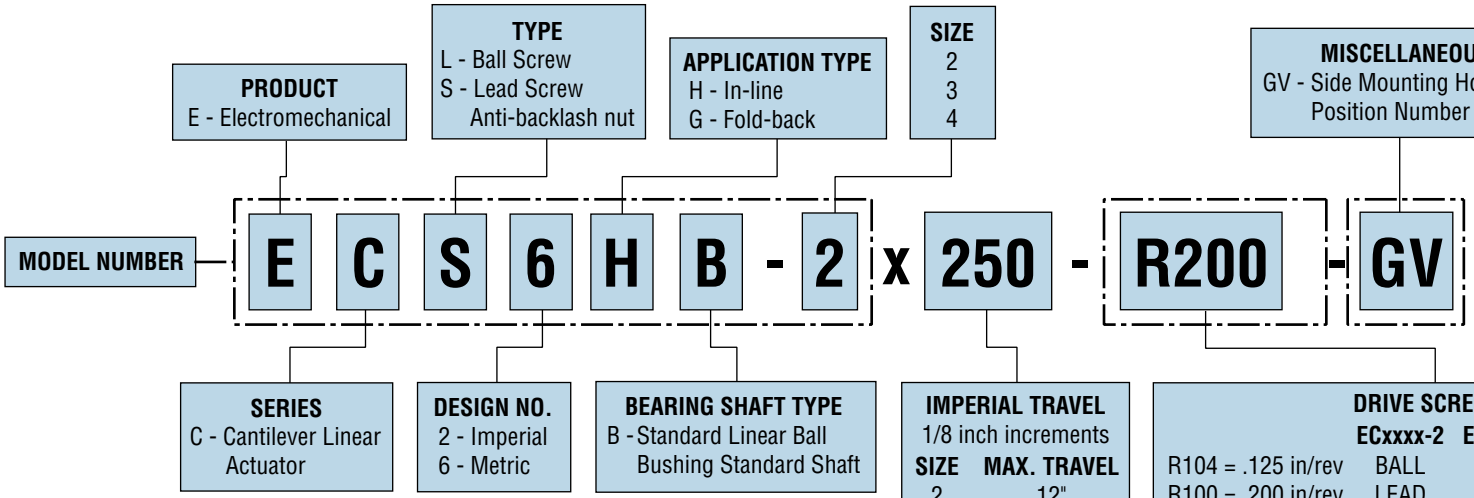
***Motion Controller**
page 32

Cables
page 32

Switches
(Sold separately)
page 23

*Refer to the FREE Sizing Software CD-ROM for Driver/Motor compatibility.

TO ORDER, SPECIFY:
Product, Series, Type, Design No.,
Application Type, Bearing Shaft
Type, Size, Travel, and Screw Leads.



IMPERIAL TRAVEL
1/8 inch increments

SIZE	MAX. TRAVEL
2	12"
3	18"
4	24"

METRIC TRAVEL
5 mm increments

SIZE	MAX. TRAVEL
2	310 mm
3	460 mm
4	610 mm

DRIVE SCREWS

	ECxxxx-2	ECxxxx-3	ECxxxx-4
R104 = .125 in/rev	BALL	BALL	—
R100 = .200 in/rev	LEAD	LEAD	BALL OR LEAD
R101 = .500 in/rev	LEAD	LEAD	BALL OR LEAD
R102 = 1.000 in/rev	LEAD	LEAD	LEAD
R200 = 10 mm/rev	LEAD	LEAD	LEAD
R202 = 20 mm/rev	—	—	LEAD
R203 = 25 mm/rev	LEAD	LEAD	—

NOTES:
1) Motor mounting kits and couplings are ordered separately. See pages 32 thru 35.
2) For ordering examples, see pages 26 and 27.

HALL EFFECT SWITCHES

PART NO.	DESCRIPTION
55803-1-02	NPN 4.5 - 24 VDC WITH 2 METER CABLE
55804-1-02	PNP 4.5 - 24 VDC WITH 2 METER CABLE
55823-1	NPN 4.5 - 24 VDC WITH QUICK CONNECT
55824-1	PNP 4.5 - 24 VDC WITH QUICK CONNECT

6mm SQUARE INDUCTIVE PROXIMITY SWITCHES

PART NO.	DESCRIPTION
18431-001-02	NPN 10 - 30 VDC WITH 2 METER CABLE
18431-002-02	PNP 10 - 30 VDC WITH 2 METER CABLE

REED SWITCHES

PART NO.	DESCRIPTION
55802-1-02	NPN OR PNP 4.5 - 24 VDC WITH 2 METER CABLE
55822-1	NPN OR PNP 4.5 - 24 VDC WITH QUICK CONNECT

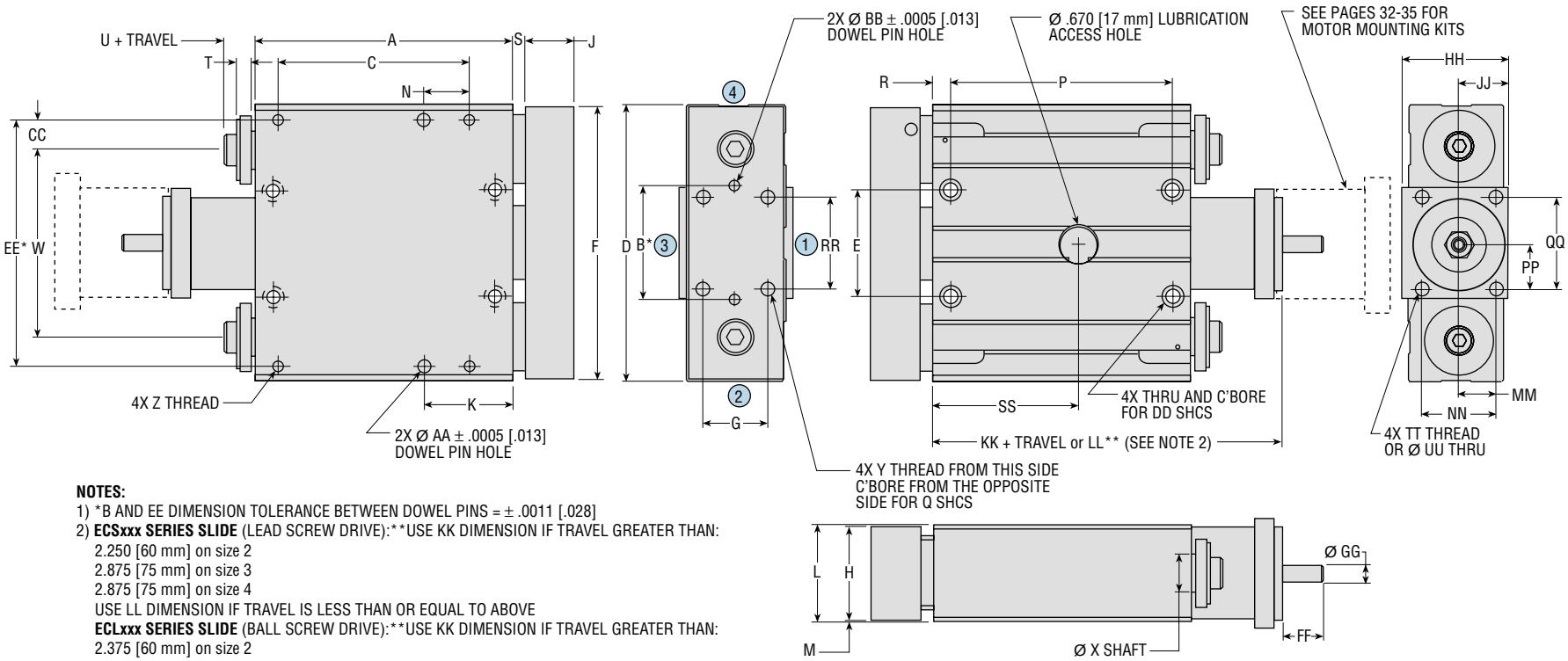
SWITCH MOUNTING KITS

	KIT NUMBER	
MODEL NO.	IMPERIAL	METRIC
ECxxxB-2	62067-01	62067-02
ECxxxB-3	62068-01	62068-02
ECxxxB-4	62069-01	62069-02

BENEFITS: SERIES EC CANTILEVER SLIDE

- Series EC Slides provide multiple position, low cost, linear motion for a wide range of motion control applications.
- Easy to assemble as a complete package of slide, motor, and controls. Simple programming, with an icon driven language.
- Available with a matched PHD Series FS servo or stepper motor package, or alternatively, a standard NEMA motor interface. This allows the user flexibility in the choice of motor and associated controls. See pages 51 to 66.
- Can be used as an individual actuator, or combined with other PHD actuators using standard transition plates. See page 44.
- Series EC Slides are available in three sizes in both imperial and metric versions for use in a wide range of applications worldwide.
- Four pre-lubricated linear ball bushings allow the hardened and precision ground guide shafts to move smoothly, and ensure precise linear motion of the tool plate and load.
- Linear ball bushings with shaft wipers provide long life and protect against external contaminants.
- Wide range of drive screws that provide you flexibility to match velocity and load requirements.
- Anti-backlash lead screw drive automatically compensates for wear and provides quiet operation for high speed medium duty applications.
- Precision ball screw drive provides high thrust and long life for demanding applications.
- Travel to 24 inches [610 mm] and velocities to 30 in/sec [750 mm/sec] depending on model and drive screw selected.
- Available with either direct, in-line drive, or space saving fold-back belt drive. Fold-back drives are available in 1:1 or 1:2 ratios.
- Anodized aluminum alloy tool plates have combination tapped and counterbored holes and a precisely machined mounting surface, permitting easy attachment of fixturing.

SPECIFICATIONS		SIZE 2	SIZE 3	SIZE 4
SHAFT DIAMETER	in [mm]	.472 [12]	.630 [16]	.787 [20]
MAX. TRAVEL	in [mm]	12.0 [310]	18.0 [460]	24.0 [610]
MAX. STATIC AXIAL LOAD at 9" travel	lb [N]	225 [1000]	225 [1000]	600 [2670]
DRIVE SCREW LEADS	in [mm]	.125, .20, .50, 1.00 [10, 25]	.125, .20, .50, 1.00 [10, 25]	.20, .50, 1.00 [10, 20]
SUPPORTED NEMA MOTOR FRAMES		17, 23	17, 23	23, 34



NOTES:

1) *B AND EE DIMENSION TOLERANCE BETWEEN DOWEL PINS = ± .0011 [.028]
2) **ECSxxx SERIES SLIDE** (LEAD SCREW DRIVE):**USE KK DIMENSION IF TRAVEL GREATER THAN:
   2.250 [60 mm] on size 2
   2.875 [75 mm] on size 3
   2.875 [75 mm] on size 4
   USE LL DIMENSION IF TRAVEL IS LESS THAN OR EQUAL TO ABOVE
   ECLxxx SERIES SLIDE (BALL SCREW DRIVE):**USE KK DIMENSION IF TRAVEL GREATER THAN:
   2.375 [60 mm] on size 2
   3.000 [75 mm] on size 3
   2.875 [65 mm] on size 4
   USE LL DIMENSION IF TRAVEL IS LESS THAN OR EQUAL TO ABOVE
3) NUMBERS IN CIRCLES INDICATE POSITION
4) MOUNTING PATTERNS ARE CENTER ON GUIDE SHAFTS UNLESS OTHERWISE NOTED.

IN-LINE MOTORS

	MODEL NO.	LETTER DIMENSION																						
		A	B*	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X	Y	Z
IMPERIAL	ECS2HB-2 & ECL2HB-2	4.330	1.929	3.091	4.213	1.771	4.134	.906	1.500	.709	1.417	1.570	.035	.512	3.465	#10	.433	.236	.286	.562	2.992	.472	1/4-20	10-24 x .285 DP
	ECS2HB-3 & ECL2HB-3	4.920	1.968	3.701	4.803	1.732	4.724	1.182	1.690	.866	1.378	1.770	.040	.748	4.213	#10	.354	.236	.298	.574	3.189	.630	1/4-20	1/4-20 x .400 DP
	ECS2HB-4 & ECL2HB-4	5.118	1.870	3.780	5.630	2.165	5.551	1.260	1.890	.984	1.752	1.969	.040	.886	4.409	1/4	.354	.236	.298	.633	3.819	.787	5/16-18	1/4-20 x .400 DP
METRIC	ECS6HB-2 & ECL6HB-2	110.0	49.0	78.5	107.0	45.0	105.0	23.0	38.1	18.0	36.0	39.9	0.9	13.0	88.0	M4	11.0	6.0	7.3	14.3	76.0	12.0	M5 x 0.8	M5 x 0.8 x 7.5 DP
	ECS6HB-3 & ECL6HB-3	125.0	50.0	94.0	122.0	44.0	120.0	30.0	42.9	22.0	35.0	45.0	1.0	19.0	107.0	M5	9.0	6.0	7.6	14.6	81.0	16.0	M6 x 1.0	M6 x 1.0 x 9.9 DP
	ECS6HB-4 & ECL6HB-4	130.0	47.5	96.0	143.0	55.0	141.0	32.0	48.0	25.0	44.5	50.0	1.0	22.5	112.0	M6	9.0	6.0	7.6	16.1	97.0	20.0	M8 x 1.25	M6 x 1.0 x 9.9 DP

	MODEL NO.	LETTER DIM		
		GG	KK**	LL**
IMPERIAL	ECS2HB-2	.250	3.83	6.08
	ECL2HB-2	.250	3.66	6.04
	ECS2HB-3	.250	3.80	6.67
	ECL2HB-3	.250	3.63	6.63
	ECS2HB-4	.375	3.97	6.84
	ECL2HB-4	.313	4.40	6.90
METRIC	ECS6HB-2	6.35	97.3	154.5
	ECL6HB-2	6.35	93.0	153.3
	ECS6HB-3	6.35	96.5	169.5
	ECL6HB-3	6.35	92.2	168.4
	ECS6HB-4	9.53	100.8	173.8
	ECL6HB-4	7.95	111.8	175.3

	MODEL NO.	LETTER DIMENSION																
		AA	BB	CC	DD	EE*	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU
IMPERIAL	ECS2HB-2 & ECL2HB-2	.198 x .236 DP	.198 x .315 DP	.374	#10	3.741	.883	SEE OTHER CHART	1.750	.875	SEE OTHER CHART	SEE OTHER CHART	.625	1.250	.625	1.250	1.516	2.500	—	.173
	ECS2HB-3 & ECL2HB-3	.198 x .275 DP	.198 x .500 DP	.571	1/4	4.331	.883		1.750	.875			.625	1.250	.625	1.250	1.968	2.500	—	.173
	ECS2HB-4 & ECL2HB-4	.237 x .472 DP	.237 x .472 DP	.611	1/4	5.040	1.015		2.250	1.125			.800	1.600	.800	1.600	1.870	3.000	—	.228
METRIC	ECS6HB-2 & ECL6HB-2	5.02 x 6.0 DP	5.02 x 8.0 DP	9.5	M5	95.0	22.4		44.5	22.2			15.9	31.8	15.9	31.8	38.5	63.5	—	4.4
	ECS6HB-3 & ECL6HB-3	5.02 x 7.0 DP	5.02 x 12.7 DP	14.5	M6	110.0	22.4		44.5	22.2			15.9	31.8	15.9	31.8	50.0	63.5	—	4.4
	ECS6HB-4 & ECL6HB-4	6.02 x 12.0 DP	6.02 x 12.0 DP	15.5	M6	128.0	25.8		57.2	28.6			20.3	40.6	20.3	40.6	47.5	76.2	—	5.8

FOLD-BACK MOTORS

	MODEL NO.	LETTER DIMENSION																						
		A	B*	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X	Y	Z
IMPERIAL	ECS2GB-2 & ECL2GB-2	4.330	1.929	3.091	4.213	1.771	4.134	.906	1.500	.709	1.417	1.570	.035	.512	3.465	#10	.433	.236	.286	.562	2.992	.472	1/4-20	10-24 x .285 DP
	ECS2GB-3 & ECL2GB-3	4.920	1.968	3.701	4.803	1.732	4.724	1.182	1.690	.866	1.378	1.770	.040	.748	4.213	#10	.354	.236	.298	.574	3.189	.630	1/4-20	1/4-20 x .400 DP
	ECS2GB-4 & ECL2GB-4	5.118	1.870	3.780	5.630	2.165	5.551	1.260	1.890	.984	1.752	1.969	.040	.886	4.409	1/4	.354	.236	.298	.633	3.819	.787	5/16-18	1/4-20 x .400 DP
METRIC	ECS6GB-2 & ECL6GB-2	110.0	49.0	78.5	107.0	45.0	105.0	23.0	38.1	18.0	36.0	39.9	0.9	13.0	88.0	M4	11.0	6.0	7.3	14.3	76.0	12.0	M5 x 0.8	M5 x 0.8 x 7.5 DP
	ECS6GB-3 & ECL6GB-3	125.0	50.0	94.0	122.0	44.0	120.0	30.0	42.9	22.0	35.0	45.0	1.0	19.0	107.0	M5	9.0	6.0	7.6	14.6	81.0	16.0	M6 x 1.0	M6 x 1.0 x 9.9 DP
	ECS6GB-4 & ECL6GB-4	130.0	47.5	96.0	143.0	55.0	141.0	32.0	48.0	25.0	44.5	50.0	1.0	22.5	112.0	M6	9.0	6.0	7.6	16.1	97.0	20.0	M8 x 1.25	M6 x 1.0 x 9.9 DP

	MODEL NO.	LETTER DIM		
		GG	KK**	LL**
IMPERIAL	ECS2GB-2	.250	3.83	6.08
	ECL2GB-2	.250	3.66	6.04
	ECS2GB-3	.250	3.80	6.67
	ECL2GB-3	.250	3.63	6.63
	ECS2GB-4	.375	3.97	6.84
	ECL2GB-4	.313	4.40	6.90
METRIC	ECS6GB-2	6.35	97.3	154.5
	ECL6GB-2	6.35	93.0	153.3
	ECS6GB-3	6.35	96.5	169.5
	ECL6GB-3	6.35	92.2	168.4
	ECS6GB-4	9.53	100.8	173.8
	ECL6GB-4	7.95	111.8	175.3

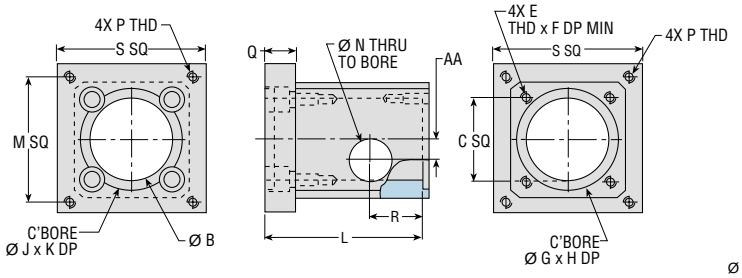
	MODEL NO.	LETTER DIMENSION																		
		AA	BB	CC	DD	EE*	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU
IMPERIAL	ECS2GB-2 & ECL2GB-2	.198 x .236 DP	.198 x .315 DP	.374	#10	3.741	.883	SEE OTHER CHART	1.673	.787	SEE OTHER CHART	SEE OTHER CHART	.591	1.181	.689	1.378	1.516	2.500	M4 x 0.7	—
	ECS2GB-3 & ECL2GB-3	.198 x .275 DP	.198 x .500 DP	.571	1/4	4.331	.883		1.673	.787			.591	1.181	.689	1.378	1.968	2.500	M4 x 0.7	—
	ECS2GB-4 & ECL2GB-4	.237 x .472 DP	.237 x .472 DP	.611	1/4	5.040	1.015		2.000	.984			.748	1.496	.906	1.811	1.870	3.000	M4 x 0.7	—
METRIC	ECS6GB-2 & ECL6GB-2	5.02 x 6.0 DP	5.02 x 8.0 DP	9.5	M5	95.0	22.4		42.5	20.0			15.0	30.0	17.5	35.0	38.5	63.5	M4 x 0.7	—
	ECS6GB-3 & ECL6GB-3	5.02 x 7.0 DP	5.02 x 12.7 DP	14.5	M6	110.0	22.4		42.5	20.0			15.0	30.0	17.5	35.0	50.0	63.5	M4 x 0.7	—
	ECS6GB-4 & ECL6GB-4	6.02 x 12.0 DP	6.02 x 12.0 DP	15.5	M6	128.0	25.8		50.8	25.0			19.0	38.0	23.0	46.0	47.5	76.2	M4 x 0.7	—

All dimensions are reference only unless specifically toleranced.

DIMENSIONS: SERIES EC IN-LINE MOTOR MOUNTINGS

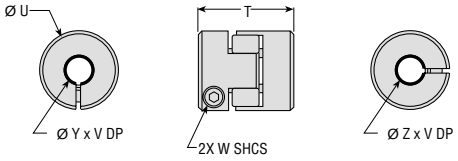
IN-LINE MOTOR MOUNTING KITS

MOUNTING KIT

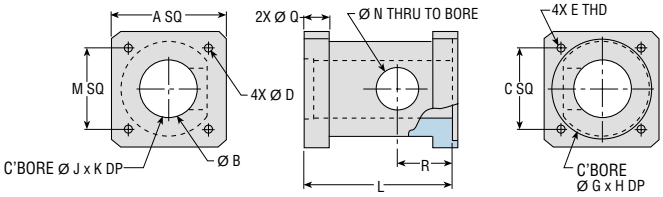


Motor mounting kits include mounting plates, frame, and screws.

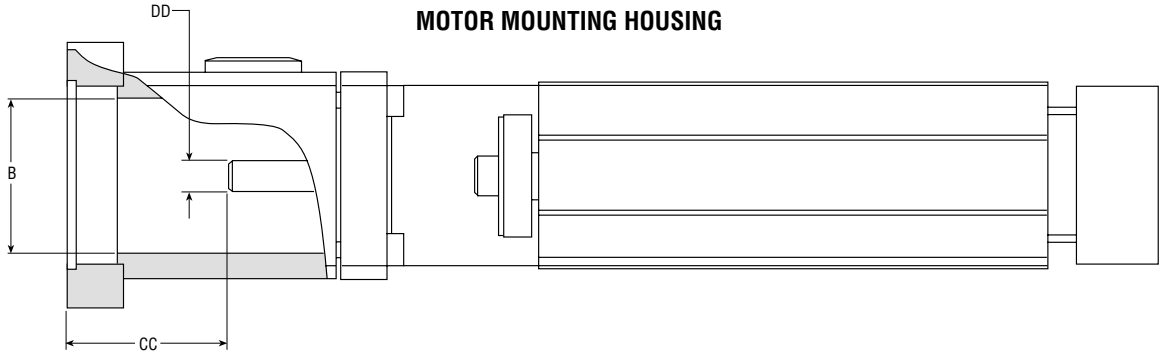
COUPLING KIT
(ordered separately)



MOUNTING KIT
(64688-01 ONLY)



MOTOR MOUNTING HOUSING



SLIDE	ECx2xx-2	ECx2xx-3		ECx6xx-2	ECx6xx-3		ECS2xx-4		ECS6xx-4		ECL2xx-4		ECL6xx-4	
MOUNTING KIT	64688-01	64688-02	64688-03	64688-01	64688-02	64688-03	64688-04	64688-05 64688-06	64688-04	64688-05 64688-06	64688-04	64688-05 64688-06	64688-04	64688-05 64688-06
B	0.750	1.310	1.310	(19.1)	(33.3)	(33.3)	1.310	1.310	(33.3)	(33.3)	1.310	1.310	(33.3)	(33.3)
CC	1.190	1.402	1.756	(30.2)	(35.6)	(44.6)	1.405	1.759	(35.7)	(44.7)	1.405	1.759	(35.7)	(44.7)
DD	0.250	0.250	0.250	(6.4)	(6.4)	(6.4)	0.375	0.375	(9.5)	(9.5)	0.312	0.312	(7.9)	(7.9)

⚠ *CAUTION:* IMPORTANT INFORMATION FOR COUPLINGS NOT PURCHASED FROM PHD ⚠

Coupling selection and manufacture are critical to slide performance. The coupling must be torsionally stiff and accurately made. Coupling bores should be concentric and bored or reamed to shaft diameter +.001"/-.000" [+.025 mm/-.000 mm]. Clamp lock couplings are preferred. Two set screws per hub, 90° apart are also acceptable. Keys and keyways are optional. Coupling torsional stiffness is very important to proper operation, especially for systems with feedback. Systems without feedback are generally less sensitive to coupling stiffness. It is always best to use the motor/controller manufacturer's recommendations if available.

DIMENSIONS: SERIES EC IN-LINE MOTOR MOUNTINGS

IMPERIAL

SLIDE	ECx2xx-2 ECx2xx-3			ECS2xx-4				ECL2xx-4			
MOTOR	64716-001	64716-003 64716-008 64716-009	64715-001	64716-003 64716-008 64716-009	64715-001	64716-011 64716-013	64715-002	64716-003 64716-008 64716-009	64715-001	64716-011 64716-013	64715-002
FRAME	NEMA 17	NEMA 23	NEMA 23	NEMA 23	NEMA 23	NEMA 34	NEMA 34	NEMA 23	NEMA 23	NEMA 34	NEMA 34
MOUNTING KIT	64688-01	64688-02	64688-03	64688-04	64688-05	64688-06	64688-06	64688-04	64688-05	64688-06	64688-06
SCREW KIT	11859	59738	64672	59738	64672	64672	64672	59738	64672	64672	64672
COUPLING KIT	64694-13	64694-02	64694-03	64694-03	64694-04	64694-04	64694-05	64694-07	64694-08	64694-08	64694-09
A	1.750	1.750	1.750	2.250	2.250	2.250	2.250	2.250	2.250	2.250	2.250
B	0.750	1.310	1.310	1.310	1.310	1.310	1.310	1.310	1.310	1.310	1.310
C	1.250	1.250	1.250	1.600	1.600	1.600	1.600	1.600	1.600	1.600	1.600
D	0.136	—	—	—	—	—	—	—	—	—	—
E	M4 x 0.7	M4 x 0.7	M4 x 0.7	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8
F	—	0.433	0.433	0.413	0.413	0.413	0.413	0.413	0.413	0.413	0.413
G	1.513	1.513	1.513	1.888	1.888	1.888	1.888	1.888	1.888	1.888	1.888
H	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
J	0.869	1.504	1.504	1.504	1.504	1.880	1.880	1.504	1.504	1.880	1.880
K	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
L	2.073	2.285	2.639	2.420	2.774	2.774	2.774	2.420	2.774	2.774	2.774
M	1.220	1.856	1.856	1.856	1.856	2.740	2.740	1.856	1.856	2.740	2.740
N	0.635	0.635	0.635	0.635	0.635	0.635	0.635	0.635	0.635	0.635	0.635
P	—	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32
Q	0.375	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
R	0.790	0.670	0.670	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
S	—	2.250	2.250	2.250	2.250	3.250	3.250	2.250	2.250	3.250	3.250
T	0.866	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378
U	0.551	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181
V	0.276	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433
W	M2	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3
Y	0.197	0.250	0.375	0.250	0.375	0.375	0.500	0.250	0.375	0.375	0.500
Z	0.250	0.250	0.250	0.375	0.375	0.375	0.375	0.313	0.313	0.313	0.313
AA	—	0.325	0.325	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450

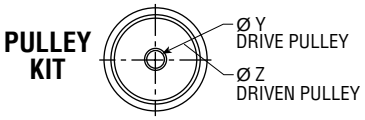
METRIC

SLIDE	ECx6xx-2 ECx6xx-3			ECS6xx-4				ECL6xx-4			
MOTOR	64716-001	64716-003 64716-008 64716-009	64715-001	64716-003 64716-008 64716-009	64715-001	64716-011 64716-013	64715-002	64716-003 64716-008 64716-009	64715-001	64716-011 64716-013	64715-002
FRAME	NEMA 17	NEMA 23	NEMA 23	NEMA 23	NEMA 23	NEMA 34	NEMA 34	NEMA 23	NEMA 23	NEMA 34	NEMA 34
MOUNTING KIT	64688-01	64688-02	64688-03	64688-04	64688-05	64688-06	64688-06	64688-04	64688-05	64688-06	64688-06
SCREW KIT	11859	59738	64672	59738	64672	64672	64672	59738	64672	64672	64672
COUPLING KIT	64694-13	64694-02	64694-03	64694-03	64694-04	64694-04	64694-05	64694-07	64694-08	64694-08	64694-09
A	44.5	44.5	44.5	57.2	57.2	57.2	57.2	57.2	57.2	57.2	57.2
B	19.1	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
C	31.8	31.8	31.8	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6
D	3.5	—	—	—	—	—	—	—	—	—	—
E	M4 x 0.7	M4 x 0.7	M4 x 0.7	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8	M5 x 0.8
F	—	11.0	11.0	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
G	38.4	38.4	38.4	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
H	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
J	22.1	38.2	38.2	38.2	38.2	47.8	47.8	38.2	38.2	47.8	47.8
K	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
L	52.7	58.0	67.0	61.5	70.5	70.5	70.5	61.5	70.5	70.5	70.5
M	31.0	47.1	47.1	47.1	47.1	69.6	69.6	47.1	47.1	69.6	69.6
N	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
P	—	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32	10-32
Q	9.5	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
R	20.1	17.0	17.0	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
S	—	57.2	57.2	57.2	57.2	82.6	82.6	57.2	57.2	82.6	82.6
T	22.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
U	14.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
V	7.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
W	M2	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3
Y	5.0	6.4	9.5	6.4	9.5	9.5	12.7	6.4	9.5	9.5	12.7
Z	6.4	6.4	6.4	9.5	9.5	9.5	9.5	8.0	8.0	8.0	8.0
AA	—	8.3	8.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4

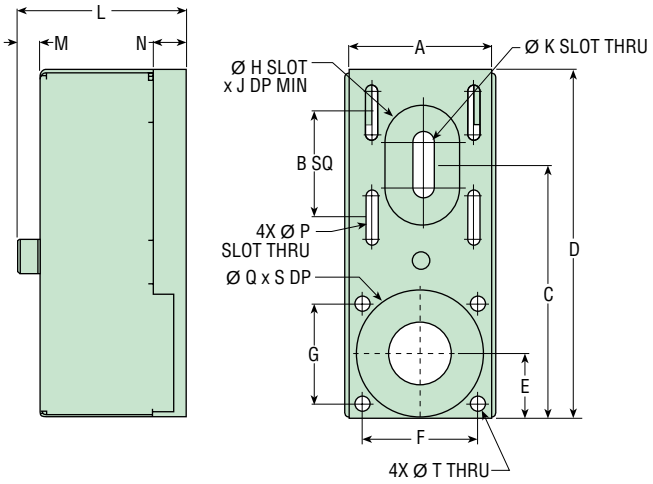
DIMENSIONS: SERIES EC FOLD-BACK MOTOR MOUNTINGS

FOLD-BACK MOTOR MOUNTING KITS

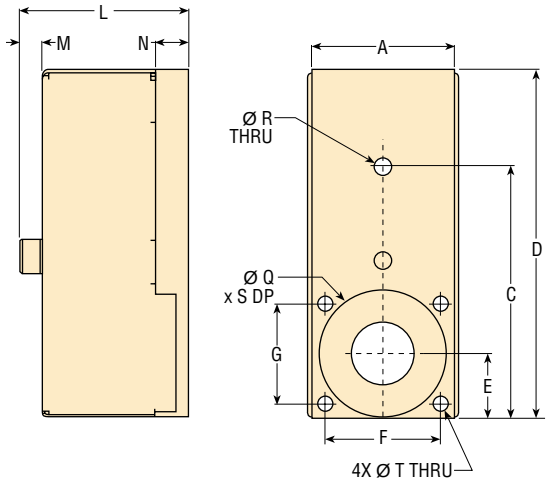
Motor mounting kits include mounting plates, frames, and screws.



Pulley kit contains a drive pulley, driven pulley, and matched drive belt. (sold separately)



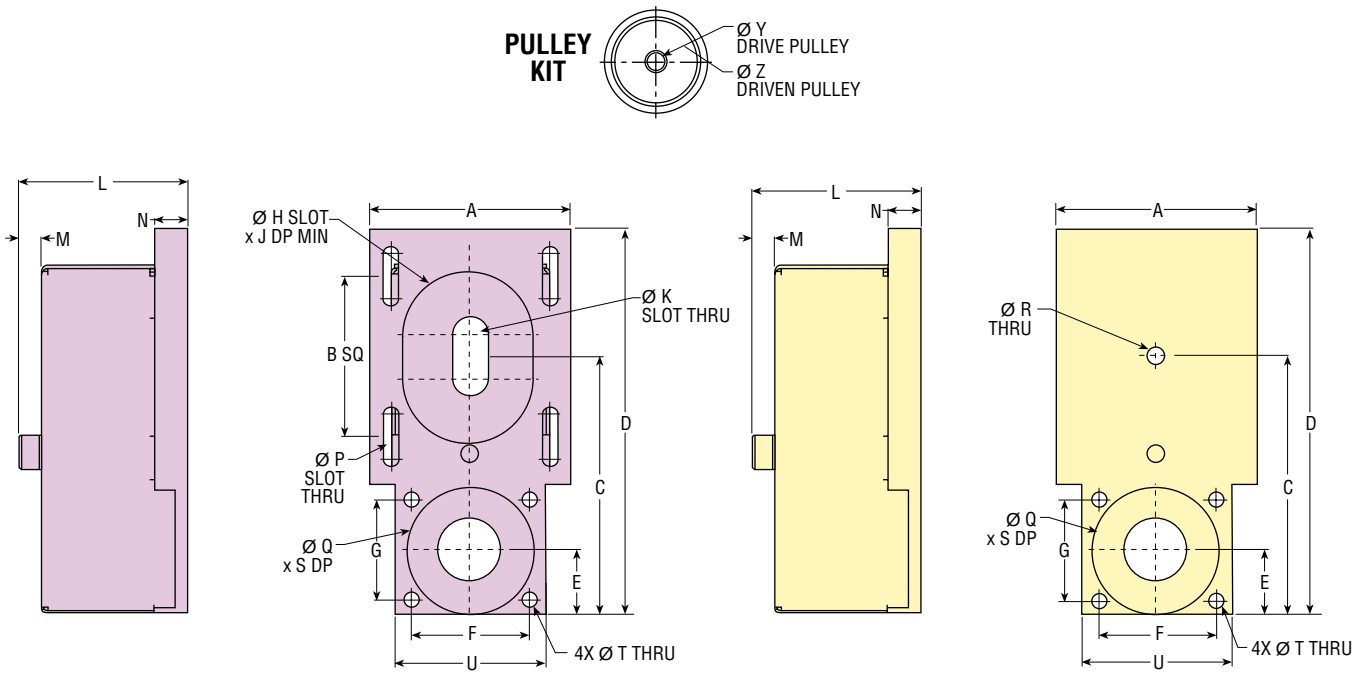
64689-01, 64689-03, 64689-05



64689-07, 64689-09, 64689-11

SLIDE	ECxxxx-2										ECxxxx-3									
MOTOR	64716-001		64716-003 64716-008 64716-009		64715-001						64716-001		64716-003 64716-008 64716-009		64715-001					
FRAME	NEMA 17		NEMA 23		NEMA 23		BLANK		BLANK OVERSIZE		NEMA 17		NEMA 23		NEMA 23		BLANK		BLANK OVERSIZE	
MOUNTING KIT	64689-01		64689-02		64689-02		64689-07		64689-08		64689-03		64689-04		64689-04		64689-09		64689-10	
SCREW KIT	11859		64697		64698		64698		64698		11859		64697		64698		64698		64698	
PULLEY & BELT KIT (1:1 DRIVE)	64695-01		64695-02		64695-03		64695-02		64695-02		64695-04		64695-05		64695-06		64695-05		64695-05	
PULLEY & BELT KIT (1:2 DRIVE)	64696-01		64696-02		64696-03		64696-02		64696-02		64696-04		64696-05		64696-06		64696-05		64696-05	
	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC
LETTER DIM	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
A	1.750	44.5	2.375	60.3	2.375	60.3	1.750	44.5	2.375	60.3	1.750	44.5	2.375	60.3	2.375	60.3	1.750	44.5	2.375	60.3
B	1.220	31.0	1.865	47.1	1.865	47.1	—	—	—	—	1.220	31.0	1.865	47.1	1.865	47.1	—	—	—	—
C	3.017	76.6	3.017	76.6	3.017	76.6	3.017	76.6	3.017	76.6	3.017	76.6	3.017	76.6	3.017	76.6	3.017	76.6	3.017	76.6
D	4.100	104.1	4.500	114.3	4.500	114.3	4.100	104.1	4.500	114.3	4.100	104.1	4.500	114.3	4.500	114.3	4.100	104.1	4.500	114.3
E	0.787	20.0	0.787	20.0	0.787	20.0	0.787	20.0	0.787	20.0	0.787	20.0	0.787	20.0	0.787	20.0	0.787	20.0	0.787	20.0
F	1.378	35.0	1.378	35.0	1.378	35.0	1.378	35.0	1.378	35.0	1.378	35.0	1.378	35.0	1.378	35.0	1.378	35.0	1.378	35.0
G	1.181	30.0	1.181	30.0	1.181	30.0	1.181	30.0	1.181	30.0	1.181	30.0	1.181	30.0	1.181	30.0	1.181	30.0	1.181	30.0
H	0.886	22.5	1.515	38.5	1.515	38.5	—	—	—	—	0.886	22.5	1.515	38.5	1.515	38.5	—	—	—	—
J	0.100	2.5	0.080	2.0	0.080	2.0	—	—	—	—	0.100	2.5	0.080	2.0	0.080	2.0	—	—	—	—
K	0.250	6.4	0.400	10.2	0.400	10.2	—	—	—	—	0.250	6.4	0.400	10.2	0.400	10.2	—	—	—	—
L	1.992	50.6	1.992	50.6	1.992	50.6	1.992	50.6	1.992	50.6	1.992	50.6	1.992	50.6	1.992	50.6	1.992	50.6	1.992	50.6
M	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0
N	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5
P	0.134	3.4	0.221	5.6	0.221	5.6	—	—	—	—	0.134	3.4	0.221	5.6	0.221	5.6	—	—	—	—
Q	1.520	38.6	1.520	38.6	1.520	38.6	1.520	38.6	1.520	38.6	1.520	38.6	1.520	38.6	1.520	38.6	1.520	38.6	1.520	38.6
R	—	—	—	—	—	—	0.188	4.8	0.250	6.4	—	—	—	—	—	—	0.188	4.8	0.250	6.4
S	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6
T	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8
U	—	—	1.750	44.5	1.750	44.5	—	—	1.750	44.5	—	—	1.750	44.5	1.750	44.5	—	—	1.750	44.5
Y	0.197	5.0	0.250	6.4	0.375	9.5	0.250	6.4	0.250	6.4	0.197	5.0	0.250	6.4	0.375	9.5	0.250	6.4	0.250	6.4
Z	0.250	6.4	0.250	6.4	0.250	6.4	0.250	6.4	0.250	6.4	0.250	6.4	0.250	6.4	0.250	6.4	0.250	6.4	0.250	6.4

DIMENSIONS: SERIES EC FOLD-BACK MOTOR MOUNTINGS



64689-02, 64689-04, 64689-06

64689-08, 64689-10,64689-12

SLIDE	ECSxxx-4												ECLxxx-4											
MOTOR	64716-003 64716-008 64716-009		64715-001		64716-011 64716-013		64715-002						64716-003 64716-008 64716-009		64715-001		64716-011 64716-013		64715-002					
FRAME	NEMA 23		NEMA 23		NEMA 34		NEMA 34		BLANK		BLANK OVERSIZE		NEMA 23		NEMA 23		NEMA 34		NEMA 34		BLANK		BLANK OVERSIZE	
MOUNTING KIT	64689-05		64689-05		64689-06		64689-06		64689-11		64689-12		64689-05		64689-05		64689-06		64689-06		64689-11		64689-12	
SCREW KIT	64697		64698		64697		64698		64698		64698		64697		64698		64697		64698		64698		64698	
PULLEY & BELT KIT (1:1 DRIVE)	64695-07		64695-08		64695-08		64695-09		64695-08		64695-08		64695-10		64695-11		64695-11		64695-12		64695-11		64695-11	
PULLEY & BELT KIT (1:2 DRIVE)	64696-07		64696-08		64696-08		64696-09		64696-08		64696-08		64696-10		64696-11		64696-11		64696-12		64696-11		64696-11	
	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC
LETTER DIM	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
A	2.375	60.3	2.375	60.3	3.500	88.9	3.500	88.9	2.375	60.3	3.500	88.9	2.375	60.3	2.375	60.3	3.500	88.9	3.500	88.9	2.375	60.3	3.500	88.9
B	1.865	47.1	1.865	47.1	2.750	69.9	2.750	69.9	—	—	—	—	1.865	47.1	1.865	47.1	2.750	69.9	2.750	69.9	—	—	—	—
C	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0	4.015	102.0
D	5.600	142.2	5.600	142.2	5.984	152.0	5.984	152.0	5.600	142.2	5.984	152.0	5.600	142.2	5.600	142.2	5.984	152.0	5.984	152.0	5.600	142.2	5.984	152.0
E	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0	0.984	25.0
F	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0	1.811	46.0
G	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0	1.496	38.0
H	1.515	38.5	1.515	38.5	2.900	73.7	2.900	73.7	—	—	—	—	1.515	38.5	1.515	38.5	2.900	73.7	2.900	73.7	—	—	—	—
J	0.080	2.0	0.080	2.0	0.080	2.0	0.080	2.0	—	—	—	—	0.080	2.0	0.080	2.0	0.080	2.0	0.080	2.0	—	—	—	—
K	0.400	10.2	0.400	10.2	0.530	13.5	0.530	13.5	—	—	—	—	0.400	10.2	0.400	10.2	0.530	13.5	0.530	13.5	—	—	—	—
L	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5	2.187	55.5
M	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0	0.236	6.0
N	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5
P	0.221	5.6	0.221	5.6	0.221	5.6	0.221	5.6	—	—	—	—	0.221	5.6	0.221	5.6	0.221	5.6	0.221	5.6	—	—	—	—
Q	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1	1.895	48.1
R	—	—	—	—	—	—	—	—	0.250	6.4	0.375	9.5	—	—	—	—	—	—	—	—	0.250	6.4	0.375	9.5
S	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6	0.063	1.6
T	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8	0.189	4.8
U	—	—	—	—	2.375	60.3	2.375	60.3	—	—	2.375	60.3	—	—	—	—	2.375	60.3	2.375	60.3	—	—	2.375	60.3
Y	0.250	6.4	0.375	9.5	0.375	9.5	0.500	12.7	0.375	9.5	0.375	9.5	0.250	6.4	0.375	9.5	0.375	9.5	0.500	12.7	0.375	9.5	0.375	9.5
Z	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5	0.313	8.0	0.313	8.0	0.313	8.0	0.375	8.0	0.313	8.0	0.313	8.0

MATERIAL SPECIFICATIONS

The slide body, tool plate, and drive rod are anodized aluminum alloy. The guide shafts are hardened and ground steel. The drive system uses either a stainless steel lead screw with a composite polymer anti-backlash nut or a precision rolled, hardened steel ball screw with a hardened steel ball nut.

OPERATING CONDITIONS

The mechanical components of the Series EC Slide are designed to provide maximum travel life under normal conditions of operation and lubrication.

Use in hostile environments should be avoided. Operating environments that flood or submerge the slide in oil, coolant, chips, dust, or other debris would be considered hostile. The slide should be shielded from forceful spraying or splashing. Environments containing chemicals damaging to the slide materials should be avoided. Be aware that motor, encoder, cables, and connectors may require additional protection.

Operating temperatures for Series EC Slides depend upon the drive screw technology. The recommended operating temperature range for lead screw driven units (ECSxxx) is 40 to 120°F [4 to 49°C]. Recommended operating temperature range for ball screw driven units (ESLxxx) is 0 to 180°F [-18 to 82°C]. Consult PHD for temperatures beyond these ranges. Be aware that motors or controls may limit use to a narrower temperature range.

LUBRICATION

Optimum service life for Series EC Slides is acheived by periodic lubrication of the guide shafts and drive screw. Guide shafts may be lubricated by applying a lightweight oil directly to the shafts every 25 million inches of travel. Drive screw lubrication depends on the screw technology.

Slides using lead screw drives (ECSxxx) should be lubricated every 10 million inches [250,000 meters] of travel if used vertically or every 20 million inches [500,000 meters] of travel if used horizontally.

Slides using ball screw drives (ECLxxx) should be initially checked every 50 million inches of travel and lubricated as needed. The drive screw and nut should be lubricated with the appropriate grease specified in the maintenance instructions provided with the slide.

MANUAL POSITIONING/SAFETY

The drive systems used in EC Slides vary in their ability to be backdriven. Because of this, manually positioning the slide by pulling or pushing on the tool plate can be very difficult, even with the power disconnected.

Some applications (often vertical) require that the load be held in the event of power loss. Since even lead screw drives can be backdriven, especially when vibration is present, these applications should use a brake on the motor shaft and ideally will use an in-line, rather than fold-back, drive. Variations in lead, lubrication, loading, and vibration can cause any screw drive to move unexpectedly. User safety must always be the first consideration concerning drive choice and the guarding of actuators and their attached loads.

POSITIONING ERROR

Positioning error describes the difference between the desired position and the actual position of the actuator. Generally, the electronic controls and motor have the greatest effect on the ability of an electromechanical slide to move to position quickly, accurately, and consistently. The mechanical system can also contribute to error in positioning. These errors are defined by several different terms: backlash, accuracy, repeatability, and resolution.

BACKLASH

Lead screw drives (ECSxxx) feature backlash-reducing nuts with automatic wear compensation. Therefore backlash remains constant over the life of the unit. Backlash on these units is equal to or better than .004" [.10 mm]. Backlash on the ball screw driven unit (ECLxxx) is .002" [.05 mm].

ACCURACY

Accuracy refers to the ability of the system to move to a predicted position. Accuracy is important for applications such as machine tools, however, for positioning applications such as work station loading, accuracy variation in the drive screw is simply fine-tuned out by adjusting the position data at machine start up. The standard accuracy of the drive screws in the EC Slide is .004 in/ft [.22 mm/m] for ball screw units (ECLxxx), and .007 in/ft [.37 mm/m] for lead screw units (ECSxxx). If greater lead accuracy is required, contact PHD for more information.

REPEATABILITY

Mechanical repeatability is a measure of how closely the actuator can return to a previously defined position. Unidirectional repeatability is the ability of the actuator to return to a previous position when traveling in the same direction. Bidirectional repeatability is the ability of the actuator to return to a previous position traveling from any direction. Unidirectional repeatability ignores the effect of the backlash and can be misleading. Repeatability is usually expressed for actuators with no or light loads. The unidirectional repeatability of the EC Slide is less than or equal to .001 in [.025 mm]. The bidirectional repeatability is less than or equal to .004 in [.1 mm]. Some motor and control arrangements may limit the system repeatability to values worse than these mechanical repeatability values. The motor and control systems offered by PHD do not have this limitation and allow repeatability up to the mechanical limits of the system.

RESOLUTION

Resolution measures how small a movement may be measured by the system. It is determined by the control electronics. If position is being sensed indirectly by counting motor steps or using an encoder connected to the motor, then the lead of the drive screw and belt drive ratio (if any) must also be considered. For units using PHD supplied controls, resolutions well under .001" [.025 mm] are obtainable. Please also refer to paragraphs on repeatability, accuracy, and backlash for additional information.

ACCELERATION/DECELERATION

The EC Slide is designed for accelerations of .33 g (10.7 ft/sec^2 [3.2 m/s^2]) or less. High accelerations and decelerations tend to cause excessive vibrations and should be avoided. Please contact PHD for applications exceeding this limit.

DEFLECTION/VIBRATION/IMPACT

The slide performance pages provide charts showing guide shaft deflections at various loads and travels. Long travel units may vibrate at end of travel. A dwell time, change in programmed motion profile, or some form of load vibration damping may be required to reduce this vibration.

EC Slides are not designed for impact loading, either due to driving the slide into a stop or driving something else into the slide. If impacts exist within the application, techniques should be employed to isolate the slide from these impacts.

HOME SWITCH ALLOWANCE AND POSITION

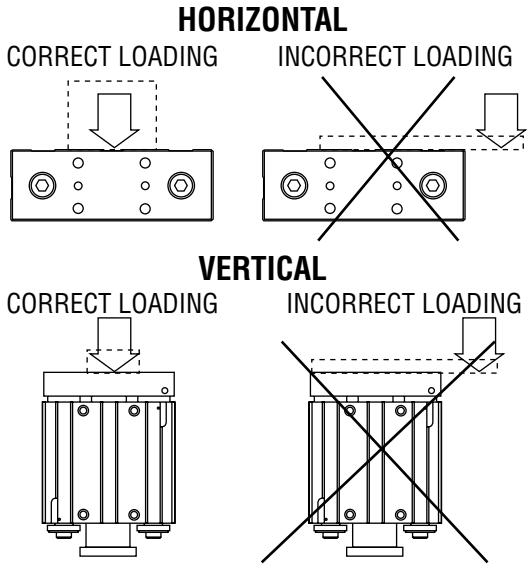
Motion control systems that do not use absolute position sensing require a home position sensing routine in order to establish a zero point. Some control arrangements may require specifying a slide with extra travel to accommodate the home position sensing. If specifying the optionally available home switches for the EC Slide and ordering a slide with travel capability beyond what the application requires (as is commonly done), make certain that the slide can move to either the fully retracted or fully extended limit of travel and locate the home switch in that position. If this is not possible, an alternative is to sense the tooling with an externally located switch.

DUTY CYCLE

The duty cycle of an application is a percentage expressing the activity of the actuator over a defined time period. The duty cycle for an EC Slide application is calculated by determining how many minutes (or seconds) the slide is actually moving during the operating cycle. If the slide operates continuously for more than 5 minutes at any point in the cycle, use a duty cycle figure of 100%. Duty cycle calculation is applicable to lead screw (ECSxxx) driven units. Even in highly active machines, the slide duty cycle is often well under 80%. This allows substantially more loading on the lead screw driven slides than using a figure of 100%. Duty cycle need not be considered for ball screw (ECLxxx) driven units.

ECCENTRIC LOADING

Eccentric loads are loads positioned so that they cause moment or twisting loads to the slide. Series EC Slides are not recommended for applications involving moment loads. It is better to arrange the work area so that the slide may operate in-line with the load. The slide should be positioned so that the centerline of axial or thrust loads is located between the tool plate guide shafts.



SLIDE PERFORMANCE GUIDE: SERIES EC CANTILEVER SLIDE

This section contains information on the capabilities of the Series EC Slide. It is not intended to be a comprehensive selection guide - there being many calculations necessary to properly select a slide and motor combination. To make the selection process simple and quick, PHD offers sizing software which is available from your PHD distributor or may be downloaded from PHD's website. As an alternative, you may request application assistance from your distributor or PHD's Customer Service Department. Use the Application Data Fax Sheet on pages 81 and 82 in this catalog.The following steps define the criteria necessary for slide selection and the graphs illustrate some of the capabilities of Series EC Slides.

1 DEFINE APPLICATION REQUIREMENTS:

1) Determine the maximum required travel (including any extra amount for the home position sensing).
2) Determine the forces acting on the actuator. Consider the weight of the tooling and the load as well as any process forces acting on the slide. Be sure to consider the direction of the forces to determine whether they add or subtract from one another.
3) Determine the desired maximum slide velocity based on the application requirements. If the application cycle time is critical, be sure to account for acceleration and deceleration at each end of travel.
4) Determine the slide duty cycle. This is simply the percentage of time that the slide is operating (moving) within a 5 minute interval. If the slide operates continuously for more than 5 minutes, consider the duty cycle to be 100%. Duty cycle need not be considered for ball screw (ESLxxx) driven units.
5) Determine the ambient temperature range the slide will be subjected to while operating.

For immediate assistance, see the application fax sheet on pages 81 and 82 in this catalog!

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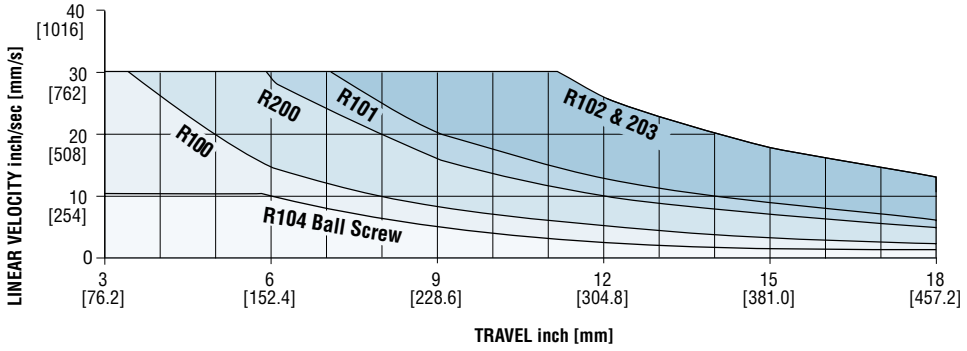
MAXIMUM ALLOWABLE VELOCITY

SIZES 2 & 3



SCREW LEADS

LEAD SCREWS

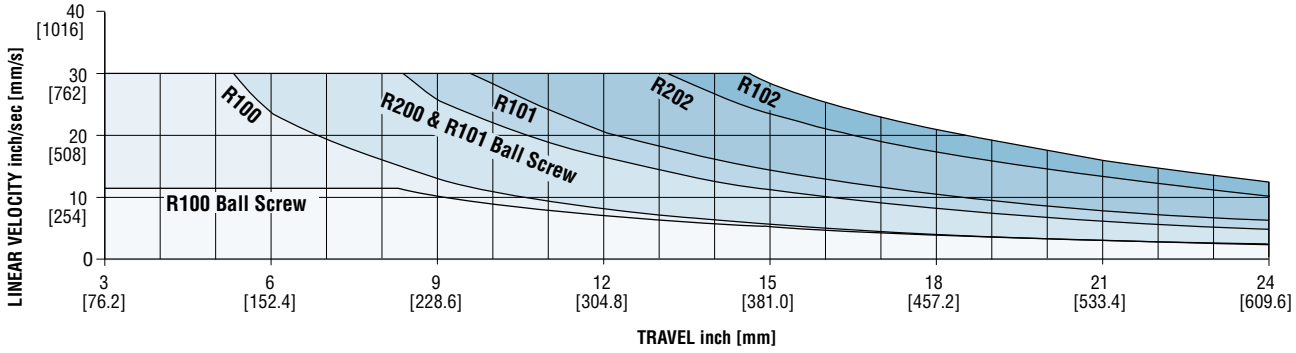
IMPERIAL
R100 = .200 in/rev
R101 = .500 in/rev
R102 = 1.000 in/rev

METRIC
R200 = 10 mm/rev
R202 = 20 mm/rev
R203 = 25 mm/rev

BALL SCREWS

IMPERIAL
R104 = .125 in/rev
R100 = .200 in/rev
R101 = .500 in/rev

SIZE 4



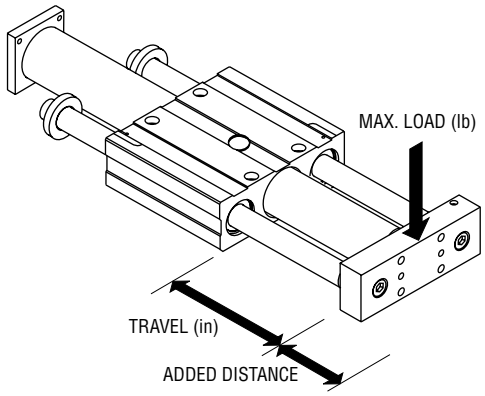
MAXIMUM ROLLING LOAD & DEFLECTION GRAPHS

The following graphs are designed to be used in conjunction with the Slide Performance Guide to simplify the selection of the EC Slides in horizontal applications. Use the Deflection Graphs to determine the shaft deflection for the applied load. Consult PHD for the applications which exceed maximum load ranges shown.

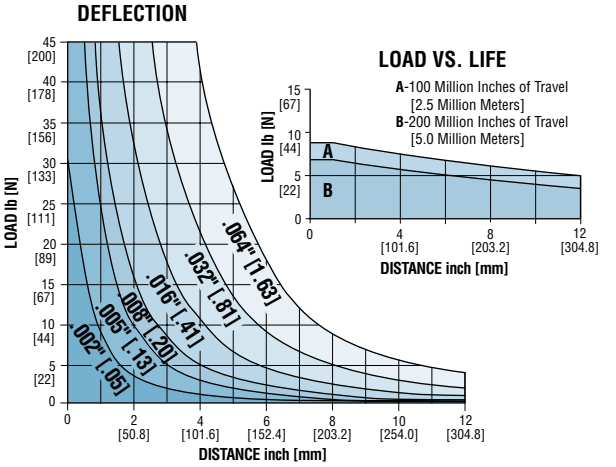
The deflection figures given in these graphs are based on the effect of external loads only. Other factors can affect the accuracy of the tool plate location.

Consult PHD for applications for high precision tool plate location.

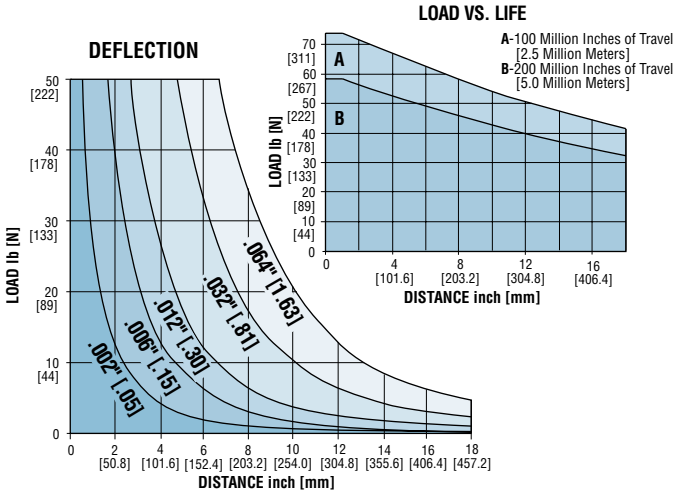
NOTE: When the center of gravity of the applied load is at a distance in front of the tool plate, add that distance to the travel length and use the resulting total as the distance in the following graphs.



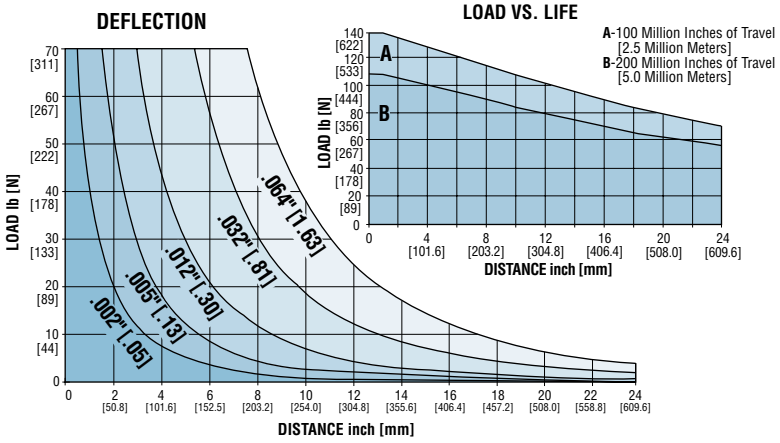
ECxxxB-2 WITH 12 mm SHAFTS AND LINEAR BALL BUSHINGS



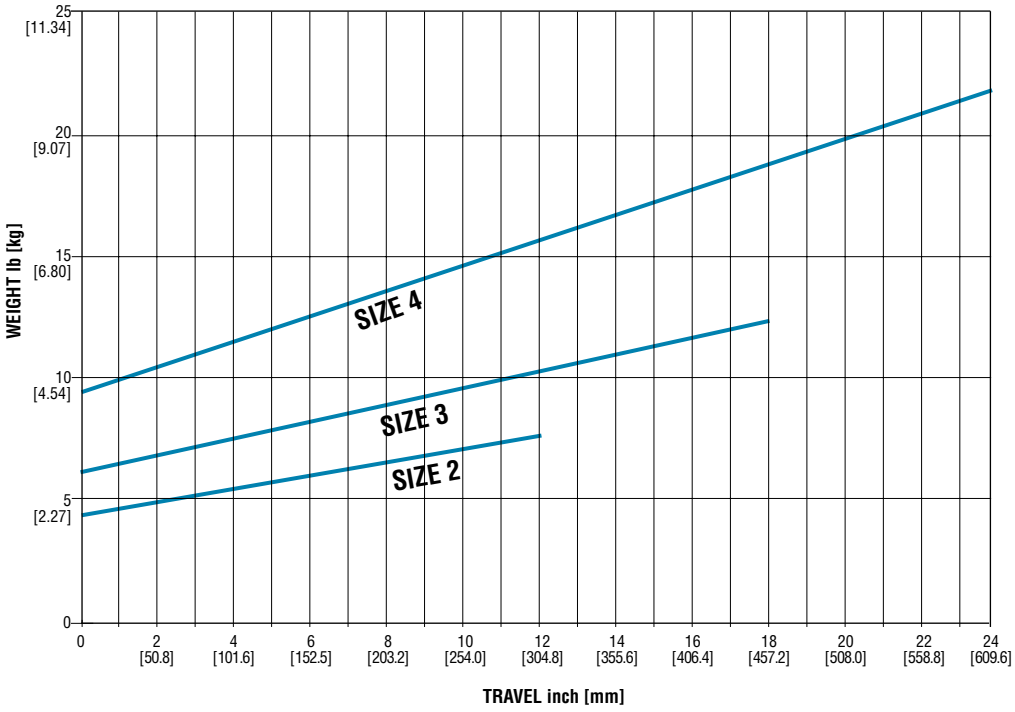
ECxxxB-3 WITH 16 mm SHAFTS AND LINEAR BALL BUSHINGS



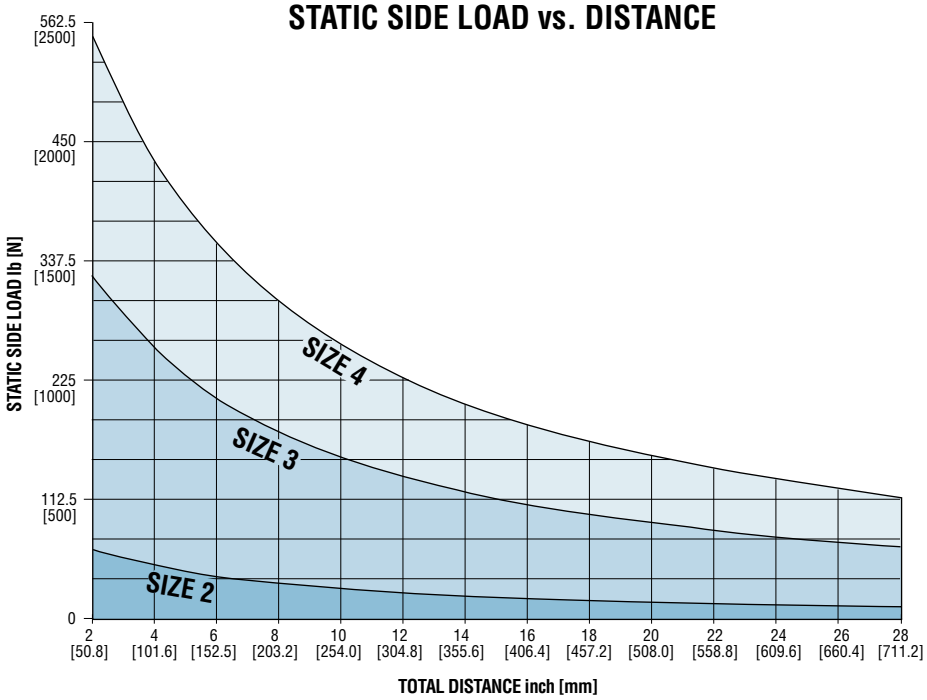
ECxxxB-4 WITH 20 mm SHAFTS AND LINEAR BALL BUSHINGS



SLIDE BASE WEIGHT

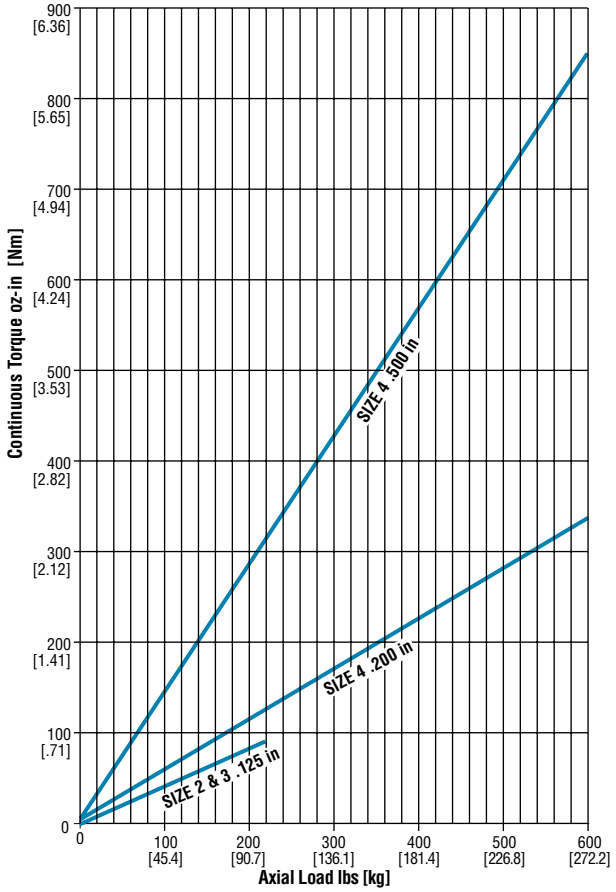


STATIC SIDE LOAD vs. DISTANCE

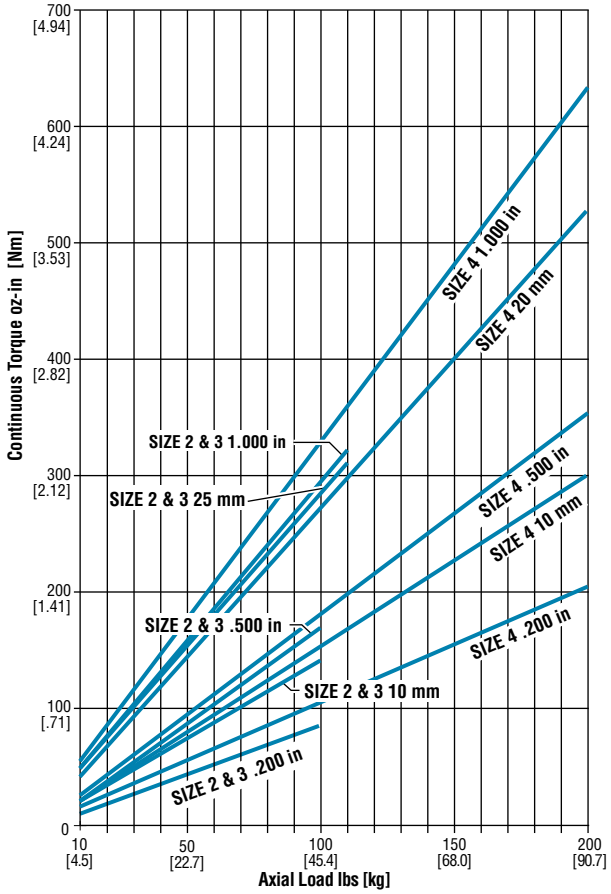


TORQUE VS. LOAD

BALL SCREW DRIVES (ECLxxx) CONTINUOUS TORQUE VS. LOAD



LEAD SCREW DRIVES (ECSxxx) CONTINUOUS TORQUE VS. LOAD

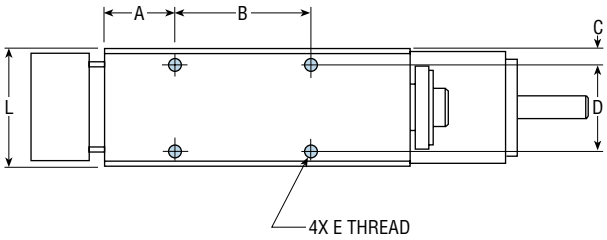


Note: These graphs are provided for comparison purposes only. Use PHD sizing software to select a slide for a particular application.

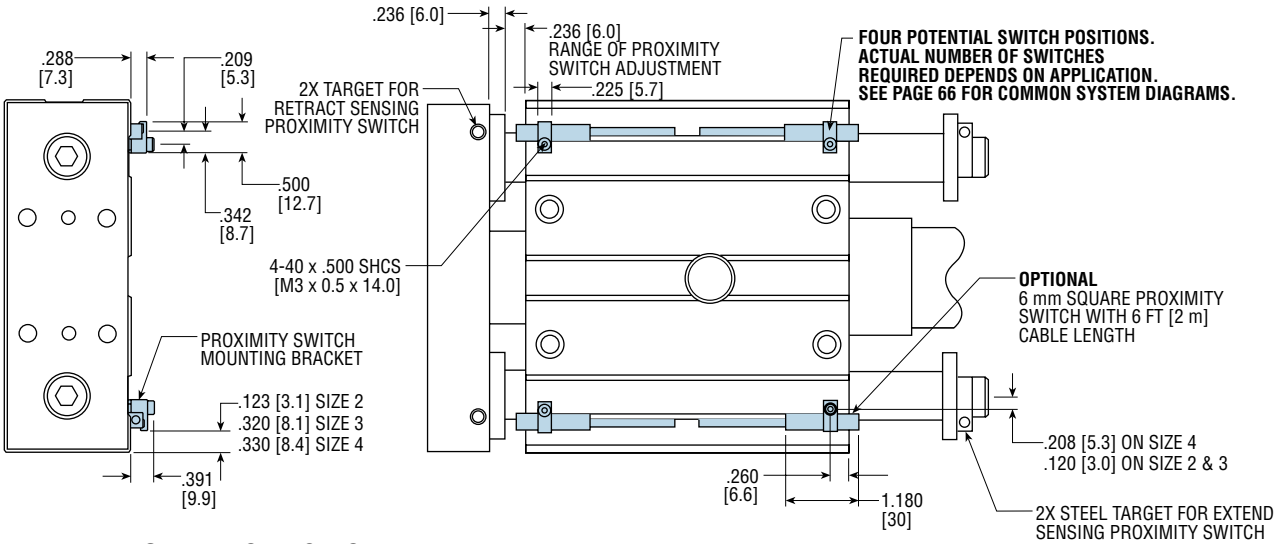
GV SIDE MOUNTING HOLES IN POSITION NUMBER 2

This option provides an additional mounting pattern on one side of the slide body. This allows the slide to be mounted on edge for applications where a narrow profile is required.

	MODEL NO.	LETTER DIMENSION					
		A	B	C	D	E	L
IMPERIAL	ECx2xB-2	.472	1.968	.196	1.182	10-24 x .500 DP	1.570
	ECx2xB-3	1.004	1.870	.256	1.260	1/4-20 x .375 DP	1.770
	ECx2xB-4	1.240	2.284	.276	1.417	1/4-20 x .430 DP	1.969
METRIC	ECx6xB-2	12.0	50.0	5.0	30.0	M5 x 0.8 x 12.5 DP	39.9
	ECx6xB-3	25.5	47.5	6.5	32.0	M6 x 1.0 x 15.0 DP	45.0
	ECx6xB-4	31.5	58.0	7.0	36.0	M6 x 1.0 x 15.0 DP	50.0



ACCESSORIES: PROXIMITY SWITCH MOUNTING KIT



PROXIMITY SWITCHES

HALL EFFECT SWITCHES

PART NO.	DESCRIPTION
55803-1-02	NPN 4.5 - 24 VDC WITH 2 METER CABLE
55804-1-02	PNP 4.5 - 24 VDC WITH 2 METER CABLE
55823-1	NPN 4.5 - 24 VDC WITH QUICK CONNECT
55824-1	PNP 4.5 - 24 VDC WITH QUICK CONNECT

REED SWITCHES

PART NO.	DESCRIPTION
55802-1-02	NPN OR PNP 4.5 - 24 VDC WITH 2 METER CABLE
55822-1	NPN OR PNP 4.5 - 24 VDC WITH QUICK CONNECT

6mm SQUARE INDUCTIVE PROXIMITY SWITCH

PART NO.	DESCRIPTION
18431-001-02	NPN 10 - 30 VDC WITH 2 METER CABLE
18431-002-02	PNP 10 - 30 VDC WITH 2 METER CABLE

QUICK CONNECT CORDSETS

PART NO.	DESCRIPTION
63549-02	2 METER CABLE
63549-05	5 METER CABLE

NOTES:

1) EACH PROXIMITY SWITCH MOUNTING KIT CONTAINS THE FOLLOWING:
   - 1 TARGET PIN WITH MAGNET
   - 1 TARGET WITH MAGNET
   - 2 SWITCH MOUNTING BRACKETS
   - 2 4-40 x .500 SHCS [M3 x 0.5 x 14 mm]

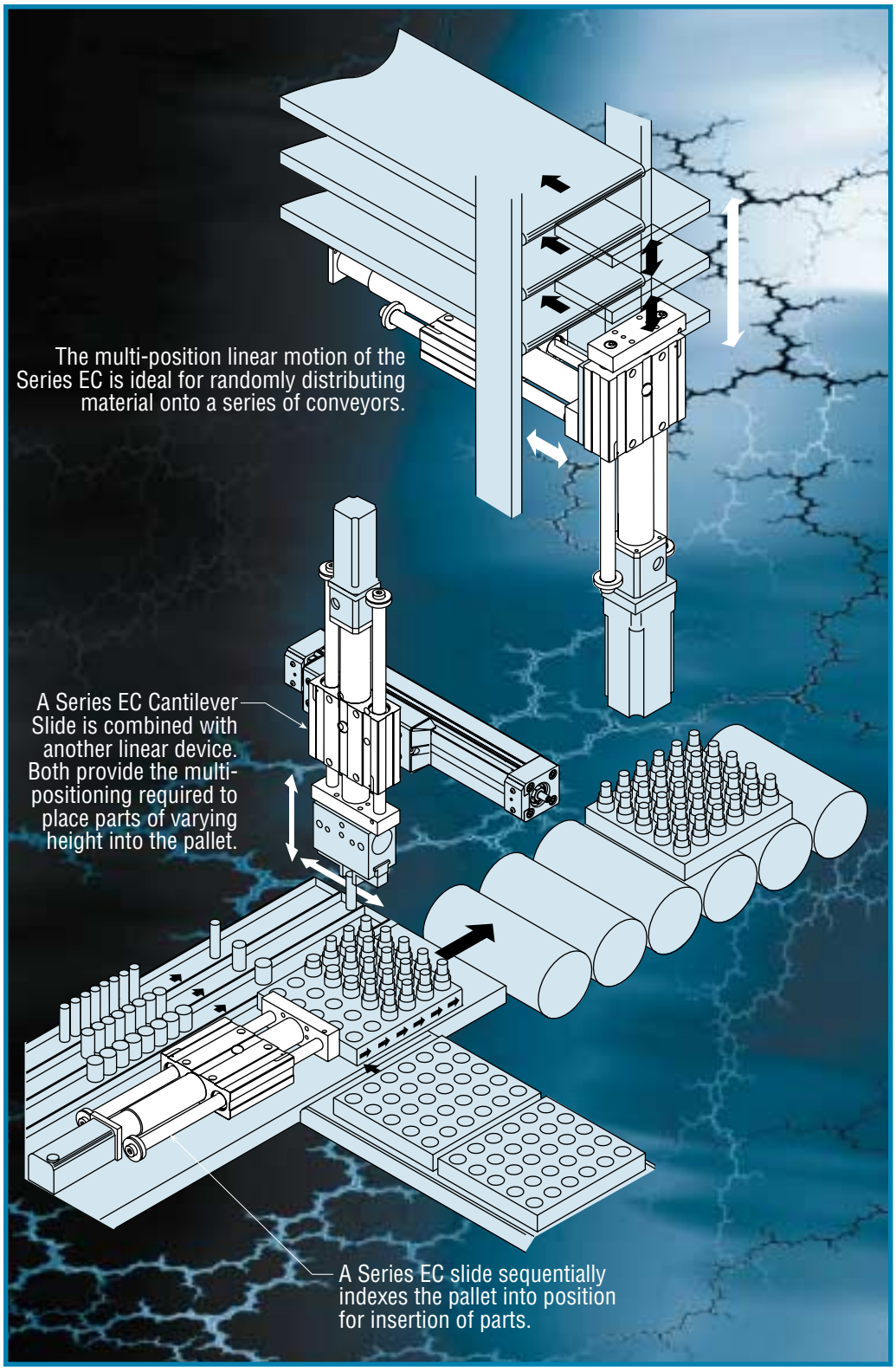
   RETRACT AND EXTEND KITS CONTAIN COMPONENTS FOR THAT DIRECTION ONLY. (COMPLETE KIT CONTAINS BOTH)
2) SEE PROXIMITY SWITCHES AND SENSORS SECTION OF PHD'S MAIN CATALOG FOR COMPLETE SWITCH SPECIFICATIONS.
3) SWITCHES ARE ORDERED SEPARATELY.
4) NUMBERS IN [ ] ARE mm

SWITCH MOUNTING KITS

	KIT NUMBER	
MODEL NO.	IMPERIAL	METRIC
ECxxxx-2	62067-01	62067-02
ECxxxx-3	62068-01	62068-02
ECxxxx-4	62069-01	62069-02

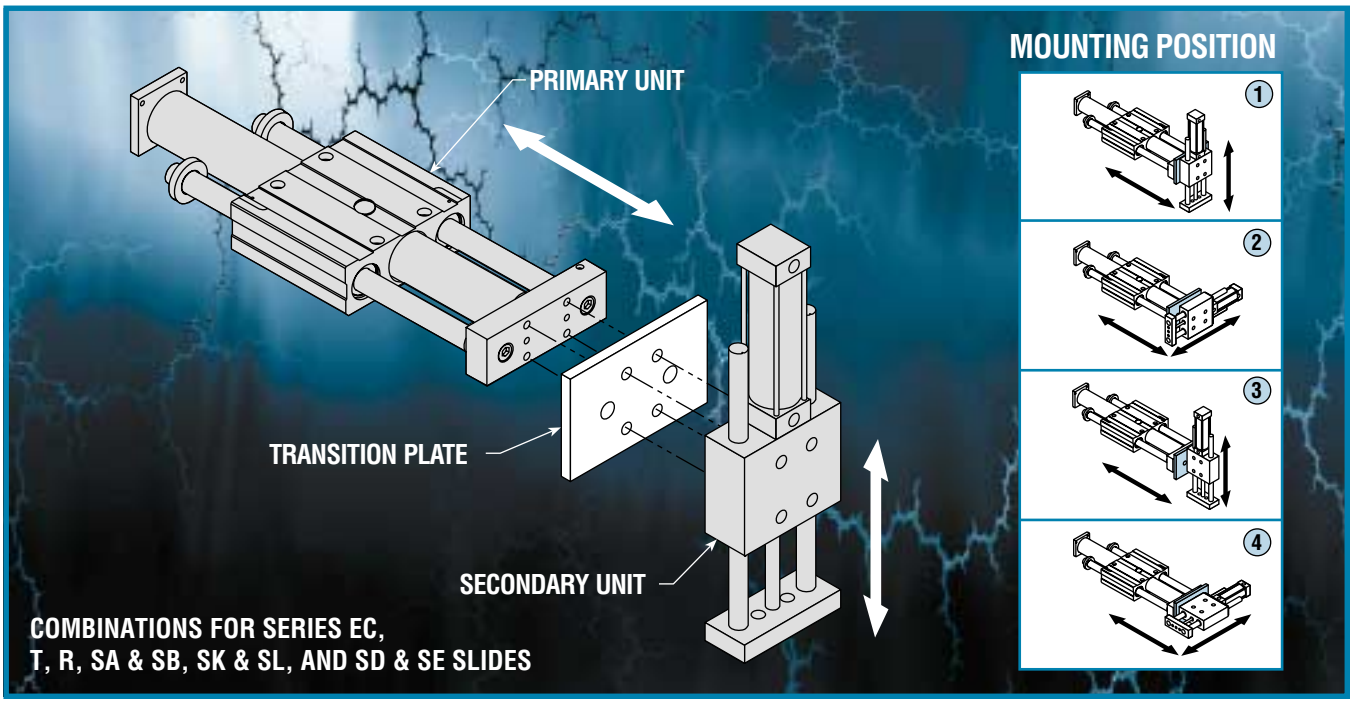
SOLUTIONS FOR MODULAR AUTOMATION

USING TRANSITION PLATES



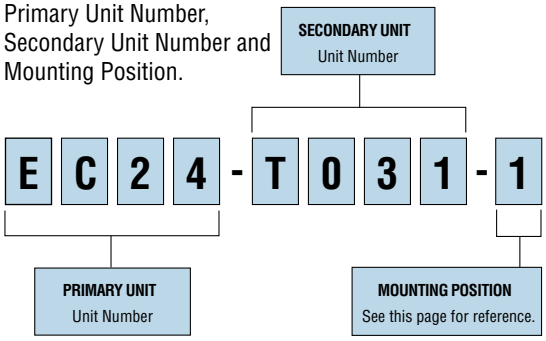
INDEX:

TRANSITION PLATES: SERIES EC & CANTILEVER SLIDE

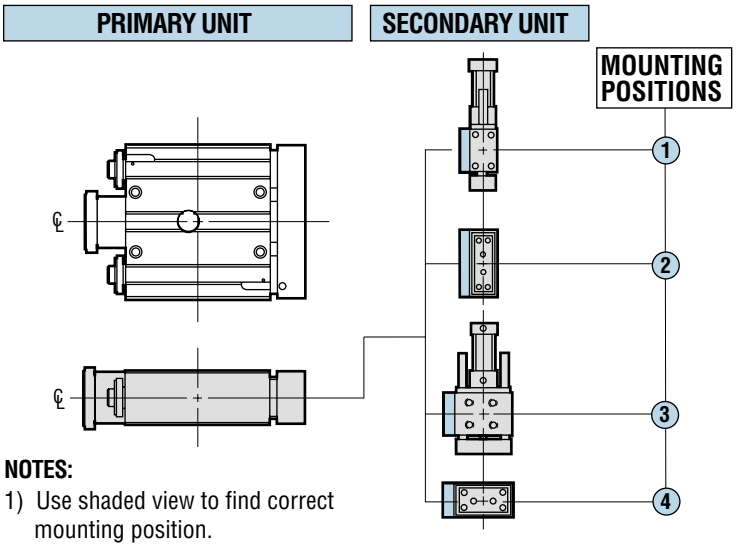


ORDERING DATA

TO ORDER SPECIFY:
Primary Unit Number, Secondary Unit Number and Mounting Position.



NOTES:
1) These numbers apply regardless of unit travel.
2) All required mounting hardware is included with the transition plate.
3) Series EC, SK, SL, SD, and SE Slides as secondary units positions 4 & 3 require -GV option



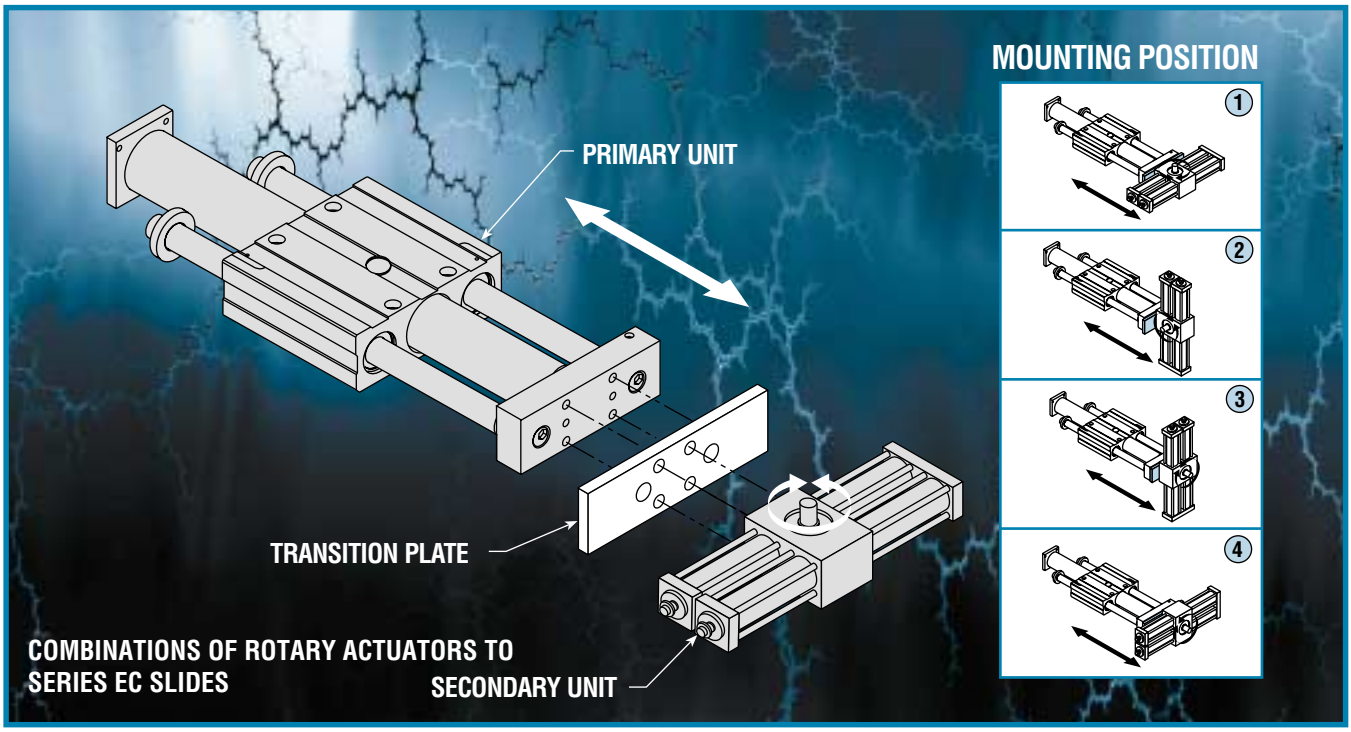
NOTES:
1) Use shaded view to find correct mounting position.
2) All units centered on specific hole mounting pattern of housing and/or tool plate.

			SECONDARY UNIT																										
			SLIDES																										
NOTE: METRIC NUMBERS ARE IN [ ]		UNIT NO.	SA12 [SA17] SB12 [SB17]	SA22 [SA27] SB22 [SB27]	SA33 [SA38] SB33 [SB38]	SA44 [SA49] SB44 [SB49]	SA63 [SA68] SB63 [SB68]	SD22 SE22	SD23 SE23	SD24 SE24	SD25 SE25	SD26 SE26	T031 [T035]	T041 [T045]	T061 [T065]	T082 [T086]	SK51 SL51	SK52 SL52	SK53 SL53	SK54 SL54	SK55 SL55	SK66 SL66	EC12 [EC52]	EC13 [EC53]	EC14 [EC54]
PRIMARY UNIT	SERIES EC SLIDES	EC22 [EC62]	3	3	3			3					3				3	3					3		
		EC23 [EC63]	3	3	3			3	3				3				3	3	3				3	3	
		EC24 [EC64]	3	3	3	3		3	3	3			3	3			3	3	3	3			3	3	3

SHADED AREAS – CONSULT PHD FOR AVAILABILITY

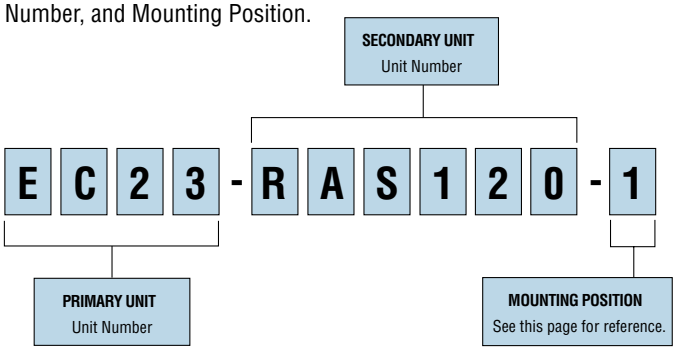
PLATE THICKNESS KEY 3 = .500 [12.7]

TRANSITION PLATES: SERIES EC & ROTARY ACTUATOR

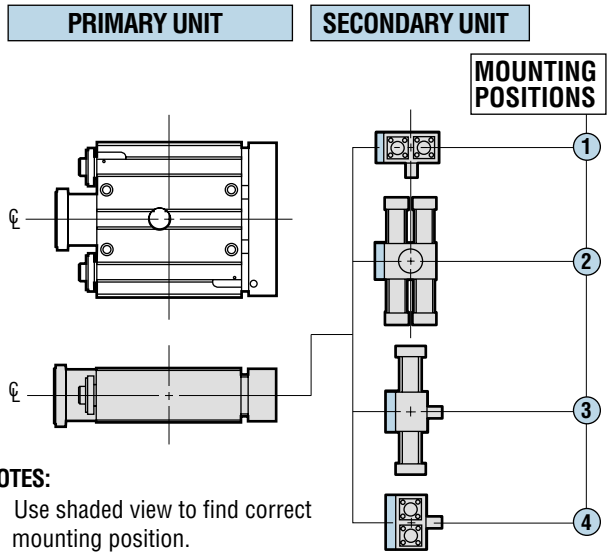


ORDERING DATA

TO ORDER SPECIFY:
Primary Unit Number, Secondary Unit Number, and Mounting Position.



NOTES:
1) These numbers apply regardless of unit travel and rotation.
2) All required mounting hardware is included with the transition plate.



NOTES:
1) Use shaded view to find correct mounting position.
2) All units centered on specific hole mounting pattern of tool plate.

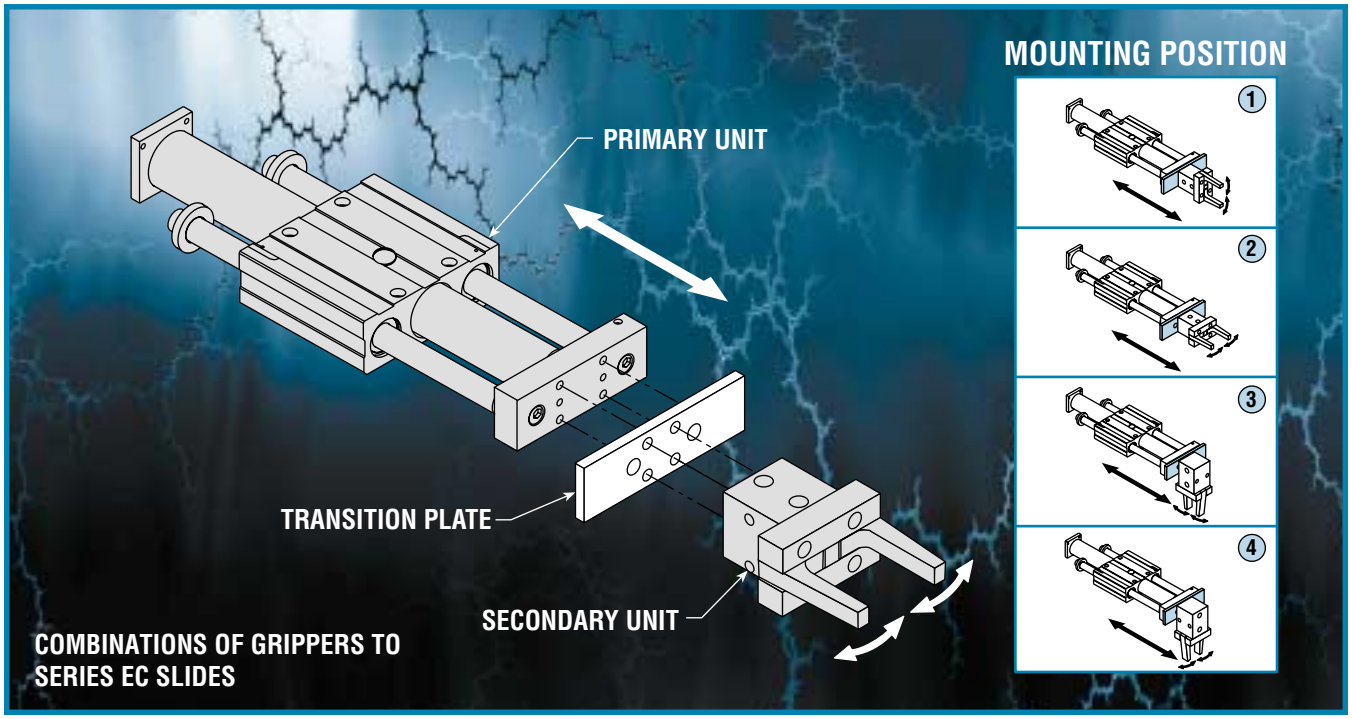
			SECONDARY UNIT																		
			ROTARY ACTUATOR																		
NOTE: METRIC NUMBERS ARE IN [ ]		UNIT NO.	RO50 [RE50]	RO75 [RE75]	R200 [R205]	R400 [R405]	R600 [R605]	R800 [R805]	RAS120 [RAS520]	RAS125 [RAS525]	RAS132 [RAS532]	RAS140 [RAS540]	RAS150 [RAS550]	RLS112 [RLS512]	RLS116 [RLS516]	RLS120 [RLS520]	RLS125 [RLS525]	RLS132 [RLS532]	RLS140 [RLS540]	RLS163 [RLS563]
PRIMARY UNIT	SERIES EC SLIDES	EC22 [EC62]	3	3					3					3	3	3				
		EC23 [EC63]	3	3					3					3	3	3	3			
		EC24 [EC64]	3	3					3	3	3			3	3	3	3	3	3	

SHADED AREAS – CONSULT PHD FOR AVAILABILITY

PLATE THICKNESS KEY

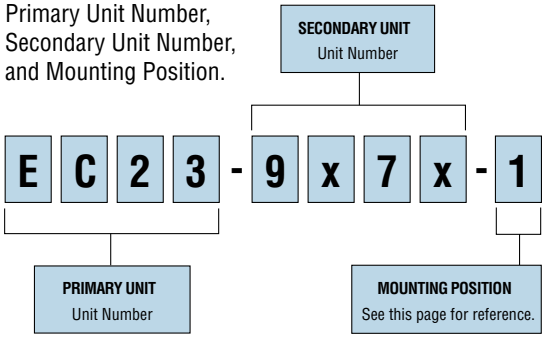
3 = .500 [12.7]

TRANSITION PLATES: SERIES EC & GRIPPER

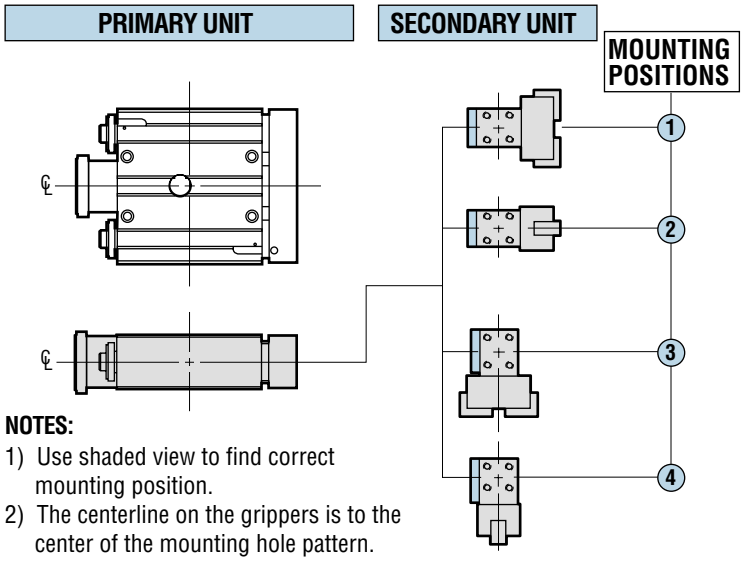


ORDERING DATA

TO ORDER SPECIFY:
Primary Unit Number,
Secondary Unit Number,
and Mounting Position.



NOTES:
1) These numbers apply regardless of unit travel.
2) All required mounting hardware is included with the transition plate.
3) Mounting positions 3 and 4 are not available with Series 19xx, 8660, 8670, 8680, and 8690 Grippers.
4) Mounting position 3 not applicable with Series GRC.



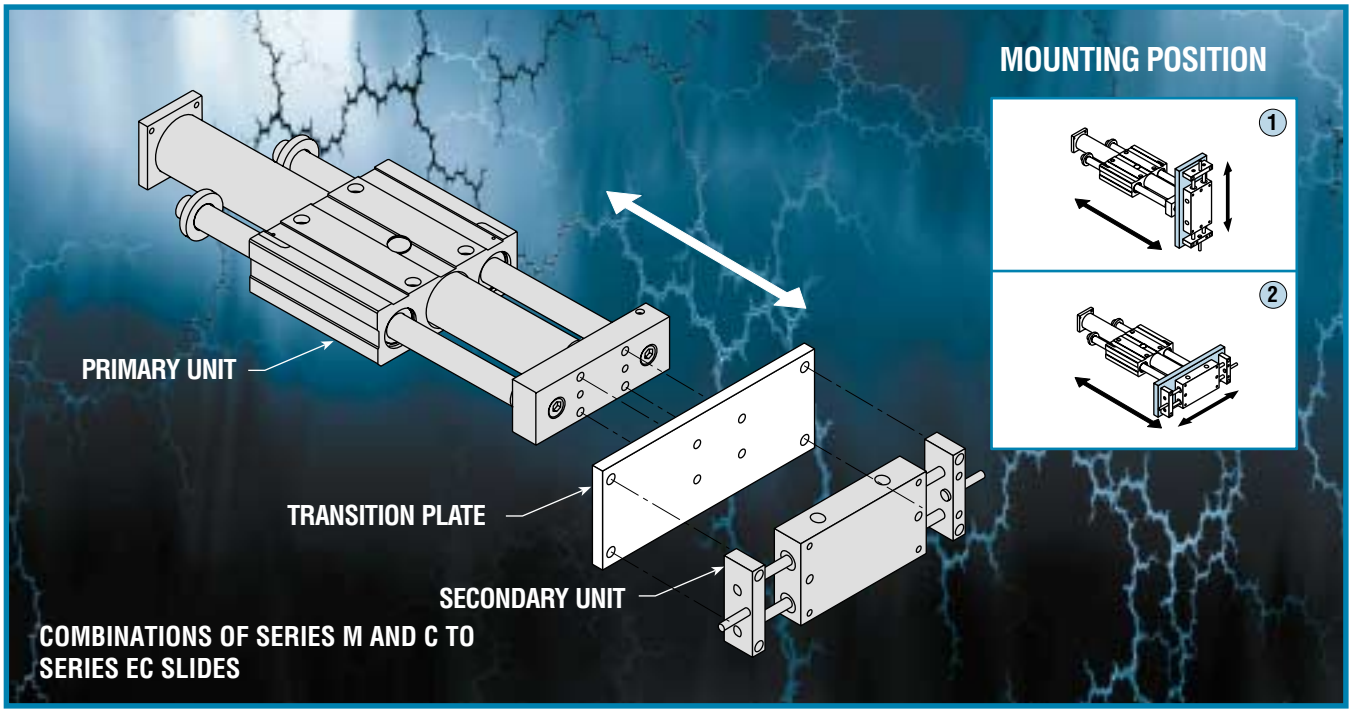
NOTES:
1) Use shaded view to find correct mounting position.
2) The centerline on the grippers is to the center of the mounting hole pattern.
3) All units are centered on specific hole mounting patterns of tool plate and/or gripper body.

			SECONDARY UNIT																																			
			GRIPPERS																																				
NOTE: METRIC NUMBERS ARE IN [ ]		UNIT NO.	8400	8410	8420	8430	9x6x	9x7x	9x8x	9x9x	862x 866x 792x 796x 532x 536x	863x 867x 793x 797x 533x 537x	864x 868x 794x 798x 534x 538x	865x 869x 795x 799x 535x 539x	GRBx2x	GRBx3x	GRBx4x	GRBx5x	GRBx6x	GRBx7x	GRCx3x	GRCx4x	GRCx5x	GRCx6x	GRDx3x	GRDx4x	GRDx5x	GRDx6x	GRTx2x	GRTx3x	GRTx4x	GRTx5x	GRTx6x	GRTx7x	GRTx8x
PRIMARY UNIT	SERIES EC SLIDES	EC22 [EC62]	2	2	3	3	2	2	3	3	3				3	3	3	3			3				2	2	3	3	2	2					
		EC23 [EC63]	2	2	3	3	2	2	3	3	3				3	3	3	3			3				2	2	3	3	3	3					
		EC24 [EC64]	3	3	3	3	3	3	3	3	3	3			3	3	3	3	5		3	3			3	3	3	3	3	3	4	4			

SHADED AREAS – CONSULT PHD FOR AVAILABILITY

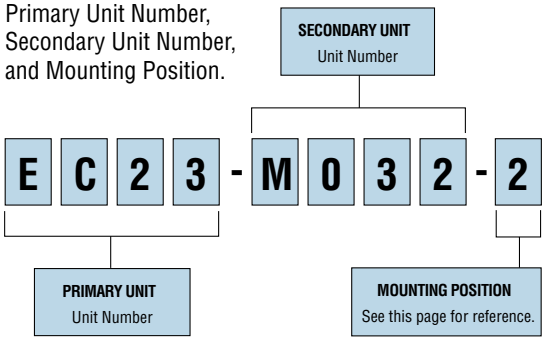
PLATE THICKNESS KEY 2 = .375 [9.5] 3 = .500 [12.7] 4 = .625 [15.9] 5 = .750 [19]

TRANSITION PLATES: SERIES EC & SADDLE SLIDE



ORDERING DATA

TO ORDER SPECIFY:
Primary Unit Number,
Secondary Unit Number,
and Mounting Position.

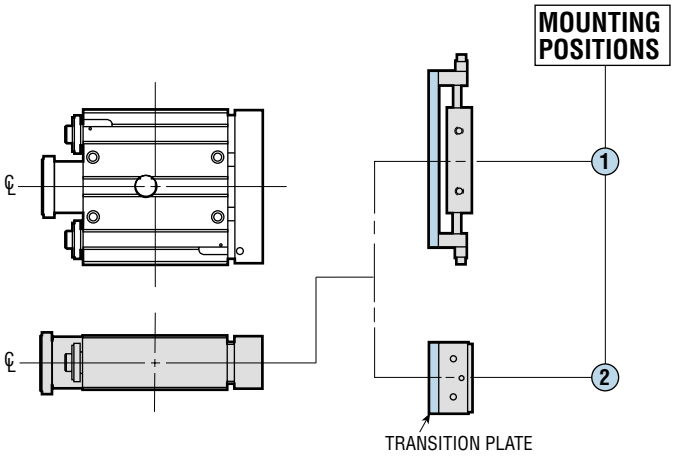


NOTES:
1) These numbers apply regardless of unit travel and rotation.
2) All required mounting hardware is included with the transition plate.
3) When a Series C Slide is the secondary unit, the travel must be specified when ordered.

			SECONDARY UNIT						
			SLIDES						
NOTE: METRIC NUMBERS ARE IN [ ]		UNIT NO.	M022 [M026]	M032 [M036]	M042 [M046]	M062 [M066]	C031 [C035]	C041 [C045]	C061 [C065]
PRIMARY UNIT	SERIES EC SLIDES	EC22 [EC62]	3	3			3		
		EC23 [EC63]	3	3			3		
		EC24 [EC64]	3	3	3		3	3	

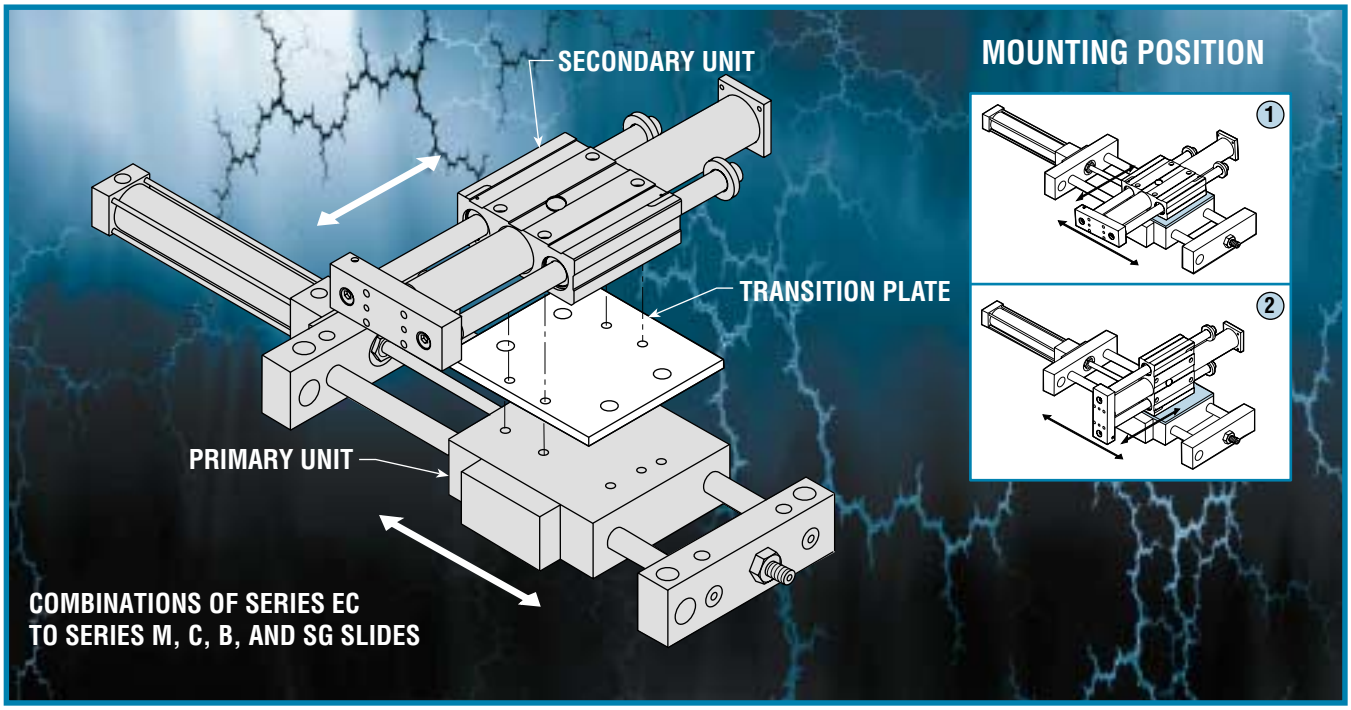
SHADED AREAS – CONSULT PHD FOR AVAILABILITY
PLATE THICKNESS KEY 3 = .500 [12.7]

PRIMARY UNIT | **SECONDARY UNIT**



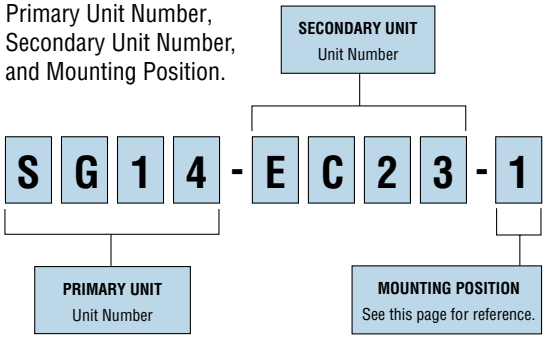
NOTES:
1) Use shaded view to find correct mounting position.
2) The Transition Plates in this section for Series M Slides are manufactured to fit the maximum travel of the unit and constructed of aluminum for easy machining. Machining off the excess material to fit your unit may be required.
3) All units are centered on specific hole mounting pattern of tool plate and/or end blocks.

TRANSITION PLATES: SADDLE SLIDE & SERIES EC

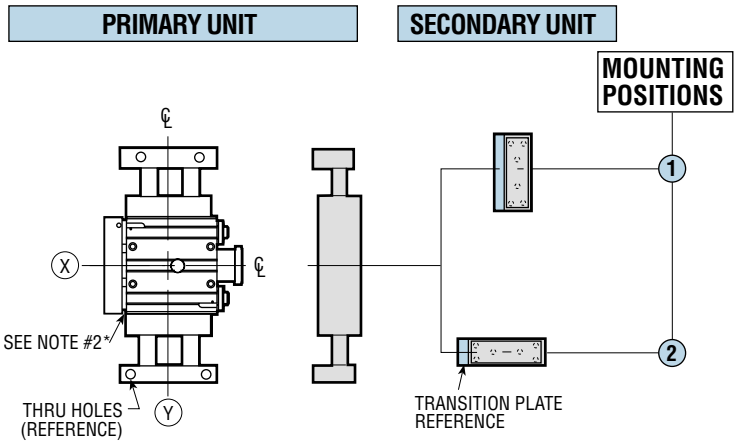


ORDERING DATA

TO ORDER SPECIFY:
Primary Unit Number,
Secondary Unit Number,
and Mounting Position.



NOTES:
1) These numbers apply regardless of unit travel.
2) All required mounting hardware is included with the transition plate.
3) EC Slide as secondary units position 2 require -GV option.



NOTES:
1) Use shaded view to find correct mounting position.
2) *Unless otherwise specified, the front edge of the secondary unit bearing housing is flush with the primary slide saddle side.

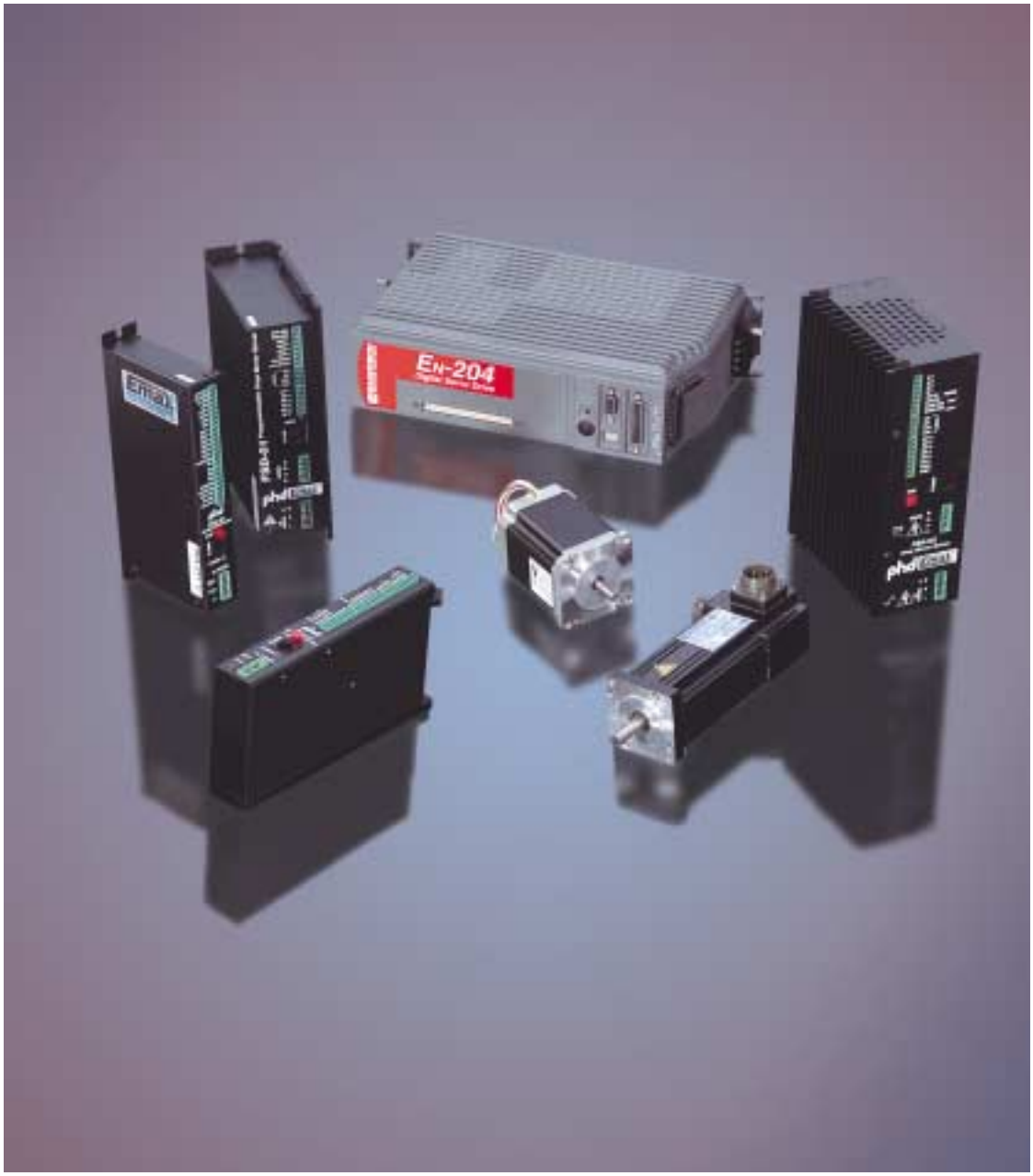
			PRIMARY UNIT																		
			SLIDES																		
NOTE: METRIC NUMBERS ARE IN [ ]		UNIT NO.	MO22 [MO26]	MO32 [MO36]	MO42 [MO46]	MO62 [MO66]	CO31 [CO35]	CO41 [CO45]	CO61 [CO65]	BO31 [BO35]	BO41 [BO45]	BO61 [BO65]	BO81 [BO85]	B101 [B105]	B121 [B125]	SG11 [SG51]	SG12 [SG52]	SG13 [SG53]	SG14 [SG54]	SG15 [SG55]	SG16 [SG56]
SECONDARY UNIT	SERIES EC SLIDES	EC22 [EC62]	1	2	3	3	3	3	3	3	3	4	4	5	5	3	3	3	4	5	5
		EC23 [EC63]	2	3	3	3	3	3	3	3	3	4	4	5	5	3	3	3	4	5	5
		EC24 [EC64]			3	3			3		3	4	4	5	5			3	4	5	5

SHADED AREAS – CONSULT PHD FOR AVAILABILITY

PLATE THICKNESS KEY 1 = .312 [7.9] 2 = .375 [9.5] 3 = .500 [12.7] 4 = .625 [15.9] 5 = .750 [19]

NOTES

SERIES FS
MOTORS AND CONTROLS



INDEX:

ORDERING DATA: SERIES FS MOTORS AND CONTROLS

STEPPER CONTROLS AND MOTORS

STEPPER MOTOR

PART NO.	NEMA FRAME
64716-003	23
64716-008	23
64716-009	23
64716-011	34
64716-013	34
64716-014	42

Motor Screw kits sold separately.
For Series EQ see pages 11 to 15.
For Series EC see pages 33 to 35.

MOTION CONTROLLER/DRIVER

PART NO.	DESCRIPTION
FSD-01	3.5 amp
FSD-02	5.5 amp

CONTROLLER REPLACEMENT ACCESSORIES

PART NO.	DESCRIPTION
64512	Adapter, RS232 to PC 9 Pin
64513	Cord, RS232 10 ft
64511	Programming Software

NOTE: All accessories above are provided with each FSD-01 and FSD-02 controller.

SERVO CONTROLS AND MOTORS

SERVO MOTOR

PART NO.	NEMA FRAME
64715-001	23
64715-002	34

Motor Screw kits sold separately.
For Series EQ see pages 11 to 15.
For Series EC see pages 33 to 35.

SERVO DRIVE

PART NO.	DESCRIPTION
FSA-01	Servo Amplifier including Setup Software

MOTION CONTROLLER

PART NO.	DESCRIPTION
FSC-01	Step and Direction

CABLES

PART NO.	DESCRIPTION
64719-015	*Motor Cable with 15 ft cable
64720-015	*Feedback Cable with 15 ft cable
64722-010	*I/O Cable with 10 ft cable
64723-010	**RS232 Cable PC 9 Pin with 10 ft cable
64724-010	**RS232 Cable PC 25 Pin with 10 ft cable

*Required **Select one

CONTROLLER REPLACEMENT ACCESSORIES

PART NO.	DESCRIPTION
64512	Adapter, RS232 to PC 9 Pin
64513	Cord, RS232 10 ft
64511	Programming Software

NOTE: All accessories above are provided with each FSC-01 controller.

SERVO DRIVE REPLACEMENT ACCESSORIES

PART NO.	DESCRIPTION
64730	Power Tools Setup Software

NOTE: Power Tools are included with each FSA-01 Servo Drive.

CONTROLLER ACCESSORIES

PART NO.	DESCRIPTION
MMI-01	Operator Interface
HUB-8	Multi-Axis Hub

BRAKES

PART NO.	NEMA FRAME SIZE	INPUT SHAFT DIAMETER	OUTPUT SHAFT DIAMETER	USE WITH MOTOR NUMBER
64728-001	23	1/4	1/4	64716-003, 64716-008, 64716-009
64728-002	23	3/8	3/8	64715-001
64728-003	34	3/8	3/8	64716-011, 64716-013
64728-004	34	1/2	1/2	64715-002
64728-005	42	5/8	5/8	64716-014

BENEFITS: SERIES FS MOTORS AND CONTROLS

STEPPER MOTION CONTROLLER/DRIVE

- Series FS Controller/Drives feature low cost and high performance for a wide range of motion control applications.
- Extremely easy to use Windows programming interface. No complex programming language required.
- Eight inputs, three outputs, optically isolated for maximum noise immunity.
- Two models to choose from to meet application power requirements.
- Software selectable step resolutions for maximum system flexibility.

SERVO MOTION CONTROLLER

- Series FS Servo Motion Controllers provide the same easy Windows programming as the stepper controllers.
- Eight inputs, three outputs, optically isolated for maximum noise immunity.
- Step and direction outputs for simple interfacing to a Servo Motor Drive.
- Programmable resolutions provide convenient matching of motors, screw leads, and pulley ratios.

SERVO DRIVE

- Accepts step and direction inputs from the Servo Motion Controller and provides the benefits of closed loop servo performance.
- Wide range of power output to match a variety of application requirements.
- Interfaces easily with listed NEMA 23 and 34 frame size motors using available motor and feedback cables.

Stepper Controller FSD-01

Stepper Controller FSD-02

Servo Controller FSC-01


Servo Drive FSA-01

SPECIFICATIONS	STEPPER CONTROLLER/DRIVE FSD-01, FSD-02	SERVO PACKAGE* CONTROLLER FSC-01	SERVO PACKAGE* DRIVE FSA-01
INPUT VOLTAGE	110 or 220 VAC (switch selectable) 50-60 Hz		90-264 VAC 47-63 Hz
INPUTS	8 Optically Isolated 5-24 VDC Bidirectional		5 Optically Isolated 10-30 VDC Current Sourcing
OUTPUTS	3 General Purpose		3 Optically Isolated
FEEDBACK	Open Loop	NA	Closed Loop
RESOLUTIONS	13 Programmable 2000 to 50800 Steps/Rev.	16 Programmable 200 to 50800 Steps/Rev.	8192 Pulses/Rev.
SERIAL COMMUNICATIONS	RS-232		RS-232/RS-485
PROGRAMMING	Windows Menu Programming Interface-100 Instruction Lines		Windows Based Setup Program
AMBIENT TEMPERATURE	32° to 122°F [0° to 50°C]		32° to 104°F [0° to 40°]
HUMIDITY	90% Maximum Non-condensing		10% - 95% Non-condensing
AGENCY APPROVALS	CE		UL listed or UL recognized, CE

*The servo package contains the controller FSC-01 and the servo drive FSA-01.

MMI - 01

The MMI-01 is an easy to use, flexible device that allows an operator to enter move speeds, move distances, or repeat loop counts. Messages can also be displayed and the program can be paused until the user presses a key, such as ENTER, YES, or NO. Program branching can be accomplished based on the response of YES or NO.

The MMI-01 is compact, easy to install, and carries a NEMA 4/12 rating. (The 4 x 20 character display and 20 key membrane keypad are sealed.)

Connection to an FSC-01, FSD-01, or FSD-02 Motion Controller/Driver is accomplished by the standard programming cable that is supplied with every drive. This cable also supplies power to the MMI-01 so that no additional power supply or wiring is needed.

Setup and programming of the MMI-01 is fast and easy. The FSC-01, FSD-01, and FSD-02 Motion Controller/Drivers are furnished with PHD Programmer Software, which allows the user to easily program instructions for the terminal. Complex, confusing items like baud rate, parity, and cursor positioning are handled automatically by the software.

On screen emulation of the MMI-01 by the PHD Programmer Software allows a potential user to try the MMI-01 before purchasing one.

FEATURES:

- Ideal operator interface for FSC-01, FSD-01, and FSD-02 Motion Controller/Drivers.
- Connects directly to FSC-01, FSD-01, and FSD-02 Motion Controller/Drivers using the standard programming cable. No special wiring required.
- 4 line, 20 character/line LCD display
- NEMA 4/12 rating (dustproof and drip proof when properly mounted)
- Can be surfaced mounted or flush mounted (NEMA 4/12 rating for flush mounting only).

Programming From FSC-01, FSD-01, or FSD-02

- Easy to program using PHD Programmer Software, running on Windows 3.1, Windows 95, Windows 98, or Windows NT.
- Seven functions are available:
  1) Display a message up to 60 characters.
  2) Display a message and pause program until operator presses ENTER key.
  3) Display a message, wait for operator to press YES or NO key, branch program on YES.
  4) Display message, allow operator to enter a loop count.
  5) Display a message, allow operator to end a speed.
  6) Display a message, allow operator to enter a distance.
  7) Create a Custom MMI Menu and branch to up to eight different program lines based on operator input.
- Speeds, distances, and loop counts entered by the operator can be stored in any of eight nonvolatile memory locations for use in repeat loops and motor moves.

HUB - 8

The PHD Hub-8 allows up to 8 Motion Controller/Drivers to be controlled from a single RS-232 serial port of a PC or PLC.

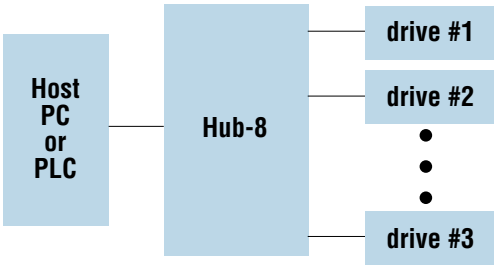
Each Motion Controller/Drive acquires a unique address from the port to which it is connected. This simple addressing scheme minimizes the cost of the controllers, and more importantly, the cost of configuring and/or replacing them within your system. Connections are made with low cost, reliable telephone cabling.

Both of PHD's popular Series FS Stepper Controller/Drives can be used with the PHD Hub-8, in addition to the stand alone Series FS Motion Controller/Indexer, FSC-01. By choosing the power level and features required for each axis of your application, the PHD Hub-8 can offer substantial savings over conventional multi-axis controls.

The PHD Hub-8 is powered by the Controller that is connected to port #1, saving you the cost and installation expense of a separate power supply.

PHD's Hub Command Language consists of approximately 50 commands allowing a host PC or PLC to execute relative, absolute, and homing moves, make status inquiries, sample inputs, set outputs, and more.

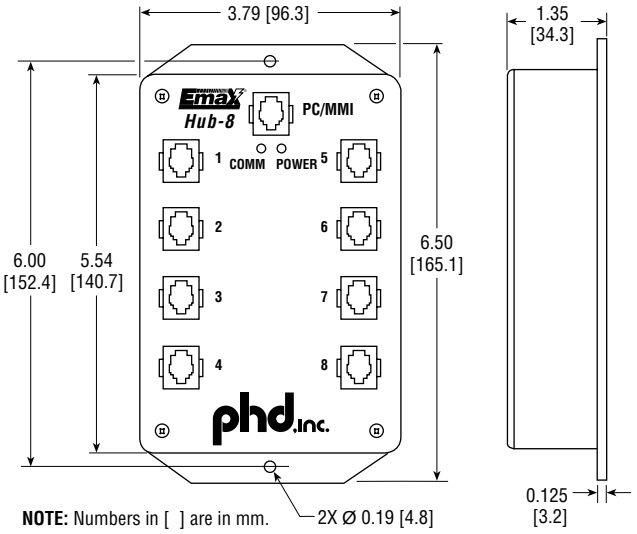
Block Diagram



Multi-Axis Stand Alone Mode

PHD's Hub Programmer Windows software will allow you to create and store multi-axis motion control programs in the Hub-8 and then run them without a connected PC. This new software brings the innovative ease of use and productivity of the PHD Series FS Single Axis Programmer Software to multi-axis applications.

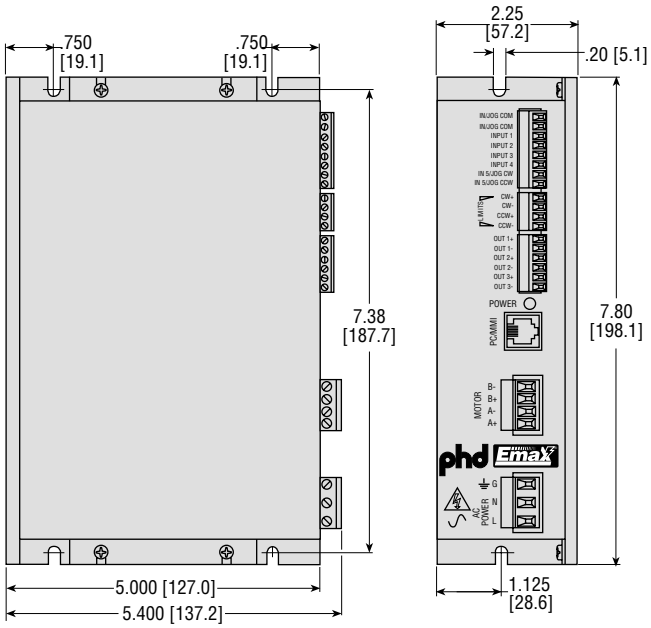
Mechanical Outline



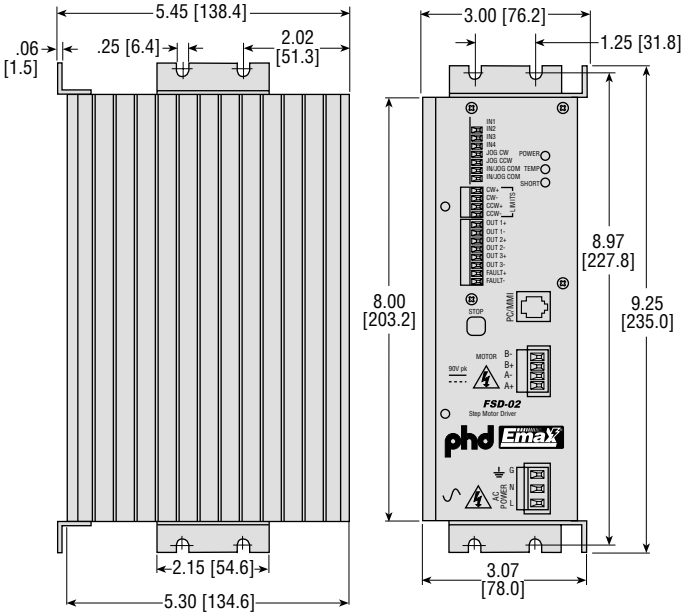
NOTE: Numbers in [ ] are in mm.

DIMENSIONS: SERIES FS MOTORS AND CONTROLS

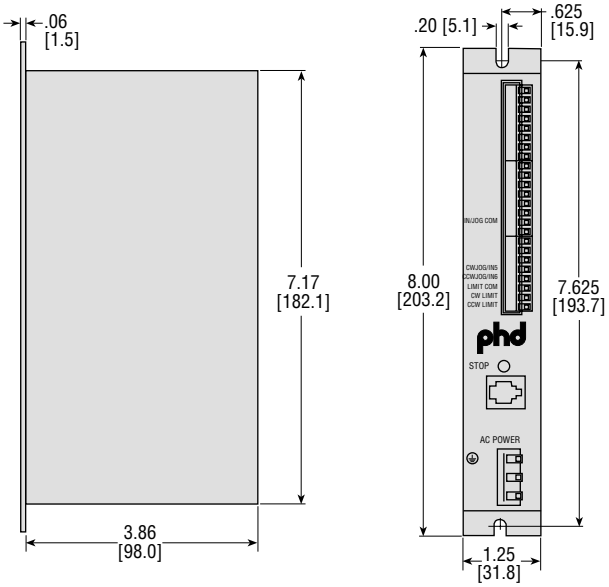
FSD-01 MOTION CONTROLLER/DRIVE



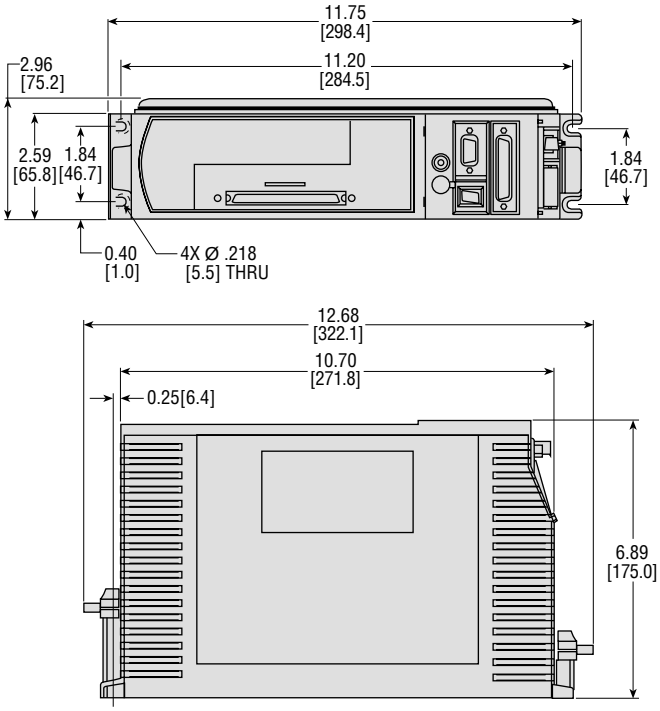
FSD-02 MOTION CONTROLLER/DRIVE



FSC-01 MOTION CONTROLLER



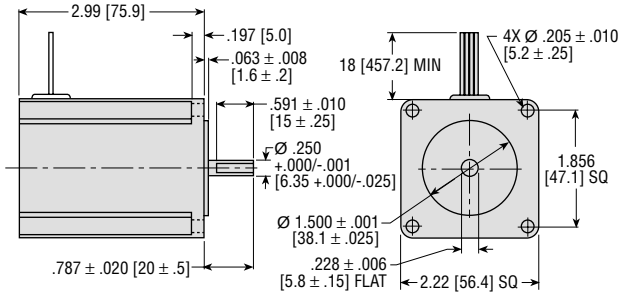
FSA-01 DRIVE



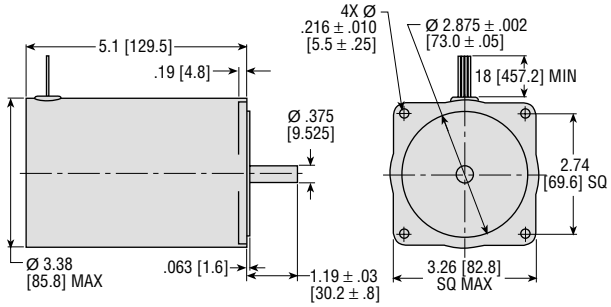
SERIES FS MOTORS & CONTROLS

STEPPER MOTORS

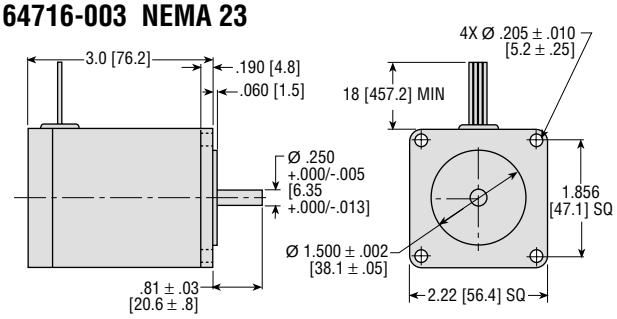
64716-008 & 64716-009 NEMA 23



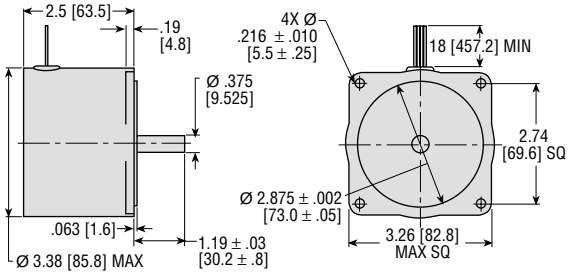
64716-013 NEMA 34



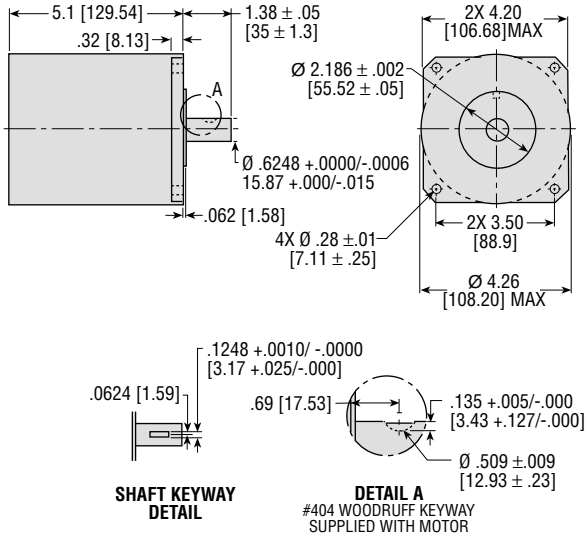
64716-003 NEMA 23



64716-011 NEMA 34



64716-014 NEMA 42



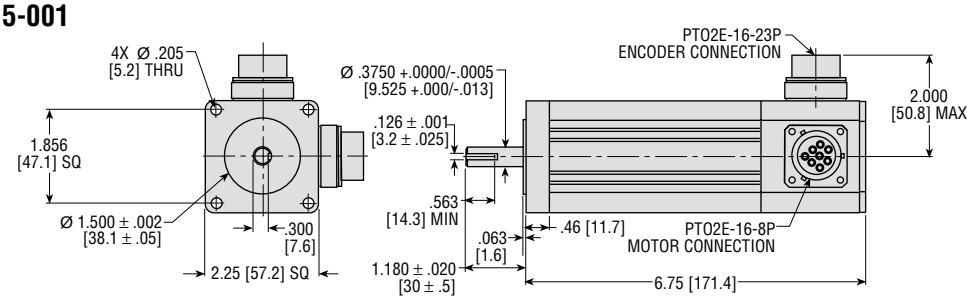
SHAFT KEYWAY DETAIL

DETAIL A
#404 WOODRUFF KEYWAY
SUPPLIED WITH MOTOR

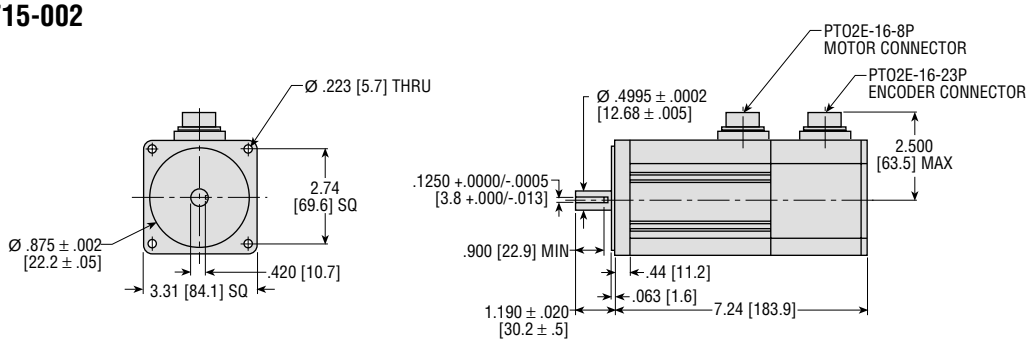
All dimensions are reference only unless specifically toleranced.

SERVO MOTORS

64715-001



64715-002

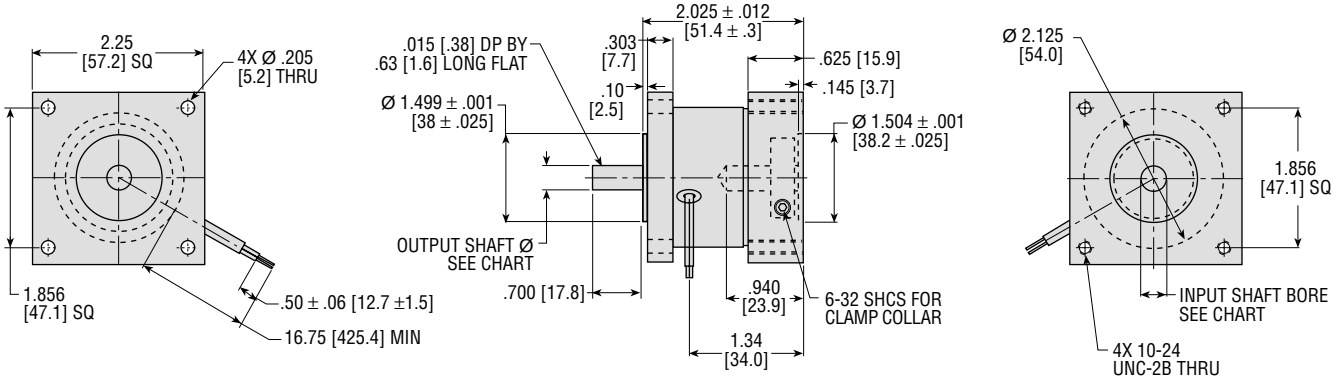


DIMENSIONS: SERIES FS IN-LINE BRAKES

64728-001

BRAKE TO EQ SLIDE MOUNTING KIT

SIZE	PART NO.	SCREW DESCRIPTION
25	65760	10-32 x 5/8
40	65760	10-32 x 5/8



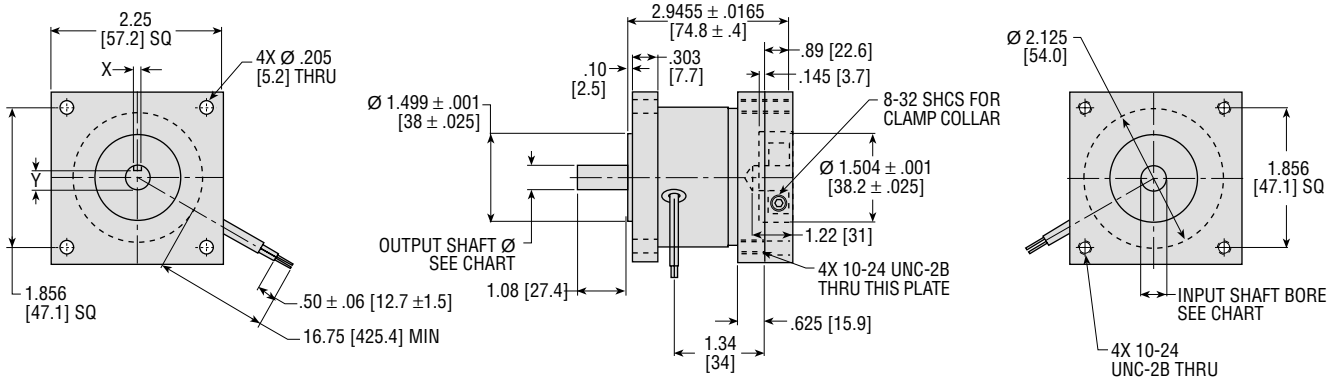
PART NO.	OUTPUT SHAFT DIAMETER	INPUT SHAFT BORE
64728-001	(1/4) .24975 ± .00025 [6.344 ± .006]	(1/4) .2525 ± .0025 [6.41 ± .06]

NOTE: Motor to brake mounting kit included with brake.

64728-002

BRAKE TO EQ SLIDE MOUNTING KIT

SIZE	PART NO.	SCREW DESCRIPTION
25	65760	10-32 x 5/8
40	65760	10-32 x 5/8



PART NO.	OUTPUT SHAFT DIAMETER	INPUT SHAFT BORE	KEYWAY		
			NOMINAL	X	Y
64728-002	(3/8) .37425 ± .00025 [9.506 ± .006]	(3/8) .3775 ± .0025 [9.59 ± .06]	(3/64 x 3/32)	.095 ± .001 [2.41 ± .025]	.317 ± .005 [8.05 ± .13]

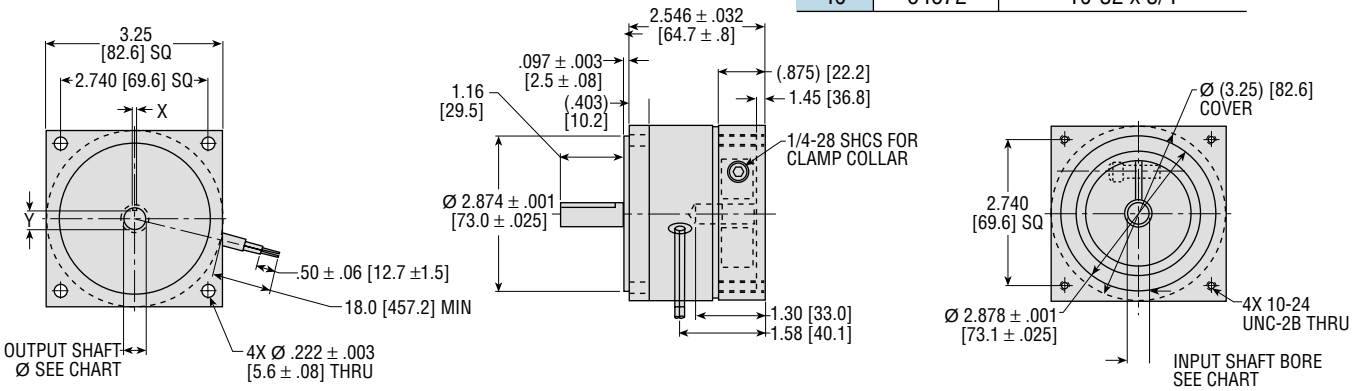
NOTE: Motor to brake mounting kit included with brake.

All dimensions are reference only unless specifically toleranced.

64728-003 & 64728-004

BRAKE TO EQ SLIDE MOUNTING KIT

SIZE	PART NO.	SCREW DESCRIPTION
25	64672	10-32 x 3/4
40	64672	10-32 x 3/4



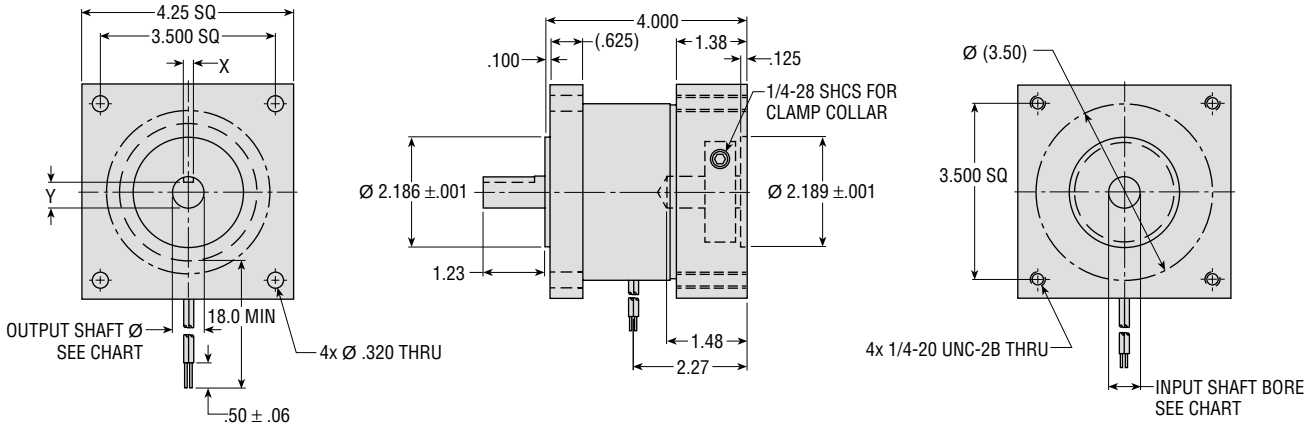
PART NO.	OUTPUT SHAFT DIAMETER	INPUT SHAFT BORE	KEYWAY		
			NOMINAL	X	Y
64728-003	(3/8) .37475 ± .00025 [9.519 ± .006]	(3/8) .3775 ± .0025 [9.59 ± .06]	(3/64 x 3/32)	.095 ± .001 [2.41 ± .025]	.317 ± .005 [8.05± .13]
64728-004	(1/2) .49945 ± .00025 [12.686 ± .006]	(1/2) .5025 ± .0025 [12.76 ± .06]	(1/16 x 1/8)	.126 ± .001 [3.20 ± .025]	.425 ± .005 [10.8 ± .13]

NOTE: Motor to brake mounting kit included with brake.

64728-005

BRAKE TO EQ SLIDE MOUNTING KIT

SIZE	PART NO.	SCREW DESCRIPTION
40	11857	1/4-20 x 1



PART NO.	OUTPUT SHAFT DIAMETER	INPUT SHAFT BORE	KEYWAY		
			NOMINAL	X	Y
64728-005	(5/8) .6245 ± .0005 [15.862 ± .013]	(5/8) .6265 ± .0025 [15.913 ± .06]	(3/32 x 3/16)	.1885 ± .001 [4.79 ± .025]	.510 ± .007 [12.95 ± .18]

NOTE: Motor to brake mounting kit included with brake.

FSD-01/FSD-02 MOTION CONTROLLER/DRIVE

PHD Series FSD-01 and FSD-02 are combination drive/indexer systems for stepper motor control. Each is capable of driving a variety of stepper motors offered by PHD. The FSD-01 is capable of 3.5 amps of drive current while the FSD-02 delivers 5.5 amps. These driver/indexers offer an integrated solution of motion and powered drive control. A major benefit of these PHD systems is the ease of programming with a simple Windows graphical user interface. No programming language to learn, no software engineer to consult, no code to write at all.

FSC-01 MOTION CONTROLLER

The PHD Series FSC-01 is a stand-alone motion controller designed to interface with a variety of step motor drives and servo amplifiers. It utilizes the same simple programming procedures as the Series FSD-01 & -02 driver/indexers. However, the FSC-01 motion controller is designed to compliment the Series FSA-01 Servo drive. It provides the drive with step and direction signals to complete a closed loop servo-based motion control system.

FSA-01 DRIVE

The Series FSA-01 is a stand-alone servo drive capable of driving 64715-001 and -002, NEMA 23 and 34 frame size servo motors. It can easily be interfaced with the Series FSC-01 controller to provide a complete closed-loop servo motion control system.

SERIES 64728 IN-LINE MOTOR BRAKES

For those applications where power failure could cause unwanted/unsafe motion of the actuator, particularly in vertical installations, PHD offers Series 64728 in-line brakes for both stepper and servo motors. The 24 Volt DC brakes are a modular in-line arrangement designed to release whenever voltage is applied and provide braking and holding when voltage is removed. They are available in NEMA 23 and 34 frame sizes. Motor brakes are not available for NEMA 17 frame size. Motor brakes are not recommended for fold-back style slides.

MOTION CONTROLLER SPECIFICATIONS

SPECIFICATIONS	FSC-01 CONTROLLER & FSD-0x CONTROLLER/DRIVE
AC INPUT VOLTAGE	110 OR 220 VAC (SWITCH SELECTABLE) 50-60 HZ.
SERIAL COMMUNICATION	RS-232 programming port
INPUTS FSC-01 & FSD-0x	 8 inputs 5-24 VDC bidirectional, optically isolated 4 general purpose inputs 4 dedicated to jog clockwise and counter clockwise, and end of limits can be assigned as general purpose
OUTPUTS	3 outputs 24 VDC general purpose optically isolated for interfacing to other equipment Can be set to high or low voltage or programmed to send a pulse by the *Set Output* instruction 1 output dedicated for drive fault *Series FSD-02 only* (Activated by over current or over temperature condition)
PARAMETER RANGES DISTANCE SPEED ACCELERATION DECELERATION TIME DELAYS OUTPUT PULSE WIDTHS ITERATIONS PER LOOP	 1 to 16,000,000 steps .025 to 50 revolutions per second (in any microstep resolution) 1 to 3,000 rev/sec/sec 1 to 3,000 rev/sec/sec (acceleration and deceleration set independently from each other) .01 to 300 seconds 2 to 500 ms 1 to 65,535
MOTOR RESOLUTIONS	13 steps per revolution with 1.8° motor 2000, 5000, 10000, 12800, 18000, 20000, 21600, 25000, 25400, 25600, 36000, 50000, 50800. 3 additional resolutions 200, 400 plus Custom *Series FSC-01 only*
CHASSIS MATERIAL	Aluminum, black anodized integral heat sink on *Series FSD-0x*
CASE AMBIENT TEMPERATURE HUMIDITY WEIGHT APPROVAL	Steel with black textured paint and white epoxy silk screen 0° to 50°C [32° to 122°F] Maximum 90% non-condensing FSC-01 2lb [0.9kg], FSD-01 4.7lb [2.1kg], FSD-02 7.9lb [3.6kg] CE

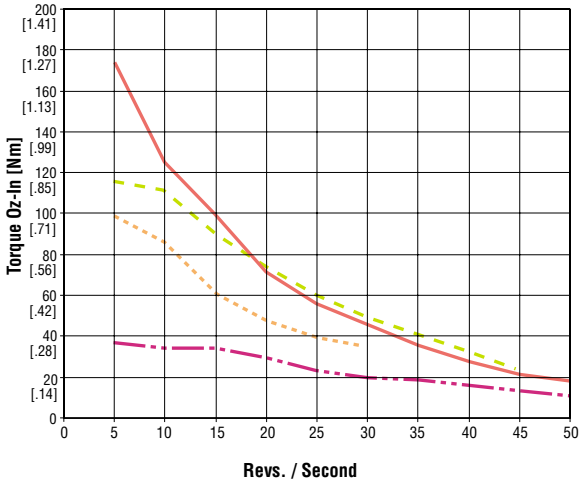
DRIVE SPECIFICATIONS

SPECIFICATIONS	FSD-0x STEPPER CONTROLLER/DRIVE
AMPLIFIER TYPE	MOSFET, dual H-Bridge
CURRENT CONTROL	3 state, pulse width modulated, switching at 25khz
OUTPUT CURRENT	0.5 to 3.5 amps FSD-01
Software Selectable	0.5 to 5.5 amps FSD-02
DC BUS VOLTAGE	40 VDC FSD-01
	80 VDC FSD-02
MAXIMUM OUTPUT POWER	122 Watts FSD-01
	440 Watts FSD-02
PROTECTION CIRCUITS	Short circuit and over temperature
IDLE CURRENT REDUCTION	0%, 25%, 50%, 100% Software selectable

SPECIFICATIONS	FSA-01 SERVO DRIVE	
AC INPUT VOLTAGE	90 or 264 VAC (auto-sensing) 47-63 Hz.	
SERIAL COMMUNICATION	RS-232 / RS-485 programming port (used for parameter setup)	
INPUTS	5 inputs, 10-30 VDC, 2.8 kohm impedance optically isolated, current sourcing (true high)	
OUTPUTS	3 outputs, 10-30 VDC optically isolated, current sourcing 200 mA max.	
RESOLUTION	8192 pulses/motor rev.	
PULSE MODE OPERATION	Interface - Differential RS-422 line receiver or TTL compatible Maximum input frequency - Pulse-CW, Pulse-CCW Mode: 2MHz - Pulse & Direction Mode: 2MHz - Quadrature Mode: 2Mhz Minimum pulse width - 250ns	
FAULT DETECTION CAPABILITY	Low DC Bus Power Stage Fault Encoder State Motor Over Temp CW Limit Pulse Mode Position Error Watchdog Timer Non-volatile Memory Invalid	High DC Bus Logic Power Encoder Line Break Over-speed CCW Limit RMS Shunt Power Fault Power-up Self Test Failure
SHUNT RESISTOR CAPACITY	Internal - Full speed reversal @ 10:1 inertia mismatch External - Bus connection provided for external shunt resistor (consult PHD for application requirements)	
AMBIENT TEMPERATURE	0° to 40°C (32° to 104°F) or 0° to 50°C (3° to 122°F) with power derating 3%/°C	
HUMIDITY	10 - 95% non-condensing	
WEIGHT	6.4 lb [2.9 kg]	
APPROVAL	CE, UL Listed or UL Recognition	

	SERIES 64728-xxx MOTOR BRAKES				
SPECIFICATIONS	64728-001	64728-002	64728-003	64728-004	64728-005
MOTOR FRAME	NEMA 23	NEMA 23	NEMA 34	NEMA 34	NEMA 42
INPUT/OUPUT SHAFT DIAMETER	1/4"	3/8"	3/8"	1/2"	5/8"
HOLDING TORQUE	160 Oz-In	160 Oz-In	400 Oz-In	400 Oz-In	800 Oz-In
COIL VOLTAGE	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC
COIL WATTAGE	4.36 Watts	4.36 Watts	8.9 Watts	8.9 Watts	17.2 Watts
COIL CURRENT	.181 Amps	.181 Amps	.369 Amps	.369 Amps	.717 Amps
COIL RESISTANCE	132 Ohms	132 Ohms	65.1 Ohms	65.1 Ohms	35.5 Ohms

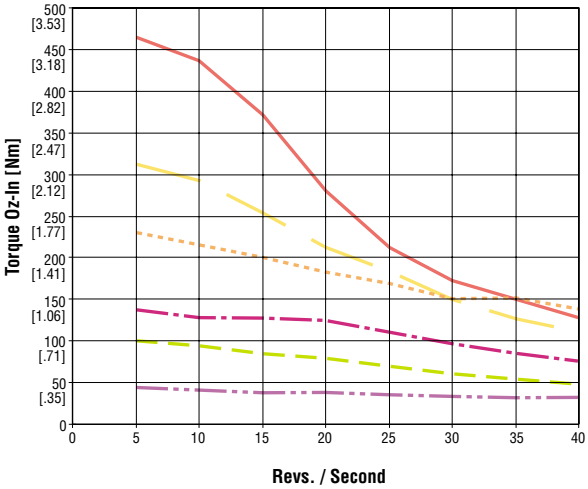
STEPPER MOTOR TORQUE WITH FSD-01 INDEXER DRIVE
All Motor Connections: Parallel



MOTOR MODELS / SIZE
DRIVE CURRENT SETTING

- 64716-001 NEMA 17, 1.7 Amp/Phase
- 64716-008 NEMA 23, 2.8 Amp/Phase
- 64716-003 NEMA 23, 2.5 Amp/Phase
- 64716-011 NEMA 34, 3.5 Amp/Phase

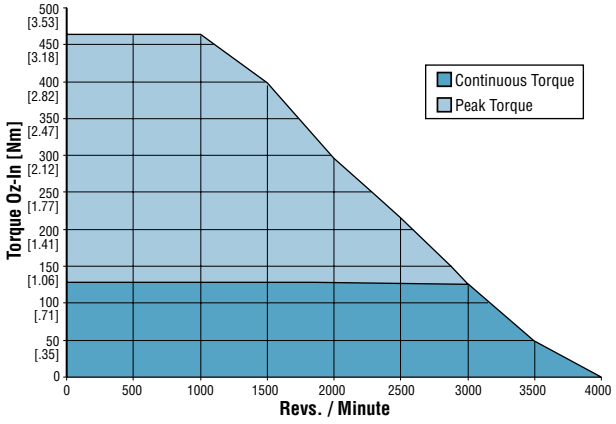
STEPPER MOTOR TORQUE WITH FSD-02 INDEXER DRIVE
All Motor Connections: Parallel



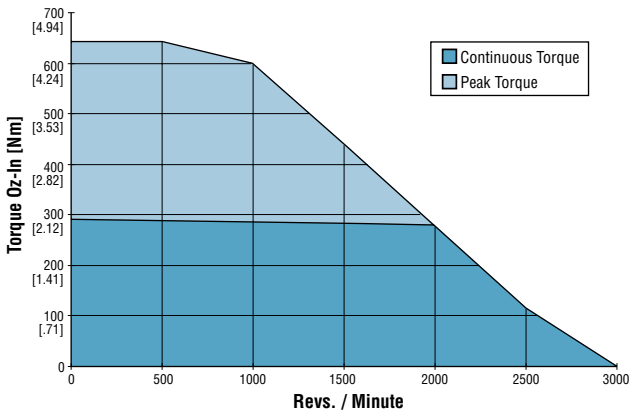
MOTOR MODELS / SIZE
DRIVE CURRENT SETTING

- 64716-001 NEMA 17, 1.6 Amp/Phase
- 64716-011 NEMA 34, 4.8 Amp/Phase
- 64716-003 NEMA 23, 2.5 Amp/Phase
- 64716-013 NEMA 34, 5.5 Amp/Phase
- 64716-009 NEMA 23, 4.2 Amp/Phase
- 64716-014 NEMA 42, 5.5 Amp/Phase

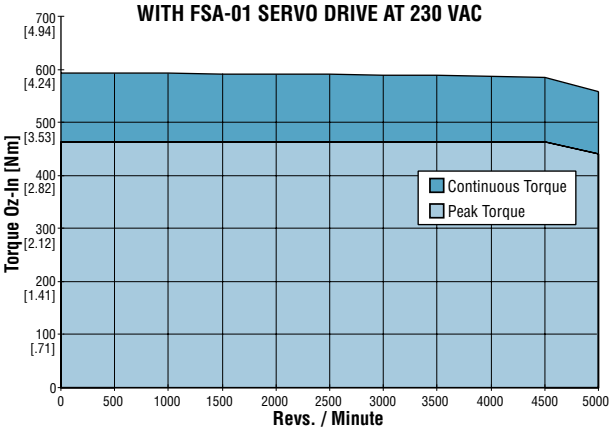
SERVO MOTOR TORQUE MODEL 64715-001 NEMA 23
WITH FSA-01 SERVO DRIVE AT 115 VAC



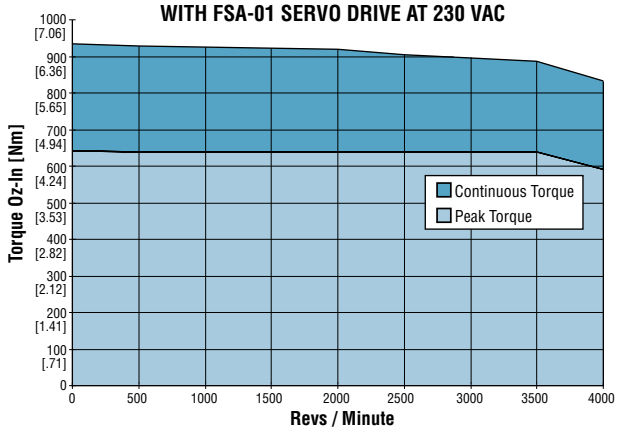
SERVO MOTOR TORQUE MODEL 64715-002 NEMA 34
WITH FSA-01 SERVO DRIVE AT 115 VAC



SERVO MOTOR TORQUE MODEL 64715-001 NEMA 23
WITH FSA-01 SERVO DRIVE AT 230 VAC



SERVO MOTOR TORQUE MODEL 64715-002 NEMA 34
WITH FSA-01 SERVO DRIVE AT 230 VAC

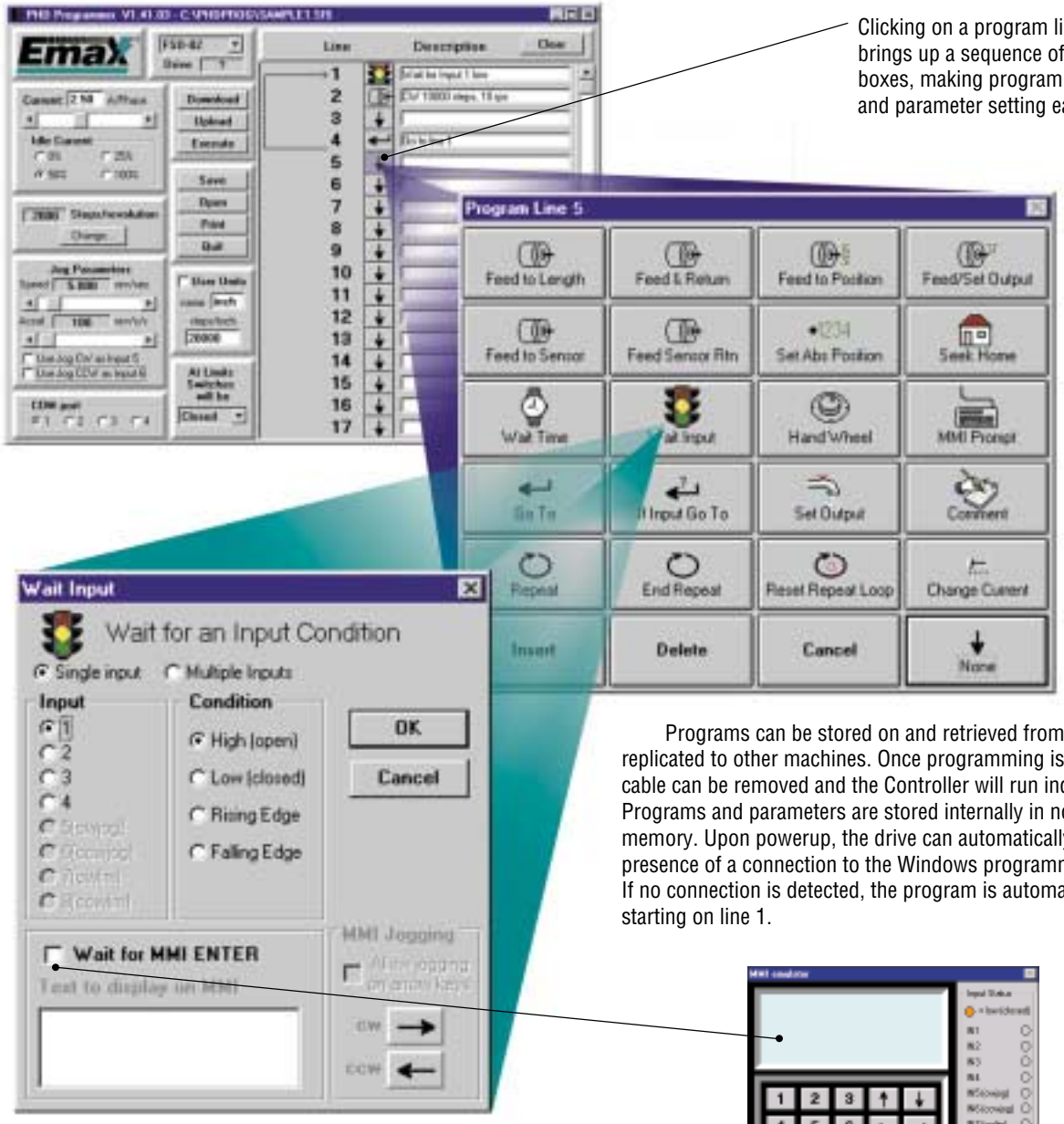


SERIES FS PROGRAMMING SOFTWARE

Series FSx Controllers are programmed via an RS-232 connection to an IBM compatible PC running Windows 3.1x, Windows 95 / 98, or Windows NT. Programming software and cables are included. (A separate programming cable is required for FSA Drive setup.) The programming language is powerful yet extremely easy to use.

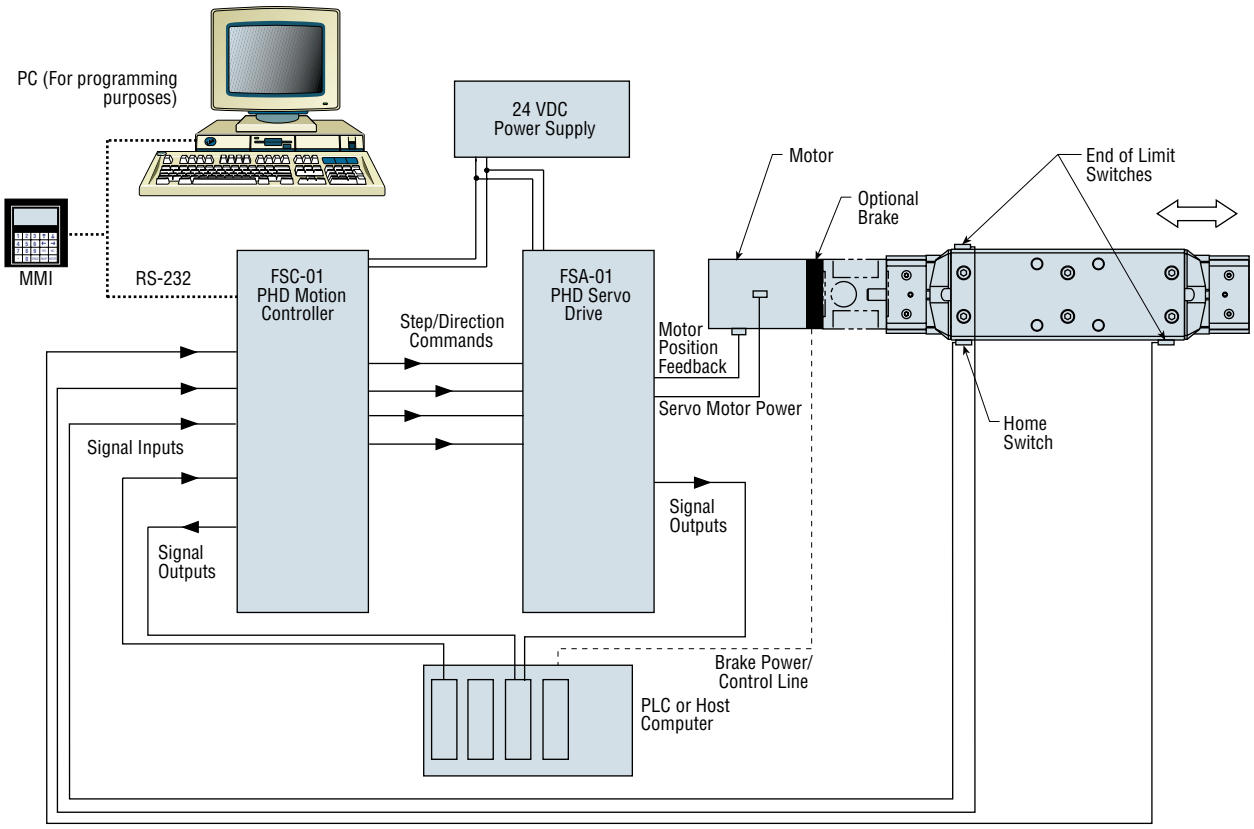
Programs can be up to 100 lines long, each line containing a single program instruction. Instructions are intuitive yet can be very powerful so 100 lines can easily build a sophisticated program. There are a total of 20 different instructions, including input/output, branches, loops, and motion commands. Instructions can be combined in a variety of ways to meet the demands of a wide range of applications.

On the right side of the main programming screen are the 100 programming lines. In the center are command buttons and on the left are global parameters such as step resolution, input/output definition and user selectable units of measure.

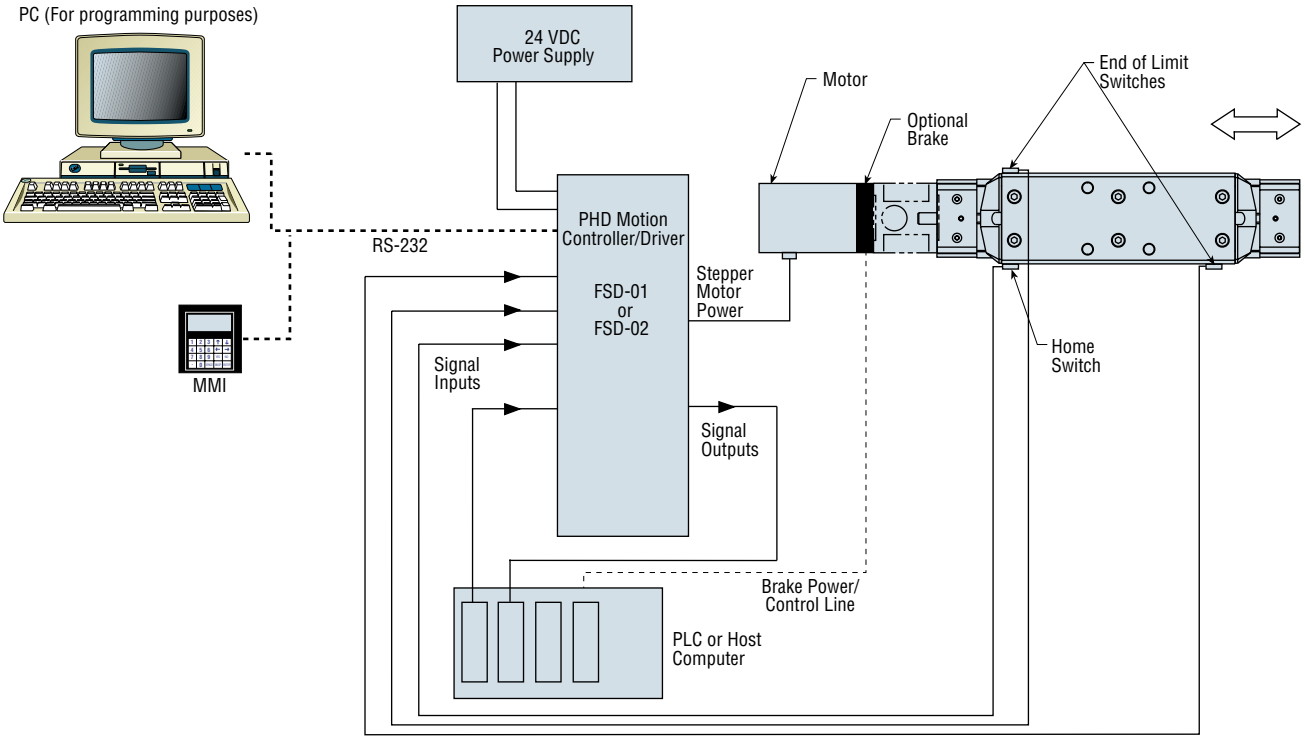


Programs can be stored on and retrieved from the PC and replicated to other machines. Once programming is complete, the cable can be removed and the Controller will run independently. Programs and parameters are stored internally in non-volatile memory. Upon powerup, the drive can automatically sense the presence of a connection to the Windows programming software. If no connection is detected, the program is automatically executed starting on line 1.

SERVO SYSTEM

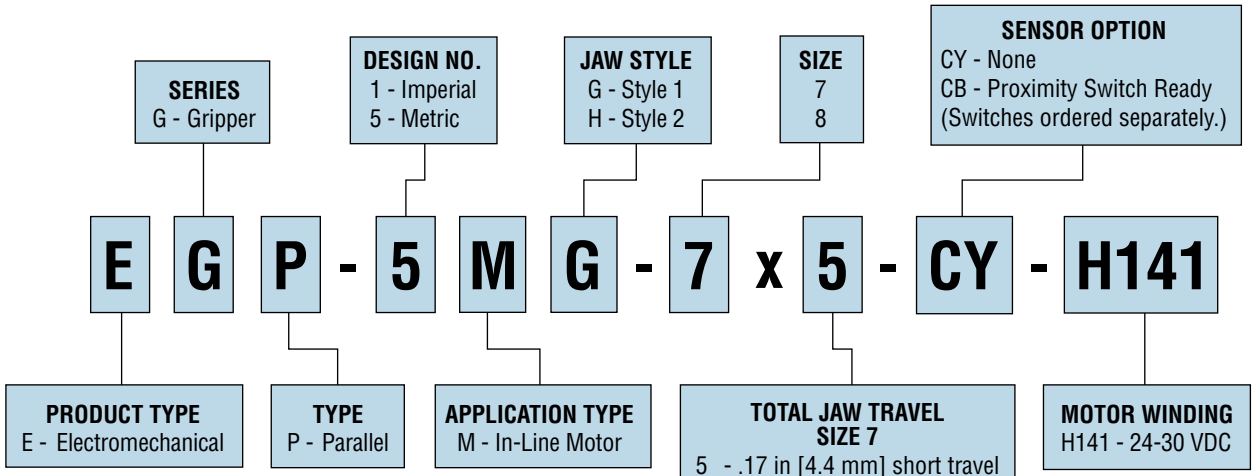


STEPPER SYSTEM



Emax® SERIES EGP
ELECTROMECHANICAL GRIPPER

TO ORDER SPECIFY:
Product Type, Series, Type, Design No., Application Type, Jaw Style, Size, Total Jaw Travel, Sensor Option, and Motor Winding.



NOTES
1) Jaw travels 9 and 14 are unavailable with style 1 jaws. See dimensional pages for specific jaw travels and tolerances.
2) Series EGP Grippers must be used with required accessories.

REQUIRED ACCESSORIES

PART NO.	DESCRIPTION
61398-02	2 meter Gripper Cordset
61398-05	5 meter Gripper Cordset

Cordsets are for wiring the gripper to the interface module.

REQUIRED ACCESSORIES

PART NO.	DESCRIPTION
64056	Interface Module
64060	1 meter Interface Module Cable
64061	3 meter Interface Module Cable

Module Cable is for wiring to the External Control (PLC or system controller).

6 mm SQUARE INDUCTIVE PROXIMITY SWITCHES

PART NO.	DESCRIPTION
18431-001-02	NPN 10-30 VDC with 2 meter cable
18431-002-02	PNP 10-30 VDC with 2 meter cable

SERIES 5580 HALL EFFECT SWITCHES

PART NO.	DESCRIPTION
55803-1-02	NPN 4.5-24 VDC with 2 meter cable
55804-1-02	PNP 4.5-24 VDC with 2 meter cable
55823-1	NPN 4.5-24 VDC with Quick Connect
55824-1	PNP 4.5-24 VDC with Quick Connect

SWITCH BRACKET & TARGET KIT FOR USE WITH:

6 mm SQUARE INDUCTIVE PROXIMITY SWITCHES

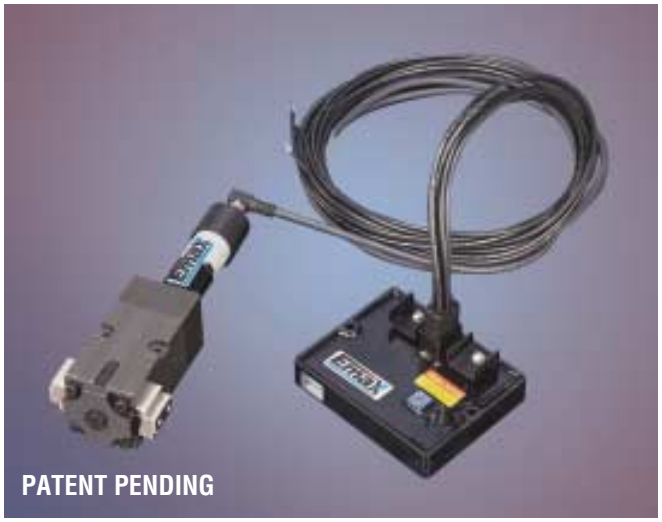
MODEL NO.	KIT NO.
EGP-xMx-7	18437
EGP-xMx-8	18438

SERIES 5580 HALL EFFECT SWITCHES

MODEL NO.	KIT NO.
EGP-xMx-7	55771
EGP-xMx-8	55772

BENEFITS: Emax® SERIES EGP GRIPPER

- A perfect solution for applications where electric power is preferred, or when pneumatics are not desirable.
- The Series EGP offers you a low cost alternative compared to higher priced competitive models.
- The combined 24 VDC motor and interface module provide a complete, easy-to-interface package for use with your existing PLC or system controller.
- Compact size is ideal for handling small parts in confined areas.
- True parallel gripping action for easy tooling design.
- Available in 2 sizes with 2 jaw styles and 2 jaw travels, with mounting options on 3 sides of the gripper for maximum application versatility.
- Double acting for internal or external gripping applications. Units are specified for minimum grip force for internal or external gripping for optimum unit performance.
- Field proven mechanical design.
- Symmetrically loaded for even grip force in the open and closed positions on both jaws.
- Close tolerance components minimize jaw play. Male keys or dowel holes are provided on the jaws for precise positioning of tooling.
- Available in either imperial or metric versions for worldwide application and system integration.



- Available as either proximity or Hall Effect switch ready for indication of jaw position and interfacing to a system controller.
- The integral jaw mechanism is constructed of hardened steel for long life.
- Rugged jaw and body construction can withstand high impact and shock loads.
- Sizing software is available providing fast and easy product selection while eliminating risk! Call 1-800-624-8511 for a free CD-Rom.

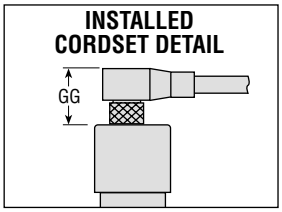
SPECIFICATIONS	EGP-xMx-7	EGP-xMx-8
JAW TRAVEL		
SHORT	0.17 in [4.4 mm]	0.3 in [7.6 mm]
LONG	0.29 in [7.5 mm] (Jaw Style 2 only)	0.53 in [13.5 mm] (Jaw Style 2 only)
GRIP FORCE	See chart on page 75	
MOTOR VOLTAGE	24-30 VDC	
INTERFACE MODULE	24-30 VDC (ordered separately)	
SENSOR OPTIONS	6 mm Square Inductive or Hall Effect Proximity Switches	
GRIPPER CORDSET	2 or 5 meter Cable	
INTERFACE MODULE CABLE	1 or 3 meter Cable (ordered separately)	
WEIGHT	10.56 oz [300 g]	1.2 lb [540 g]
JAW SEQUENCE TIME	170 millisecond [nom]	240 millisecond [nom]
JAW REPEATABILITY	± 0.003 in [0.08 mm]	

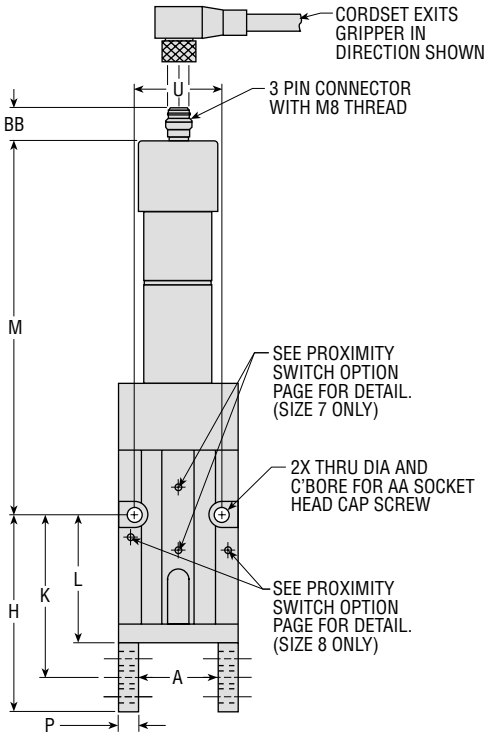
JAW STYLE 1

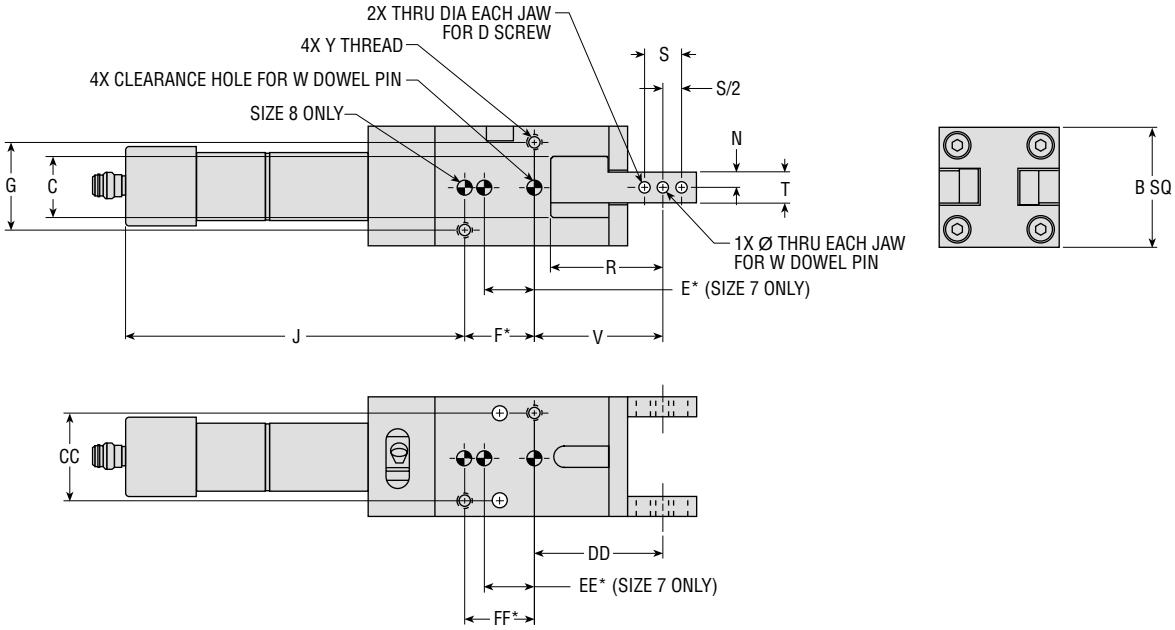
LETTER DIM.	MODEL NO. EGP-xMG-7x5 in	EGP-xMG-7x5 mm	EGP-xMG-8x5 in	EGP-xMG-8x5 mm
A CLOSE	.372	9.5	.602	15.3
A OPEN	.546	13.9	.896	22.8
B	1.024	26.0	1.496	38.0
C	.555	14.0	.791	20.0
D	#5	M3	#8	M4
E*	.5250	13.5	.8430	22.0
F*	.6875	18.0	.8430	22.0
G	.710	18.0	1.100	28.0
H	1.937	48.5	2.500	63.0
J	4.243	107.4	4.257	108.0
K	1.603	40.0	2.062	52.0
L	1.289	32.0	1.635	41.0
M	4.556	116.4	4.662	119.0
N	.138	3.5	.197	5.0
P	.215	5.5	.256	6.5
R	1.024	26.0	1.412	40.0
S	.375	10.0	.500	12.0
T	.276	7.0	.393	10.0
U	.710	18.0	1.100	28.0
V	1.228	31.0	1.624	41.0
W	1/8	3.0	1/8	4.0
Y	6-32 x .125 DP	M3 x 0.5 x 3.2 DP	8-32 x .25 DP	M4 x 0.7 x 6.0 DP
AA	#6	M3	#8	M4
BB	.395	10	.395	10
CC	.710	18.0	1.100	28.0
DD	1.228	31.0	1.624	41.0
EE*	.5250	13.5	.8430	22.0
FF*	.6875	18.0	.8430	22.0
GG	.805	20.5	.805	20.5

NOTES:

1) ALL METRIC DIMENSIONS ARE GIVEN IN MILLIMETERS 1 mm = 0.03937 in
2) *TOLERANCE BETWEEN DOWEL PIN HOLES = ± .0008 [± .02 mm]
3) JAWS OPEN AND CLOSE DIMENSIONS REFLECT THE MINIMUM DIMENSIONS AT BOTH OPEN AND CLOSE POSITIONS. GRIPPER JAWS MAY OPEN OR CLOSE .030 [.8 mm] FURTHER THAN STATED DIMENSIONS.







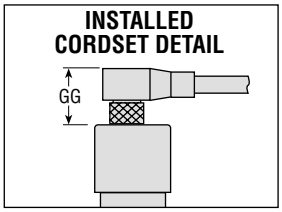
All dimensions are reference only unless specifically toleranced.

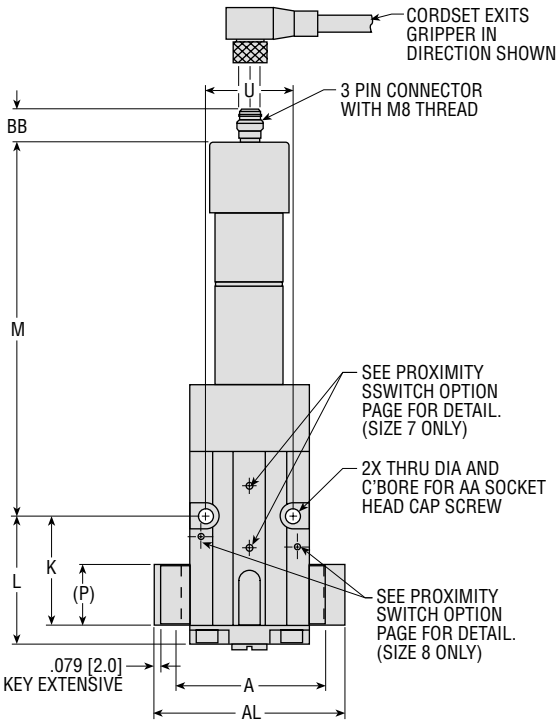
JAW STYLE 2

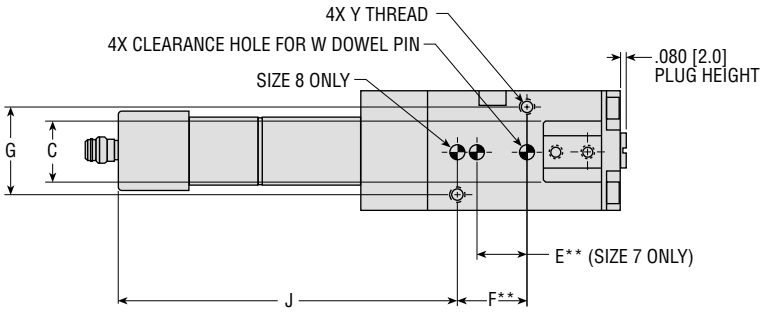
LETTER DIM.	MODEL NO. EGP-xMH-7 in	EGP-xMH-7 mm	EGP-xMH-8 in	EGP-xMH-8 mm
A CLOSE*	1.358	34.5	1.862	47.3
A OPEN*	1.530	38.9	2.160	54.9
AL CLOSE*	1.838	46.7	2.374	60.3
AL OPEN*	2.166	55.0	2.904	73.8
B	1.024	26.0	1.496	38.0
C	.555	14.0	.791	20.0
D	6-32 x .28 DP	M3 x 0.5 x 6.0 DP	8-32 x .32 DP	M4 x 0.7 x 8.0 DP
E**	.5250	13.5	.8430	22.0
F**	.6875	18.0	.8430	22.0
G	.710	18.0	1.100	28.0
H	.204	5.0	.212	5.0
J	4.243	107.4	4.257	108.0
K	1.071	26.5	1.398	35.0
L	1.289	32.0	1.635	41.0
M	4.556	116.4	4.662	119.0
N	.138	3.5	.197	5.0
P	.4921	12.5	.7480	19.0
R	.121	3.0	.186	4.5
S	.250	6.5	.375	10.0
T	.2756 ±.0006	7.0 ±0.015	.3940 ±.0007	10.0 ±0.020
U	.710	18.0	1.100	28.0
W	1/8	3.0	1/8	4.0
Y	6-32 x .125 DP	M3 x 0.5 x 3.2 DP	8-32 x .25 DP	M4 x 0.7 x 6.0 DP
AA	#6	M3	#8	M4
BB	.395	10	.395	10
CC	.710	18.0	1.100	28.0
DD	.204	5.0	.212	5.0
EE**	.5250	13.5	.8430	22.0
FF**	.6875	18.0	.8430	22.0
GG	.805	20.5	.805	20.5

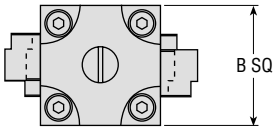
NOTES:

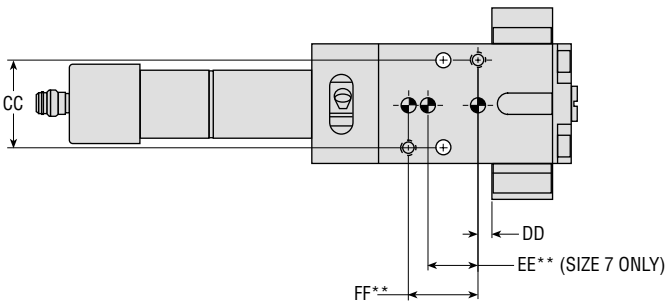
1) ALL METRIC DIMENSIONS ARE GIVEN IN MILLIMETERS 1 mm = 0.03937 in
2) *A = 5 mm jaw travel SIZE 7 AL = 9 mm jaw travel SIZE 7
   8 mm jaw travel SIZE 8 14 mm jaw travel SIZE 8
3) **TOLERANCE BETWEEN DOWEL PIN HOLES = ± .0008 [±.02 mm]
4) JAWS OPEN AND CLOSE DIMENSIONS REFLECT THE MINIMUM DIMENSIONS AT BOTH OPEN AND CLOSE POSITIONS. GRIPPER JAWS MAY OPEN OR CLOSE .030 [.8 mm] FURTHER THAN STATED DIMENSIONS.

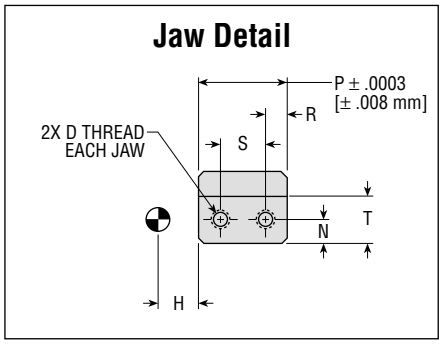








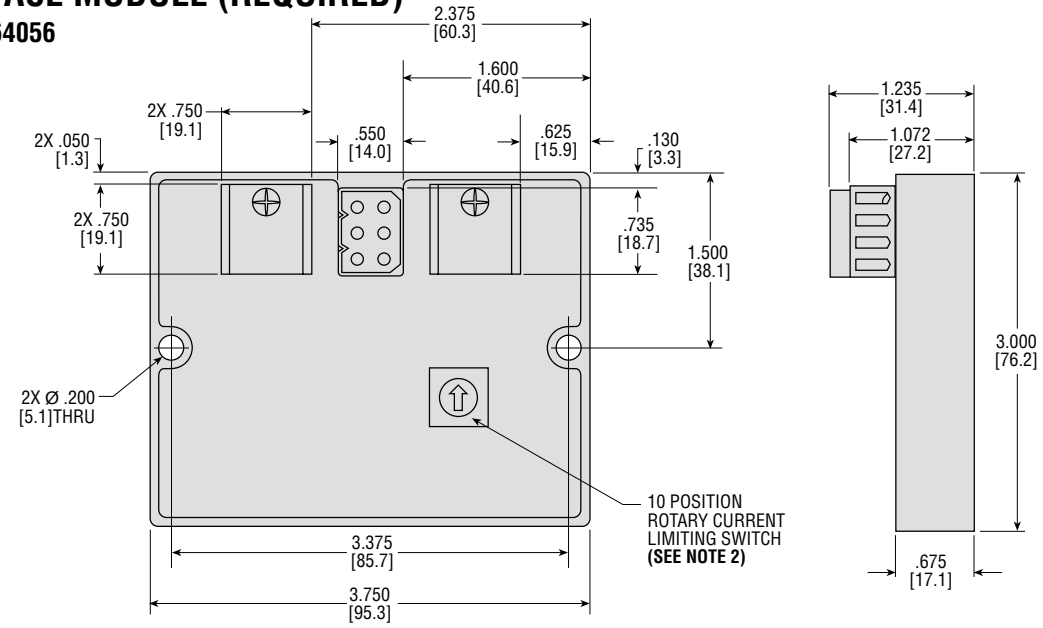




SERIES EGP GRIPPERS

INTERFACE MODULE (REQUIRED)

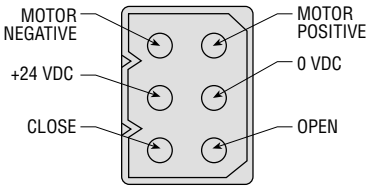
Part No. 64056



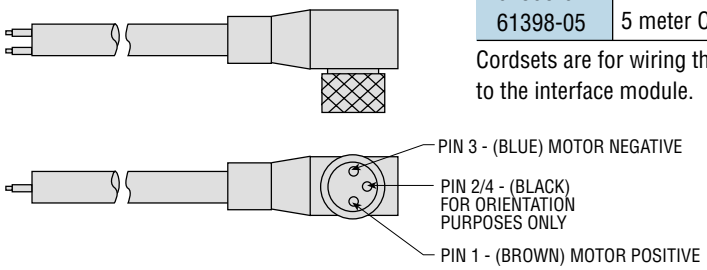
NOTES

1) DIMENSIONS SHOWN IN [ ] ARE IN mm.
2) **ROTARY SWITCH MUST NOT BE ADJUSTED MORE THAN TWO POSITIONS UP OR DOWN FROM THE NOMINAL SET POSITION AS THIS COULD REDUCE GRIPPER LIFE OR OPERATING SPEED. NOMINAL SETTING FOR INTERFACE MODULE IS POSITION 3 FOR MODEL EGP-xMx-7, AND POSITION 5 FOR MODEL EGP-xMx-8.**

INTERFACE MODULE MALE CONNECTOR PINS



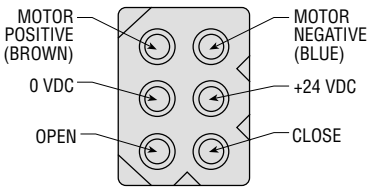
PIN CODE FOR CORDSET PART NO. 61398-xx

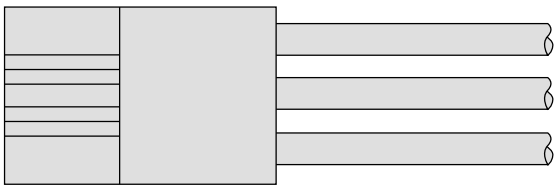


PART NO.	DESCRIPTION
61398-02	2 meter Cordset
61398-05	5 meter Cordset

Cordsets are for wiring the gripper to the interface module.

FEMALE CORDSET SOCKET PART NO. 64060, 64061



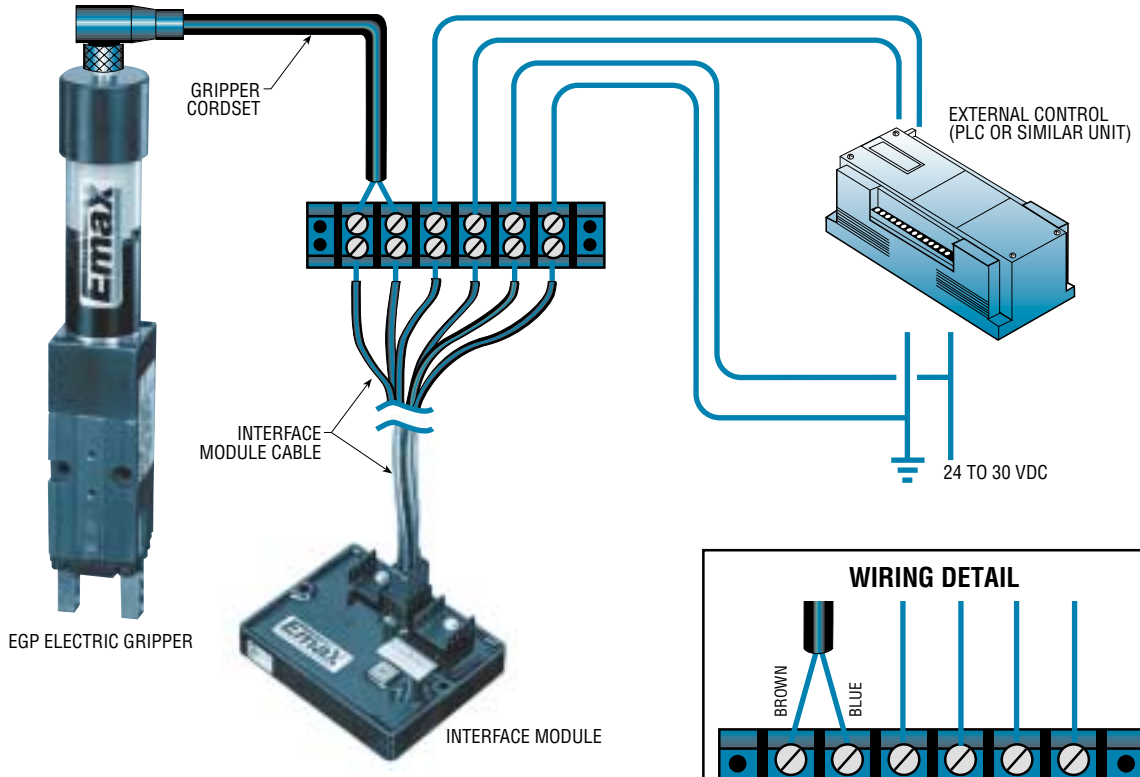


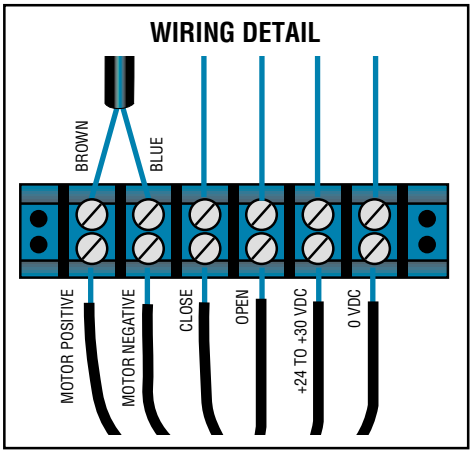
PART NO.	DESCRIPTION
64056	Interface Module
64060	1 meter Interface Module Cable
64061	3 meter Interface Module Cable

Module Cable is for wiring the Interface Module to the External Control (PLC or system controller).

All dimensions are reference only unless specifically toleranced.

SYSTEM DIAGRAM: Emax® SERIES EGP GRIPPER





NOTE: Rotary switch must not be adjusted more than two positions up or down from the nominal set position as this could reduce gripper life or operating speed. Nominal setting for interface module is position 3 for model EGP-xMx-7, and position 5 for model EGP-xMx-8.

Gripper cordset wires (blue, brown) may be reversed to reverse operation of gripper.

INTERFACE MODULE

The Interface Module provides correct current limiting to the gripper motor after initial spool up of 25 mSec and prevents motor and/or gripper damage. The Interface Module also provides the user with a limited adjustment for jaw grip force that might be necessary in fine tuning the system.

Note: It is recommended that no more than two positions up or down from the nominal set position be made as this would reduce gripper life or jaw travel time. See note 2 on page 72.

The Interface Module also provides the user with a convenient interface with an external PLC or system controller compatible with the Series EGP Gripper.

Operation occurs when positive voltage is applied to either “open” or “close” leads. Voltage should be maintained on appropriate lead for the duration of the grip cycle.

SPECIFICATIONS	EGP-xMx-7	EGP-xMx-8
JAW TRAVEL		
SHORT	0.17 in [4.4 mm]	0.3 in [7.6 mm]
LONG	0.29 in [7.5 mm] (Jaw Style 2 only)	0.53 in [13.5 mm] (Jaw Style 2 only)
GRIP FORCE	See chart on page 75	
MOTOR VOLTAGE	24-30 VDC	
INTERFACE MODULE		
SUPPLY VOLTAGE	24-30 VDC	
SUPPLY CURRENT	300 mA. Max.	
INPUTS	2-Motor Fwd., Motor Rev.	
	24-30 VDC True High @ 2mA.	
OUTPUTS	2-24 VDC, Dedicated to Motor Fwd. and Rev.	
SENSOR OPTIONS	6 mm Square Inductive or Hall Effect Proximity Switches	
WEIGHT	10.56 oz [300 g]	1.2 lb [540 g]
JAW SEQUENCE TIME	170 millisecond [nom]	240 millisecond [nom]
JAW REPEATABILITY	± 0.003 in [0.08 mm]	

TEMPERATURE LIMITS

Motor and gripper mechanism are designed to operate at temperatures between 40° to 105°F [4° to 40°C].

LUBRICATION

Gripper and drive mechanism are prelubricated at the factory for service under normal conditions. Relubrication is recommended at 2.5 million cycles. Relubrication instructions are provided with each gripper.

MATERIAL

Parallel gripper body is made of hardcoated aluminum. Jaws and gripper mechanism are manufactured from hardened steel.

REPEATABILITY

Gripper repeatability is within .003 inch [0.08 mm] of original center position. This can only be maintained coming from the same direction.

SPECIAL GRIPPERS

Grippers for special applications, severe duty, or constructed of special materials are available. Consult PHD.

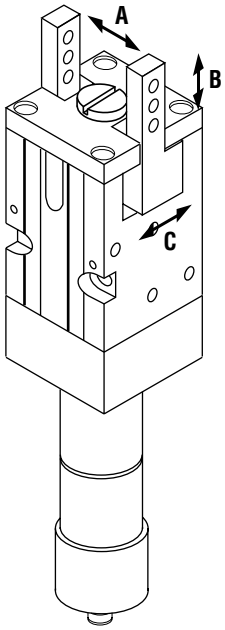
SIZING SOFTWARE

Sizing software is available providing fast and easy product selection while eliminating risk! Call 1-800-624-8511 for a free CD-Rom.

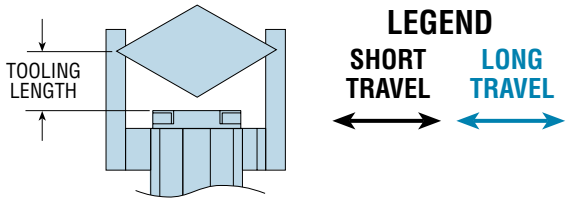
JAW BACKLASH

Clearance around the parallel jaw as measured at gripper cover surface will not exceed the following figures:

(A) ± .003 inch per jaw [0.127 mm]
(B) .0025 inch per jaw [0.064 mm]
(C) .003 inch per jaw [0.076 mm]

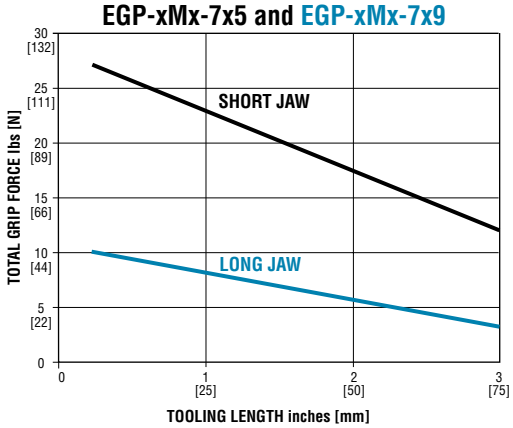


GRIP FORCE DIAGRAMS: Emax® SERIES EGP GRIPPER

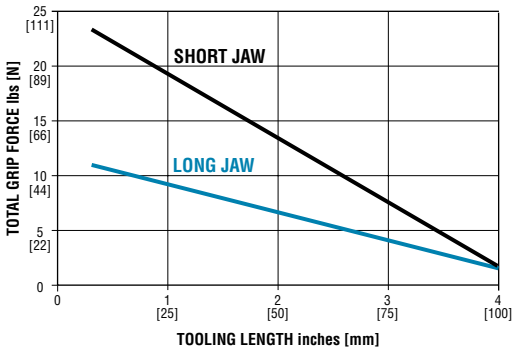


DOUBLE ACTING

EGP-xMx-7x5 and EGP-xMx-7x9



EGP-xMx-8x8 and EGP-xMx-8x14



Size 8 is used when larger jaw travel is required.

GRIP FORCE = PART WEIGHT x 3/DERATING FACTOR

The part weight that grippers can handle will vary based on: size of part being picked up, shape of part, texture of part, speed at which part is transferred, shape of finger pads, etc. PHD recommends that the fingers or jaws be tooled or machined to conform to the shape of the part being gripped.

When gripping compliant ("springy") objects or objects that require alignment by the gripper fingers prior to actual gripping, expect the grip force to be reduced significantly. This is due to the dynamic nature of the internal driving mechanism. This may also cause peak or transient gripping forces to be higher than shown in the curves.

* Gripping forces are the arithmetic sum of all forces occurring at gripper jaws.

EXAMPLE:

For the size 7 Series EGP Gripper, a weight of 2 lb needs to be carried 2 inches from the end plate. To calculate minimum grip force required, use the equation below.

GRIP FORCE = 2 x 3/0.68 = 8.8 lb

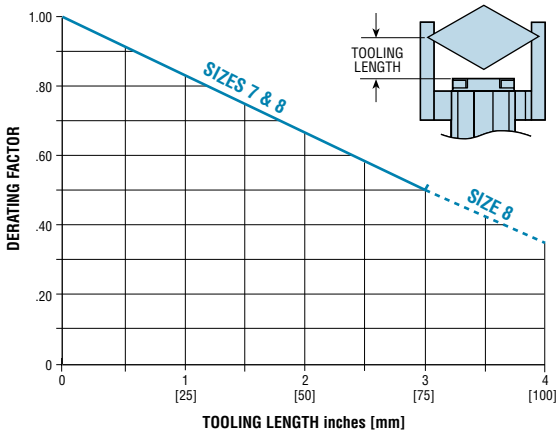
Therefore, the most cost effective model available would be the EGP-1MG-7x5 or EGP-1MH-7x5. **Be certain to review notes for additional information on grip force.**

NOTES:

1) The maximum tooling length for size 7 is 3 in [76 mm].
   The maximum tooling length for size 8 is 4 in [102 mm].
2) lb can be substituted for [N] to calculate [N].

Use the grip force charts above to determine the proper unit.

GRIP FORCE DERATING GRAPH



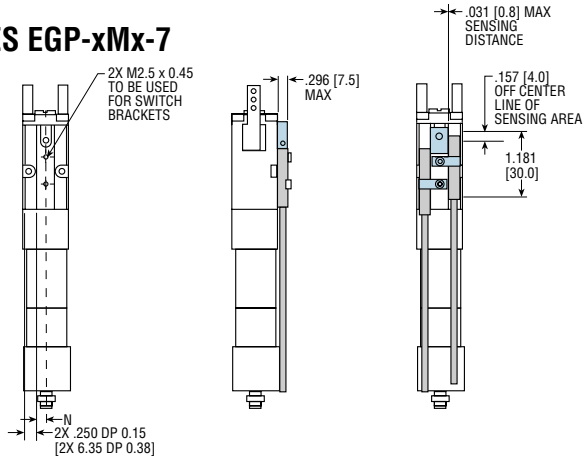
CB PROXIMITY SWITCH READY

This option provides the grippers with a pin to mount a switch target for 6 mm square inductive or Hall Effect proximity switch.

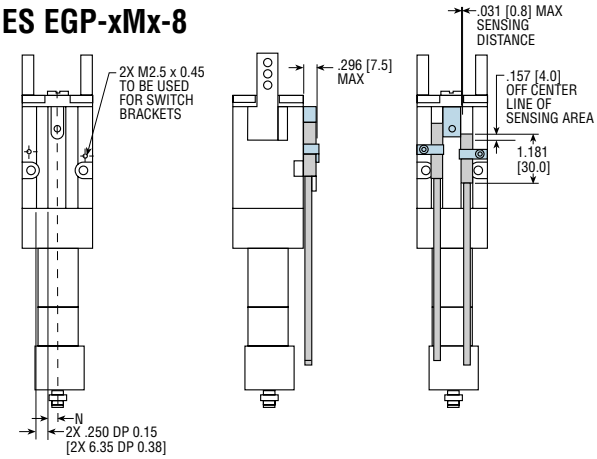
See additional information below for details and ordering part numbers on switch bracket/target kits.

SWITCH BRACKET & TARGET KITS

SERIES EGP-xMx-7



SERIES EGP-xMx-8



EACH SWITCH BRACKET & TARGET KIT CONTAINS THE FOLLOWING ITEMS:
1 TARGET WITH SCREW
2 SENSOR BRACKETS WITH MOUNTING SCREWS

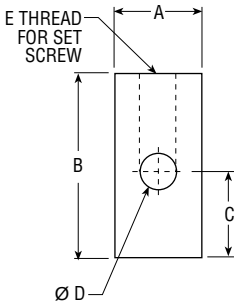
SWITCHES ARE ORDERED SEPARATELY
NUMBERS IN [ ] ARE FOR METRIC UNITS AND ARE IN mm

FOR USE WITH: SERIES 5580 HALL EFFECT SWITCHES

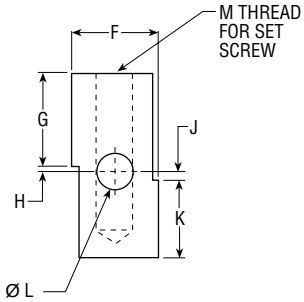
MODEL NO.	KIT NO.
EGP-xMx-7	55771
EGP-xMx-8	55772

FOR USE WITH: 6 mm SQUARE INDUCTIVE PROXIMITY SWITCHES

MODEL NO.	KIT NO.
EGP-xMx-7	18437
EGP-xMx-8	18438



5580 HALL EFFECT SWITCH



18431-xxx-xx PROXIMITY SWITCH

MODEL NO.	LETTER DIMENSIONS												
	A	B	C	ØD	E	F	G	H	J	K	ØL	M	N
EGP-xMx-7	.290 [7.4]	.531 [13.5]	.330 [8.4]	.1010 [2.6]	M4 x 0.7	.290 [7.4]	.317 [8.1]	.051 [1.3]	.095 [2.4]	.319 [8.1]	.1010 [2.6]	M4 x 0.7	.157 [4.0]
EGP-xMx-8	.398 [10.1]	.816 [20.7]	.375 [9.5]	.1600 [4.1]	M4 x 0.7	.398 [10.1]	.455 [11.6]	.030 [0.8]	.030 [0.8]	.361 [9.2]	.1600 [4.1]	M4 x 0.7	.207 [5.3]

CORDSET WITH QUICK CONNECT

PART NO.	LENGTH
17533-00-02	2 meter
17533-00-05	5 meter

SWITCHES

See the Switches and Sensors section of PHD's main catalog for complete switch specifications. Switches must be ordered separately.

6 mm SQUARE INDUCTIVE PROXIMITY SWITCHES

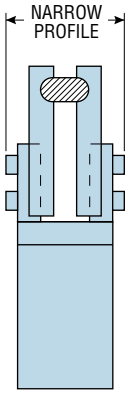
PART NO.	DESCRIPTION
18431-001-02	NPN 10-30 VDC with 2 meter cable
18431-002-02	PNP 10-30 VDC with 2 meter cable

SERIES 5580 HALL EFFECT SWITCHES

PART NO.	DESCRIPTION
55803-1-02	NPN 4.5-24 VDC with 2 meter cable
55804-1-02	PNP 4.5-24 VDC with 2 meter cable
55823-1	NPN 4.5-24 VDC with Quick Connect
55824-1	PNP 4.5-24 VDC with Quick Connect

JAW STYLE 1

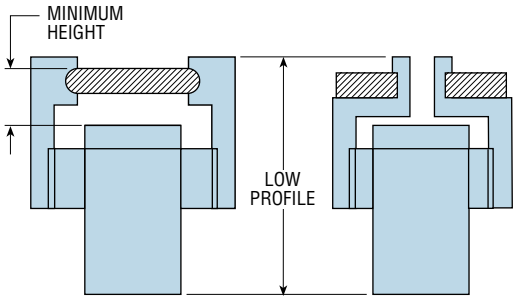
Jaw Style 1 is ideally suited for small parts. Simple tooling can provide a long narrowed profile for small parts or for reaching into confined areas.



JAW STYLE 2

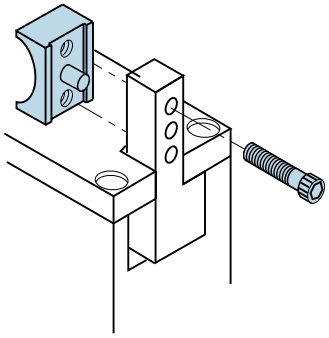
Jaw Style 2 allows simple tooling of wide parts. This type of tooling keeps the part close to the unit for a low profile package.

Jaw Style 2 provides the lowest profile assembly for internal gripping by keeping the tooling close to the gripper.



DOWEL PINS

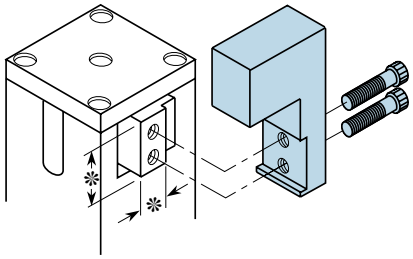
Style 1 jaw is provided with a dowel pin hole as a means of orienting and locating jaw tooling.



MALE KEY

Style 2 jaws have a close tolerance male key for orientation and precise location of jaw tooling.

Jaw tooling can be readily machined to include a mating slot for the jaw key.



NOTES

EQ APPLICATION DATA
FAX SHEET

Please use this sheet to define your application prior to using the sizing software. Or, simply fax a copy of this page to PHD's Customer Service Department at 219-747-6754. For outside the U.S., see the fax numbers on back cover.

name: _____

title: _____

company name: _____

address: _____

city: _____

state: _____ zip: _____

date: _____

phone: _____

fax: _____

e-mail: _____

distributor: _____

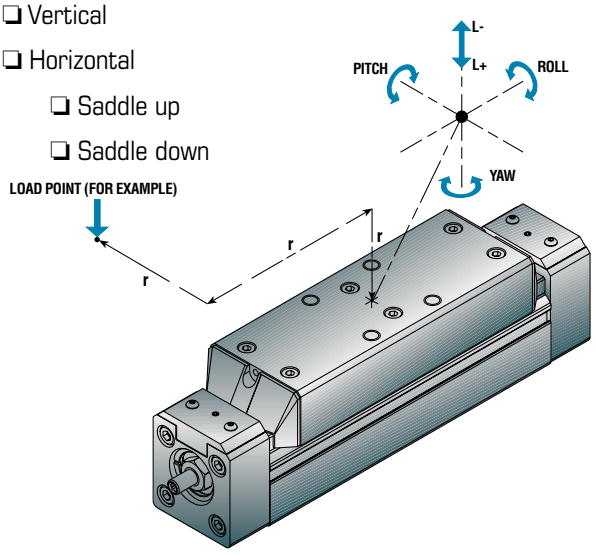
Please indicate units (in, mm, lb, N, etc.) and direction of forces (+/-, see diagram).

Orientation

❑ Vertical

❑ Horizontal

- ❑ Saddle up
- ❑ Saddle down



Payload _____

Payload Position

- X Offset _____
- Y Offset _____
- Z Offset _____

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SOFTWARE

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request part number CAT-CD-DR

External Thrust Load _____

External Load Position

- X Offset _____
- Y Offset _____
- Z Offset _____

Parallel or Perpendicular to Travel _____

Travel _____

- Allowable Repeatability _____
- Allowable Accuracy _____
- Allowable Deflection _____

Cycle Time (In Each Direction)

- Extend _____
- Retract _____

Or Fax Cycle Diagram

Duty Cycle (Number of Cycles in 5 minutes)

_____

Maximum Velocity _____

Environment

- Temperature _____
- Contaminants _____
- Specify _____

_____

Drive Preference

- ❑ In line
- ❑ Fold-back

Feedback

- ❑ Open Loop
- ❑ Closed Loop
- ❑ No Preference

Brake (recommended for vertical application)

- ❑ Hold position with power loss?

Please list any special conditions or requirements.

_____

_____

_____

_____

FAX TO PHD, INC.
219-747-6754

EQ APPLICATION DATA
FAX SHEET

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name: _____

title: _____

company name: _____

address: _____

city: _____

state: _____ zip: _____

date: _____

phone: _____

fax: _____

e-mail: _____

distributor: _____

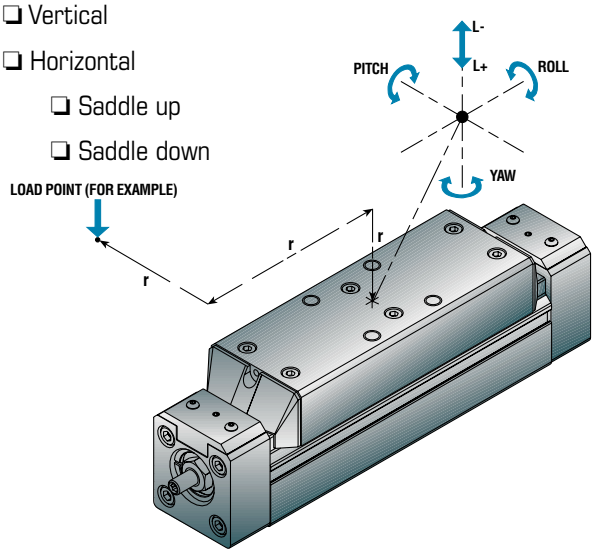
Please indicate units (in, mm, lb, N, etc.) and direction of forces (+/-, see diagram).

Orientation

❑ Vertical

❑ Horizontal

- ❑ Saddle up
- ❑ Saddle down



Payload _____

Payload Position

- X Offset _____
- Y Offset _____
- Z Offset _____

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request part number CAT-CD-DR

External Thrust Load _____

External Load Position

- X Offset _____
- Y Offset _____
- Z Offset _____

Parallel or Perpendicular to Travel _____

Travel _____

- Allowable Repeatability _____
- Allowable Accuracy _____
- Allowable Deflection _____

Cycle Time (In Each Direction)

- Extend _____
- Retract _____

Or Fax Cycle Diagram

Duty Cycle (Number of Cycles in 5 minutes)

_____

Maximum Velocity _____

Environment

- Temperature _____
- Contaminants _____
- Specify _____

_____

Drive Preference

- ❑ In line
- ❑ Fold-back

Feedback

- ❑ Open Loop
- ❑ Closed Loop
- ❑ No Preference

Brake (recommended for vertical application)

- ❑ Hold position with power loss?

Please list any special conditions or requirements.

_____

_____

_____

_____

FAX TO PHD, INC.

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8 Sizes
150 psi [10 bar] Max.
Stroke Lengths to
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6" [150 mm] CTS

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An Industry Standard with Much More

8 Sizes
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Flexible, Low Cost Clamps for Sheetmetal Handling Applications

3 Sizes
100 psi [7 bar] Max.
Wide variety of Jaw Opening and tip combinations

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Precise Rotary Positioning

5 Sizes, 6 Standard Rotations
150 psi [10 bar] Air Max.
Torques to 150 in-lb at
100 psi [17 Nm at 7 bar]

SERIES MC & ML MULTI-MOTION ACTUATORS
Compact Rotary and Linear Motion

5 Sizes MC, 7 Sizes ML
6 Standard Rotations
Stroke Lengths to 3-1/2"
[90 mm]

SERIES GRD GRIPPERS
Highest Grip Force to Weight Ratio

4 Sizes
2 Body Styles
100 psi [7 bar] Max.

SERIES GRC GRIPPERS
Rugged Construction, Maximum Grip Force

4 Sizes
2 Jaw and Body Styles
100 psi [7 bar] Max.

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