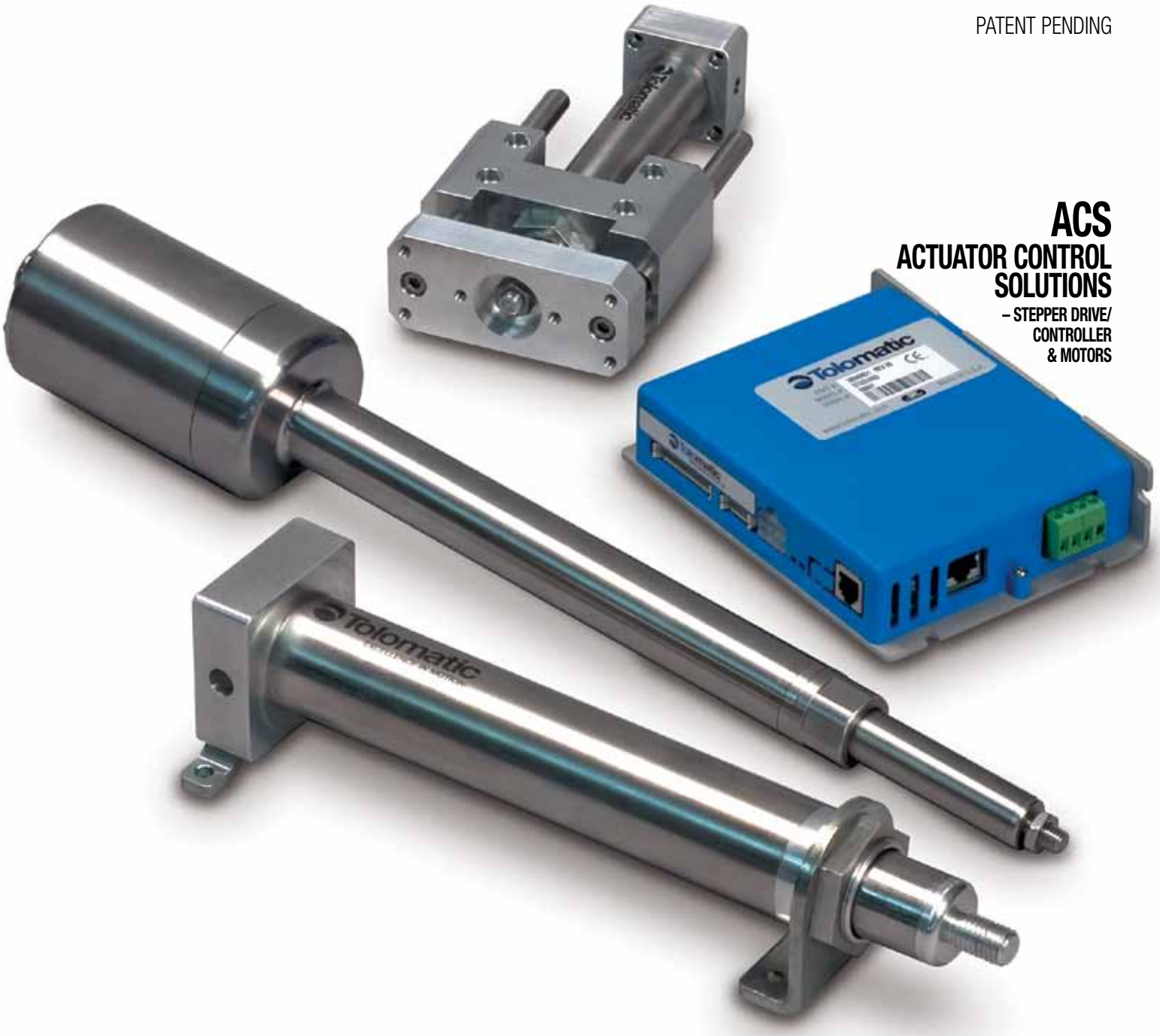
Tolomatic
EXCELLENCE *IN MOTION*®

ERD
ELECTRIC ROD-STYLE ACTUATOR

ENDURANCE TECHNOLOGY℠

PATENT PENDING



ACS
ACTUATOR CONTROL SOLUTIONS
– STEPPER DRIVE/ CONTROLLER & MOTORS

LINEAR SOLUTIONS MADE EASY

ERD – Electric Rod-Style Actuator

WHAT IS THE ERD?

The ERD is an economical rod-style electric actuator designed as an alternate to non-repairable pneumatic cylinders and an option for automating manual processes. Combined with Tolomatic's ACS stepper drive/controller product, an extremely easy-to-use and cost effective actuator control solution is created. The ERD, with two different stainless steel options, is the industry's first ever cataloged all stainless steel electric actuator family intended for washdown environments.

ERD with GD2 Guide Option

Actuator Control Solution

First Ever Catalog All Stainless Steel Electric Actuators

TOLOMATIC'S ELECTRIC ROD-STYLE ACTUATORS

5 DAYS BUILT-TO-ORDER

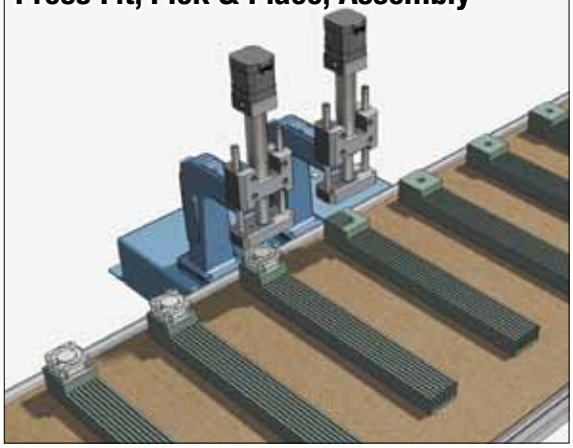
ENDURANCE TECHNOLOGY

	ERD	***ICR*** SmartActuator™	***RSA***	***GSA***	***IMA***
					
	Rod-Style Actuator	***Integrated Control Rod-Style Actuator***	***Rod-Style Actuator***	***Guided Rod-Style Actuator***	***Integrated Motor Rod-Style Actuator***
Thrust up to:	200 lbf *[890 N]*	720 lbf *[3202.7 N]*	7,000 lbf *[31,138 N]*	2,700 lbf *[12,010 N]*	3,300 lbf *[14,679 N]*
Speed up to:	40 in/sec *[1016 mm/sec]*	25 in/sec *[635 mm/sec]*	123 in/sec *[3,124 mm/sec]*	123 in/sec *[3,124 mm/sec]*	23 in/sec *[584 mm/sec]*
Stroke Length up to:	12 in *[305 mm]*	24 in *[609 mm]*	60 in *[1,524 mm]*	36 in *[914 mm]*	18 in *[457 mm]*
Screw/Nut Type	Solid & Ball	Ball	Solid, Ball & Roller	Solid & Ball	Ball & Roller
	For complete information see www.tolomatic.com or literature number:				
Literature Number:	*2190-4000*	*2100-4000*	*3600-4609*	*3600-4609*	*2700-4000*

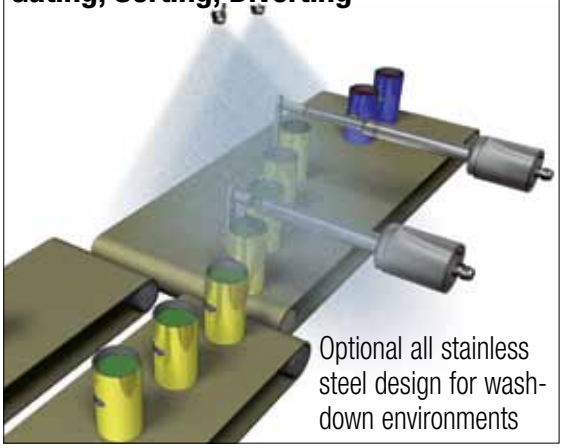
(Not all models deliver maximum values listed, i.e.: Maximum thrust may not be available with maximum speed)

ERD – Applications

Press Fit, Pick & Place, Assembly

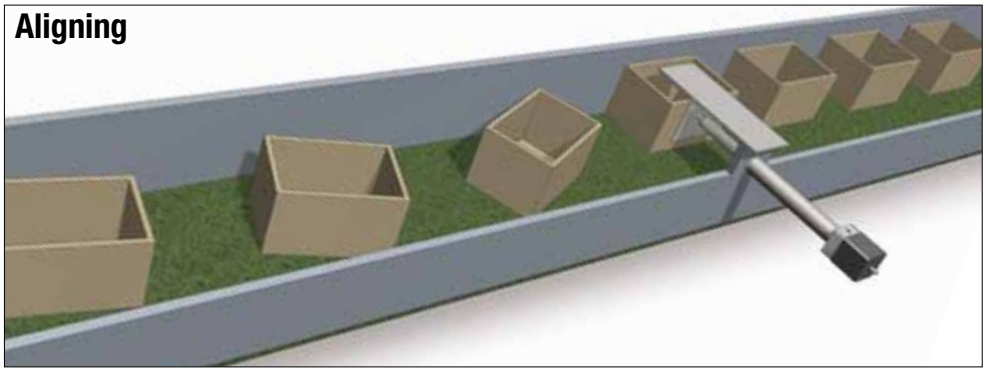


Gating, Sorting, Diverting

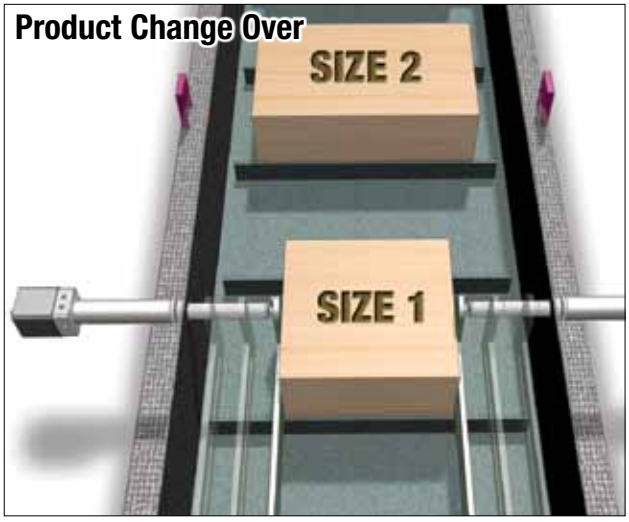


Optional all stainless steel design for wash-down environments

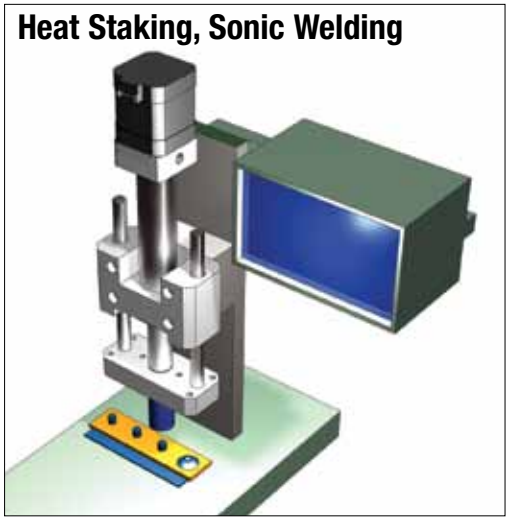
Aligning



Product Change Over



Heat Staking, Sonic Welding



Other Applications:

- Aligning
- Animation
- Assembly
- Automatic tool changers
- Automotive
- Converting
- Conveyors
- Diverting
- Fillers
- Formers
- Gating
- Heat staking
- Laser positioning
- Material handling systems
- Medical equipment
- Motion simulators
- Open/close doors
- Packaging equipment
- Parts clamping
- Patient lifts
- Pick & place
- Plate positioning change
- Press fit
- Product changeover
- Product test simulations
- Robot manipulator arms
- Sonic welding
- Sorting
- Table positioning
- Tension control
- Test stands
- Volumetric pumps
- Web guidance
- Wire winding

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ERD – ELECTRIC ROD-STYLE ACTUATOR

ENDURANCE TECHNOLOGY℠

Endurance Technology features are designed for maximum durability to provide extended service life.

The ERD is an economical rod-style electric actuator designed as an alternate to non-repairable pneumatic cylinders and an option for automating manual processes. The ERD is compatible with many NEMA & IEC standard stepper and servo motors to create a flexible, powerful electric actuator solution. Built-to-order in stroke lengths up to 12 inches.

5 DAYS BUILT-TO-ORDER

PATENT PENDING

MULTIPLE SCREW TECHNOLOGIES YOU CAN CHOOSE:

- Solid nuts of engineered resins offer quiet performance at the lowest cost

- Ball nuts offer positioning accuracy and repeatability with longer life

THREADED NOSE MOUNT WITH JAM NUT

- Metric threads
- Convenient mounting for many applications

MALE THREADED ROD END

- Standard metric threads
- Compatible with many commercially available metric rod end accessories

NOSE BEARING

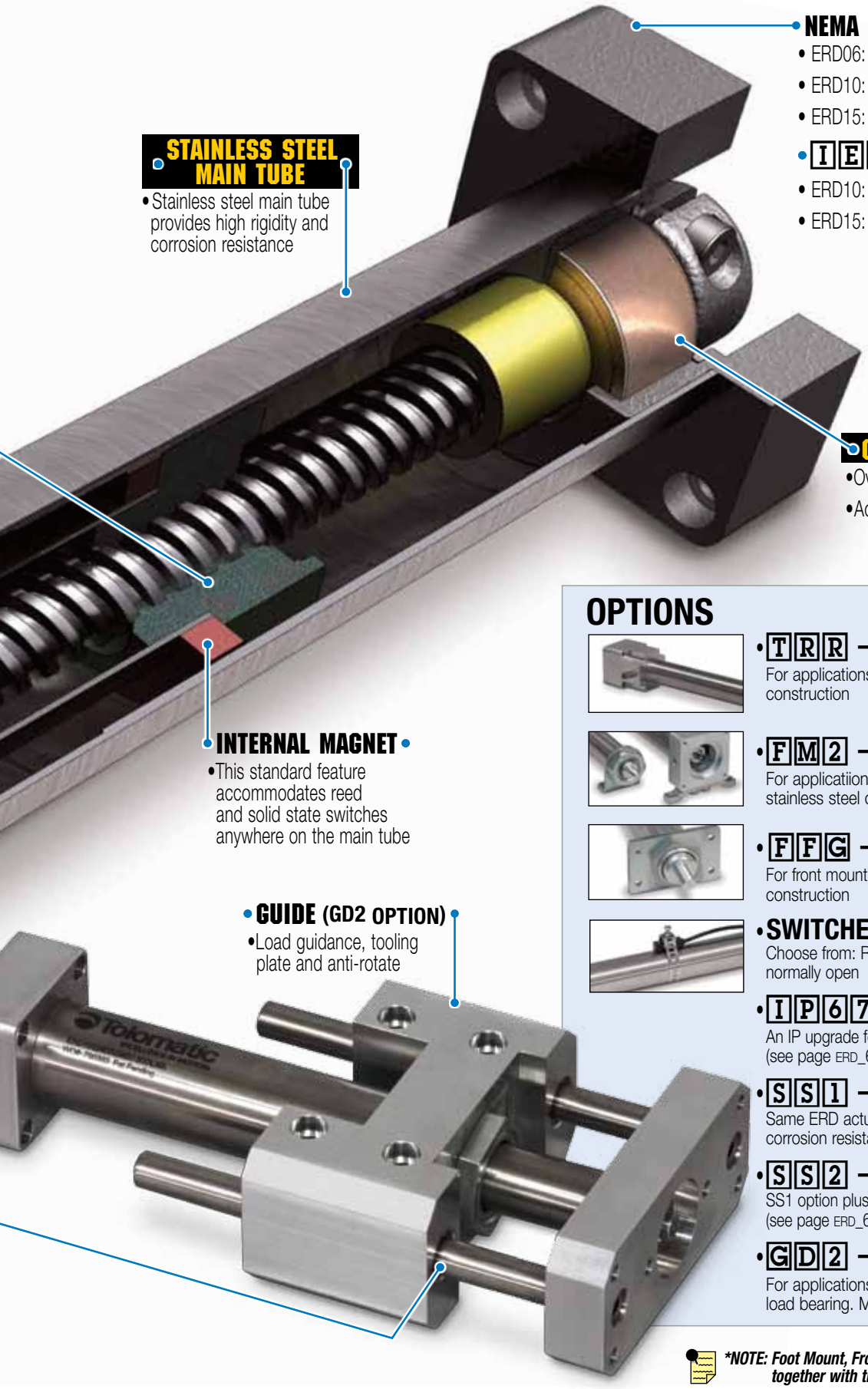
- Engineered resins for smooth operation
- Provides critical support of thrust rod

STAINLESS STEEL THRUST TUBE

- Stainless steel thrust tube provides high rigidity and corrosion resistance

INTEGRAL GUIDE RODS AND BEARINGS

- Hardened steel guide rods provide high rigidity and low deflection
- Four composite bearings support the load for smooth consistent motion
- Lubrication wick supplies lube for life of actuator



NEMA MOTOR MOUNT
- ERD06: NEMA11
- ERD10: NEMA17
- ERD15: NEMA23

IEC MOTOR MOUNT (OPTION)
- ERD10: 40mm Frame
- ERD15: 60mm Frame

STAINLESS STEEL MAIN TUBE
- Stainless steel main tube provides high rigidity and corrosion resistance

OVERSIZED MAIN BEARING
- Oversized for long life
- Accommodates high thrust load

INTERNAL MAGNET
- This standard feature accommodates reed and solid state switches anywhere on the main tube

GUIDE (GD2 OPTION)
- Load guidance, tooling plate and anti-rotate

OPTIONS

TRR – TRUNNION MOUNT
For applications that require pivoting, 304 stainless steel construction

FM2 – FOOT MOUNT*
For applicatiions that require bottom mounting, 304 stainless steel construction

FFG – FRONT FLANGE MOUNT*
For front mounting applications, 304 stainless steel construction

SWITCHES*
Choose from: Reed, Solid State PNP or NPN, all available in normally open

IP67 – IP67
An IP upgrade for protection against water and dust ingress (see page ERD_6)

SS1 – STAINLESS STEEL
Same ERD actuator made of all 304 stainless steel for corrosion resistance

SS2 – STAINLESS STEEL
SS1 option plus IP67 and protective motor cover (see page ERD_6)

GD2 – GUIDE
For applications that require anti-rotation, or guidance and load bearing. Made of lightweight aluminum

NOTE: Foot Mount, Front Flange Mount and Switches are shipped together with the actuator but are not installed by Tolomatic.

ERD – ELECTRIC ROD-STYLE ACTUATOR
SS2 ALL 304 STAINLESS STEEL, IP67, MOTOR PROTECTION

ENDURANCE TECHNOLOGY℠

Endurance Technology features are designed for maximum durability to provide extended service life.

The all 304 stainless steel ERD has an IP67 rating that includes a protective enclosure for the standard Tolomatic motor. Built-to-order in stroke lengths up to 12 inches.

5 DAYS BUILT-TO-ORDER

PATENT PENDING

MULTIPLE SCREW TECHNOLOGIES YOU CAN CHOOSE:

- Solid nuts of engineered resins offer quiet performance at the lowest cost

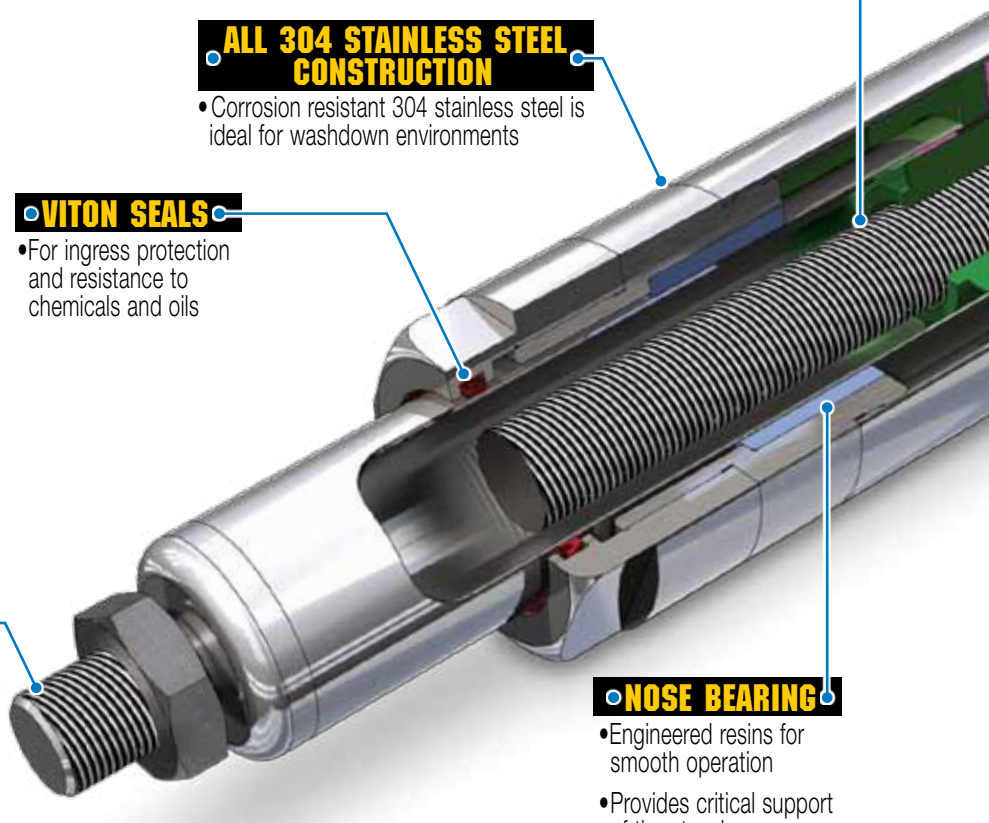
- Ball nuts offer positioning accuracy and repeatability with longer life; low-backlash available

ALL 304 STAINLESS STEEL CONSTRUCTION

- Corrosion resistant 304 stainless steel is ideal for washdown environments

VITON SEALS

- For ingress protection and resistance to chemicals and oils



MALE THREADED ROD END

- Standard metric threads
- Compatible with many commercially available metric rod end accessories

NOSE BEARING

- Engineered resins for smooth operation
- Provides critical support of thrust rod

IP67

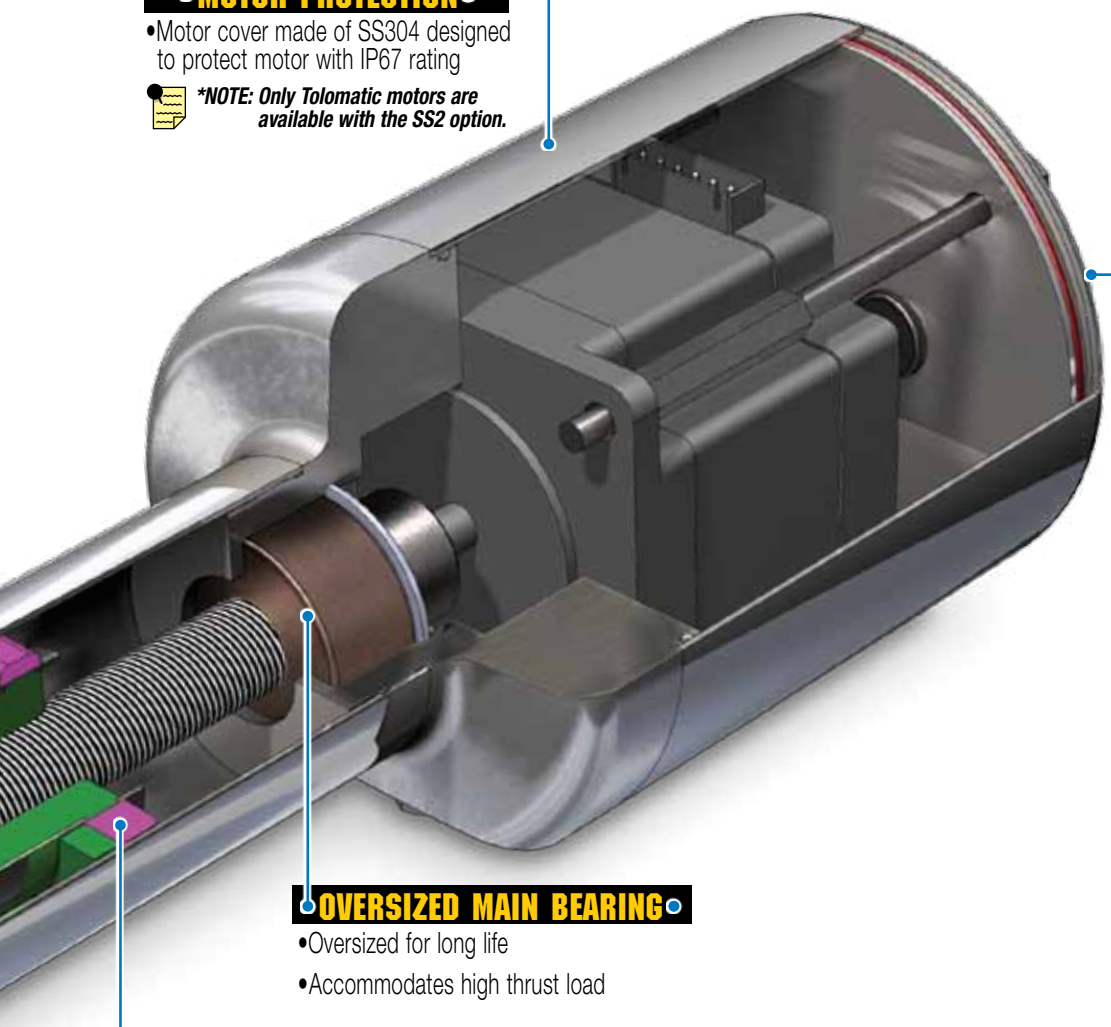
SOLIDS, FIRST DIGIT:		
6	Dust tight	No ingress of dust; complete protection against contact
LIQUIDS, SECOND DIGIT		
7	Immersion up to 1 m	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).

(See page ERD_11 for a complete definition of these IP codes)

MOTOR PROTECTION

•Motor cover made of SS304 designed to protect motor with IP67 rating

**NOTE: Only Tolomatic motors are available with the SS2 option.*



FLEXIBLE CONNECTION

• Choice fo cable grommet or industry standard conduit threads

SS23

1 or 2 grips determined by encoder choice

SS21

NPT 1/2" conduit thread

&

SS22

M20x2.5 conduit thread

OVERSIZED MAIN BEARING

•Oversized for long life

•Accommodates high thrust load

INTERNAL MAGNET

•This standard feature accommodates reed and solid state switches anywhere on the main tube

OPTIONS

• F M 2 – FOOT MOUNT*

For applicatiions that require bottom mounting, 304 stainless steel construction

• F F G – FRONT FLANGE MOUNT*

For front mounting applications, 304 stainless steel construction

•SWITCHES*

Choose from: Reed, Solid State PNP or NPN, all available in normally open

**NOTE: Foot Mount, Front Flange Mount and Switches are shipped together with the actuator but are not installed by Tolomatic.*

ACS – Actuator Control Solutions

WHAT IS THE ACS?

The ACS is an extremely easy-to-use stepper drive & controller developed specifically to be used with electric actuators. Simply select the configured Tolomatic actuator in the software to automatically set-up most of the necessary parameters to create motion in the desired linear units (mm or inch).

CAPABILITIES:

- 4, 8, or 16 move command modes (absolute, incremental or jog) for infinite position capability
- Adjustable motion profile parameters (velocity, accel/decel, force). Parameters are independently configurable for each move
- Ability to reduce holding current for energy savings
- End point correction
- Zone output based on position
- Force limiting capacity
- Configurable digital I/O (24 Vdc Opto-Isolated)(NPN or PNP)
- Compatible with most 24 Vdc stepper motors

CAPABILITIES COMING SOON!

OPERATING MODES

- Stepper mode (pulse/direction)
- Analog position mode (0-10 Vdc or 4-20 mA)
- Pneumatic modes

NETWORKING CAPABILITIES

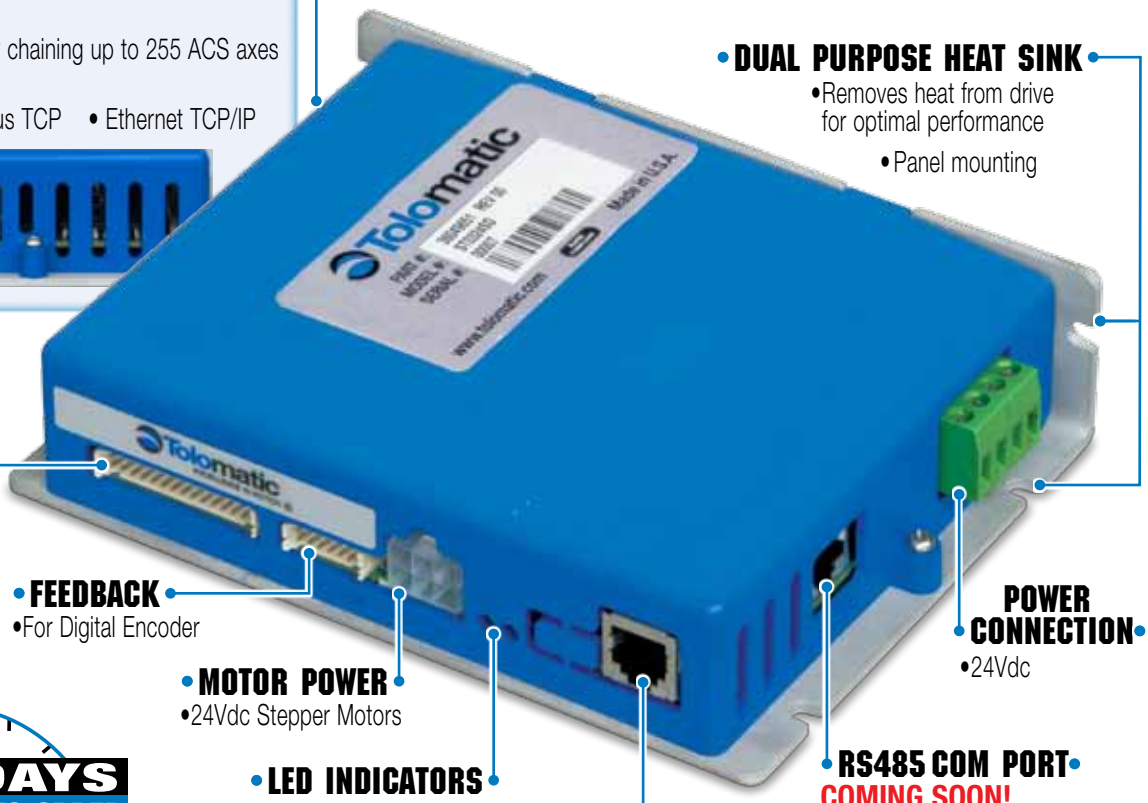
- Ethernet protocols
  - Ethernet/IP
  - Modbus TCP
  - Ethernet TCP/IP
- Dual ethernet ports with internal switch for daisy chaining
- Modbus RTU over RS-485

- **Ethernet/IP for integration with Allen Bradley PLCs**
- **Modbus TCP/RTU for integration with most other PLCs & HMIs**

ACS – Actuator Control Solutions

• DUAL ETHERNET PORTS •
COMING SOON!
•Internal switch for daisy chaining up to 255 ACS axes

Protocols:
•Ethernet/IP • Modbus TCP • Ethernet TCP/IP



• DUAL PURPOSE HEAT SINK •
•Removes heat from drive for optimal performance
• Panel mounting

• DIGITAL I/O •
•8 Digital Inputs
•4 Digital Outputs
•24 Vdc Opto-Isolated
•NPN or PNP
•Configurable

• FEEDBACK •
•For Digital Encoder

• MOTOR POWER •
•24Vdc Stepper Motors

• LED INDICATORS •
•Power & Fault indicators

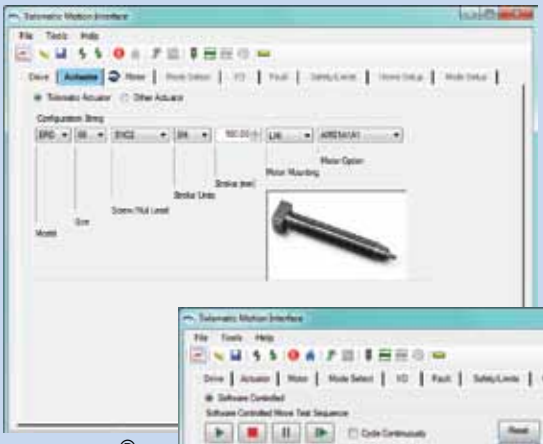
• RS232 COM PORT •
•Drive Configuration Port

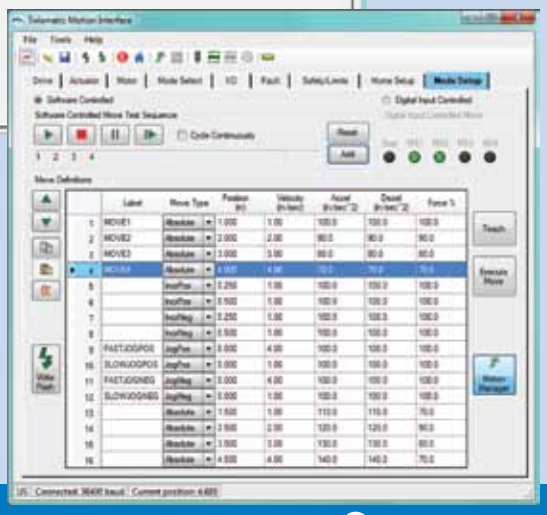
POWER CONNECTION •
•24Vdc

• RS485 COM PORT •
COMING SOON!
•Networking Port

5 DAYS
BUILT-TO-ORDER

EASY TO USE CONFIGURATION SOFTWARE





• Windows® compliant

ERD – Electric Rod-Style Actuator

SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

SIZE: **ALL**

SPECIFICATIONS (US standard measurement)

ERD SIZE	SCREW DIA.	MAXIMUM STROKE*	SCREW CODE	LEAD	LEAD ACCURACY	MAXIMUM THRUST*	INERTIA		WEIGHT		WEIGHT (GD2 adder)		WEIGHT (SS2 adder)	
							Base	Per Inch	Base	Per Inch	Base	Per Inch	Base	Per Inch
	in	in		in/rev	in/ft	lbf	lb-in^2	lb-in^2	lb	lb	lb	lb	lb	lb
06	0.250	8	SN02	0.500	0.005	20	0.0018	0.0001	0.263	0.035	0.579	0.027	–	–
			SN04	0.250										
			SN16	0.063										
10	0.375	10	SN01	1.000	0.007	40	0.0022	0.0006	0.411	0.069	1.028	0.061	2.280	0.069
			SN02	0.500										
			SN05	0.200										
	0.472		BNM05	0.197	0.004	100	0.0040	0.0014	0.607	0.087				0.087
15	0.500	12	SN01	1.000	0.006	75	0.0104	0.0017	1.079	0.126	2.297	0.095	5.771	0.126
			SN02	0.500	0.005									
			SN05	0.200	0.006									
	0.630		BNM05	0.197	0.004	200	0.0178	0.0044	1.170	0.159				0.159
			BNM10	0.394										

SPECIFICATIONS (metric measurement)

ERD SIZE	SCREW DIA.	MAXIMUM STROKE*	SCREW CODE	LEAD	LEAD ACCURACY	MAXIMUM THRUST*	INERTIA		WEIGHT		WEIGHT (GD2 adder)		WEIGHT (SS2 adder)	
							Base	Per 25mm	Base	Per 25mm	Base	Per 25mm	Base	Per 25mm
	mm	*mm*		*mm/rev*	*mm/ 300mm*	*N*	*kg-m^2 x 10^{-6}*	*kg-m^2 x 10^{-6}*	*kg*	*kg*	*kg*	*kg*	*kg*	*kg*
06	6.35	*203.2*	SN02	*12.7*	*0.13*	*89*	*0.53*	*0.03*	*0.119*	*0.016*	*0.263*	*0.012*	–	–
			SN04	*6.35*										
			SN16	*1.60*										
10	9.53	*254.0*	SN01	*25.4*	*0.18*	*188*	*0.64*	*0.18*	*0.186*	*0.031*	*0.466*	*0.028*	*2.280*	*0.031*
			SN02	*12.7*										
			SN05	*5.08*										
	12.00		BNM05	*5.00*	*0.87*	*445*	*1.16*	*0.41*	*0.275*	*0.039*				*0.039*
15	12.70	*304.8*	SN01	*25.4*	*0.15*	*334*	*3.04*	*0.50*	*0.489*	*0.057*	*1.042*	*0.043*	*5.771*	*0.057*
			SN02	*12.7*	*0.13*									
			SN05	*5.08*	*0.15*									
	16.00		BNM05	*5.00*	*0.87*	*890*	*5.18*	*1.28*	*0.531*	*0.072*				*0.072*
			BNM10	*10.00*										

Temperature range	40° to 130° F *(4.4° to 54.4° C)*
IP rating	40 (static)

***Longer stroke length modification available upon request,**

SIDE LOAD CONSIDERATIONS

The standard ERD rod-style actuator is not meant to be used in applications where side loading occurs. If side loading exists in the application consider the GD2 guided option.

Loads must be guided and supported. Loads should be aligned with the line of motion of the thrust rod.

Side loading will affect the life of the actuator.

ERD – Electric Rod-Style Actuator

SIZE: **ALL**

MOTOR SPECIFICATIONS

Specifications	NEMA 11		NEMA 17		NEMA 23	
Resistance	3.5 Ω		2.4 Ω		1.5 Ω	
Inductance	2.3 mH		4.5 mH		3.7 mH	
Rated Current	1 Arms		1.5 Arms		2 Arms	
Maximum Torque	0.813 in-lbs	0.092 N-m	4.4 in-lbs	0.497 N-m	6.25 in-lbs	0.706 N-m
Maximum RPM	1500 RPM		900 RPM		1050 RPM	
Degree per Step	1.8°		1.8°		1.8°	
Rotor Inertia	0.006 lb-in^2	17.588 g-cm^2	0.028 lb-in^2	81.939 g-cm^2	0.075 lb-in^2	219.481 g-cm^2

ENCODER SPECIFICATIONS

Motor Type	Bipolar Stepper, 1.8° per Step
Encoder	Differential; 500 line (2000 count post quad)

ACS DRIVE/CONTROLLER SPECIFICATIONS

DRIVE POWER	
Current - Max	4A
Voltage Nominal	20 - 28V
Over Voltage	30V
Under Voltage	18V
Absolute Maximum Voltage	35V
Logic Current Draw (24V)	0 - 1A

OPERATING CONDITIONS	
Ambient Temperature	77°F, 25°C Nominal
Operating Temperature	32 - 104°F, 0 - 40°C
Storage Temperature	32-158°F, 0-70°C
Humidity	0 - 90% non-condensing

See ACS Hardware and Installation Guide #3604-4173 for more details.

What Does IP67 mean?

The IP Code (or International Protection Rating) consists of the letters IP followed by two digits and an optional letter. As defined in international standard IEC 60529, it classifies the degrees of protection provided against the intrusion of solid objects (including body parts like hands and fingers), dust, accidental contact, and water in electrical enclosures.

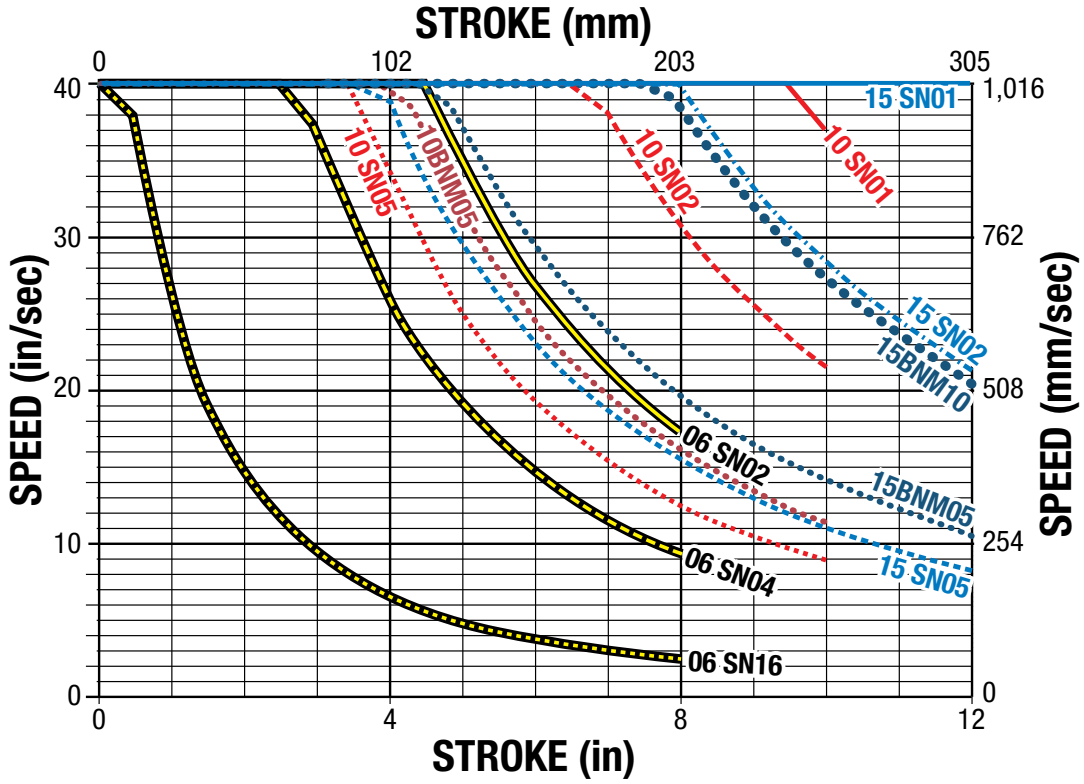
SOLIDS, FIRST DIGIT:		
4	>1 mm	Most wires, screws, etc.
6	Dust tight	No ingress of dust; complete protection against contact
LIQUIDS, SECOND DIGIT		
0	Not protected	
7	Immersion up to 1 m	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).

The first digit indicates the level of protection that the enclosure provides against access to hazardous parts (e.g., electrical conductors, moving parts) and the ingress of solid foreign objects.

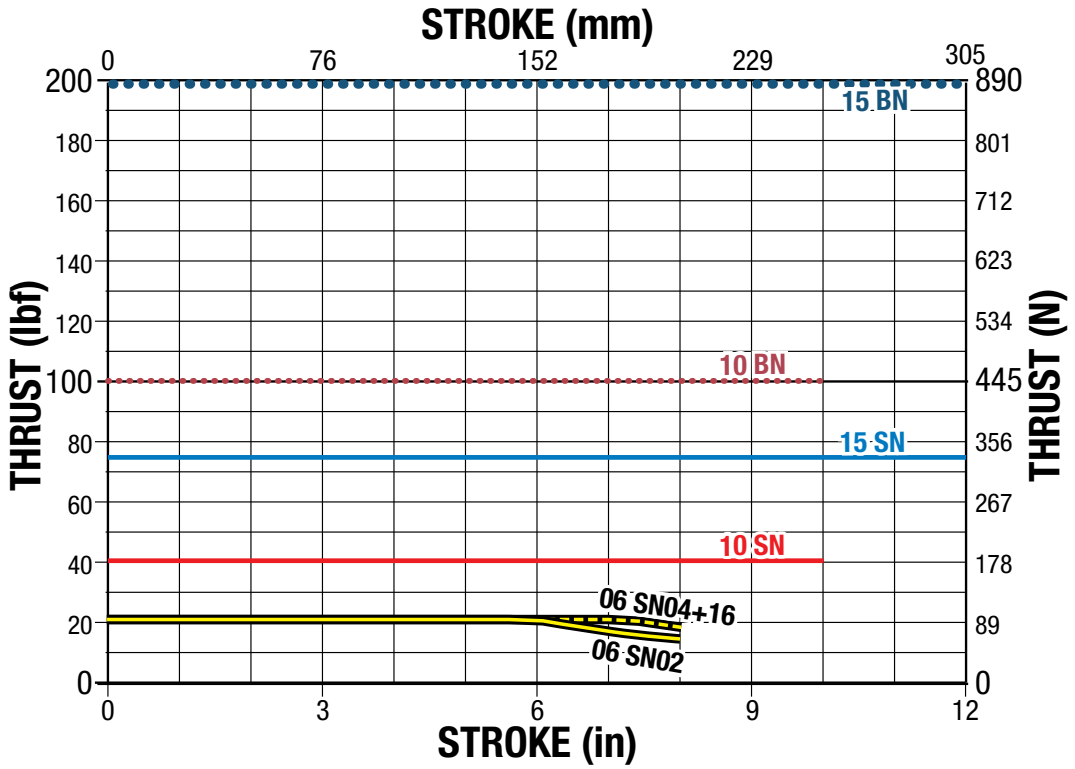
The second digit indicates the level of protection that the enclosure provides against harmful ingress of water.

SIZE: **ALL**

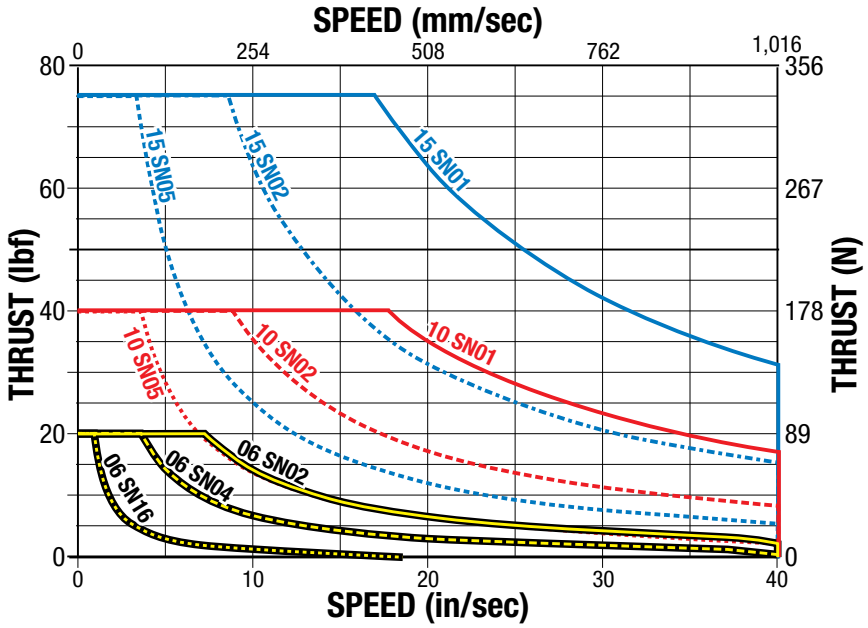
ACME & BALL SCREW/NUT CRITICAL SPEED CAPACITIES



SCREW BUCKLING LOAD



PV LIMITS (Pressure Velocity of Acme Nut)

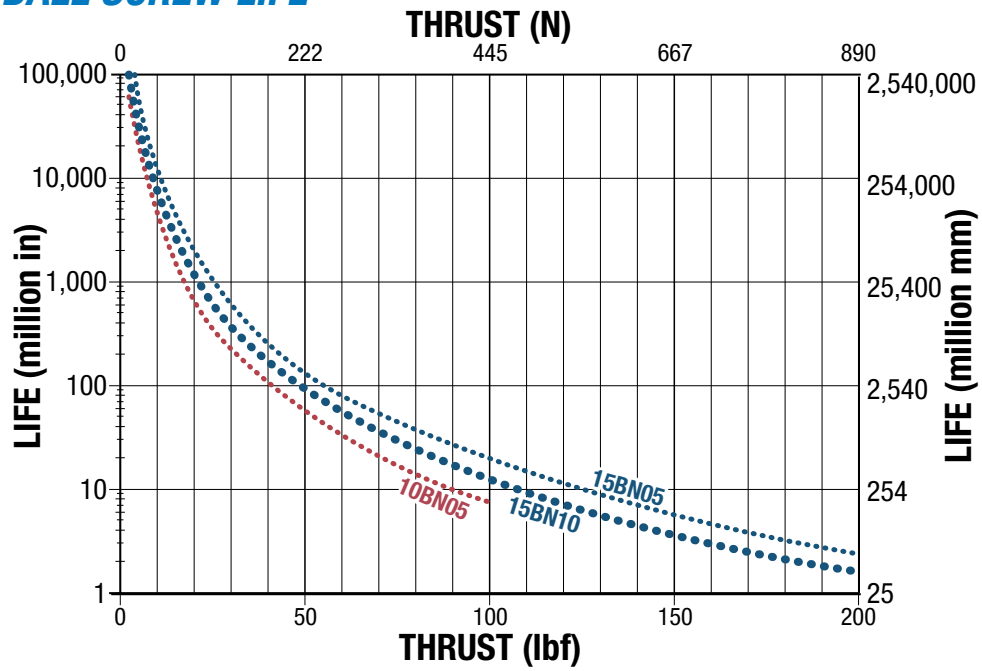


PV LIMITS: Any material which carries a sliding load is limited by heat buildup. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch and the surface velocity in feet per minute. The product of these factors provides a measure of the severity of an application.

$$P \quad x \quad V \quad \leq 0.1$$

$$\left(\frac{\text{Thrust}}{\text{(Max. Thrust Rating)}}\right) \text{ x } \left(\frac{\text{Speed}}{\text{(Max. Speed Rating)}}\right) \leq 0.1$$

BALL SCREW LIFE



NOTE: The L_{10} *expected life of a ball screw linear actuator is expressed as the linear travel distance that 90% of properly maintained ball screw manufactured are expected to meet or exceed. This is not a guarantee and this graph should be used for estimation purposes only.*

The underlying formula that defines this value is:

$$L_{10} = \left(\frac{C}{F}\right)^3 \bullet \ell \equiv$$

Travel life in millions of inches, where:

C = Dynamic load rating (lbf)
F = Equivalent load (lbf)
ℓ = Screw lead (in/rev)

*Use the "**Equivalent Load**" calculation below, when the load is not constant throughout the entire stroke. In cases where there is only minor variation in loading, use greatest load for life calculations.*

$$P_e = \sqrt[3]{\frac{\%(P_1)^3 + \%(P_2)^3 + \%(P_3)^3 + \%(P_n)^3}{100}}$$

Where:

P_e = Equivalent load (lbs)
P_n = Each increment at different load (lbs)
$\%_n$ = Percentage of stroke at load increment

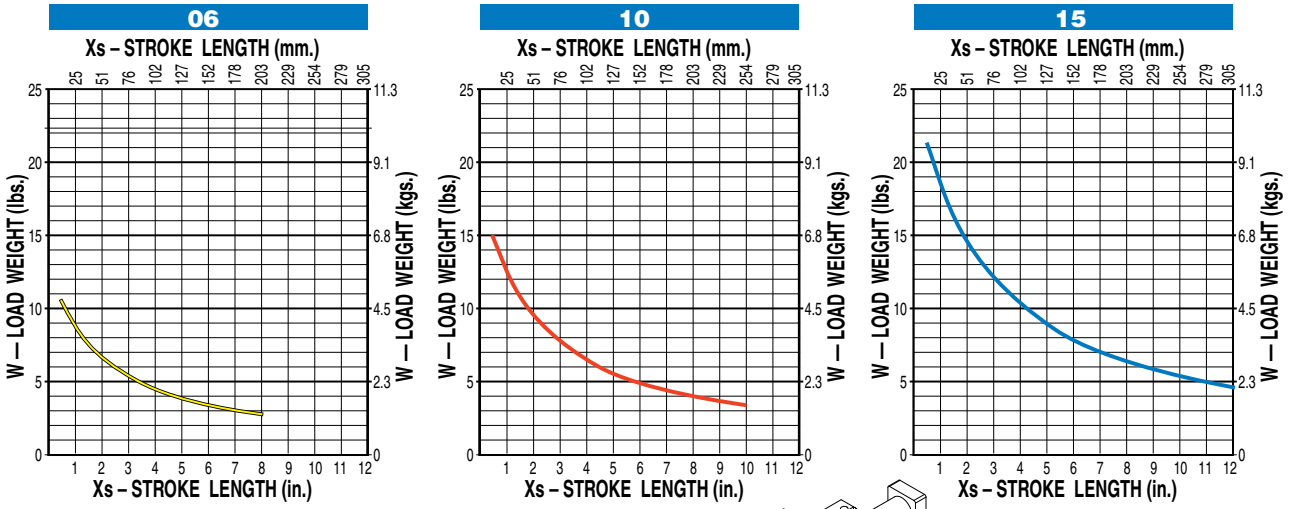
ERD – Electric Rod-Style Actuator

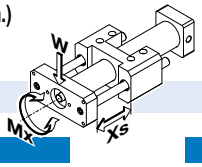
OPTION: **GD2 – GUIDED ERD**

PERFORMANCE

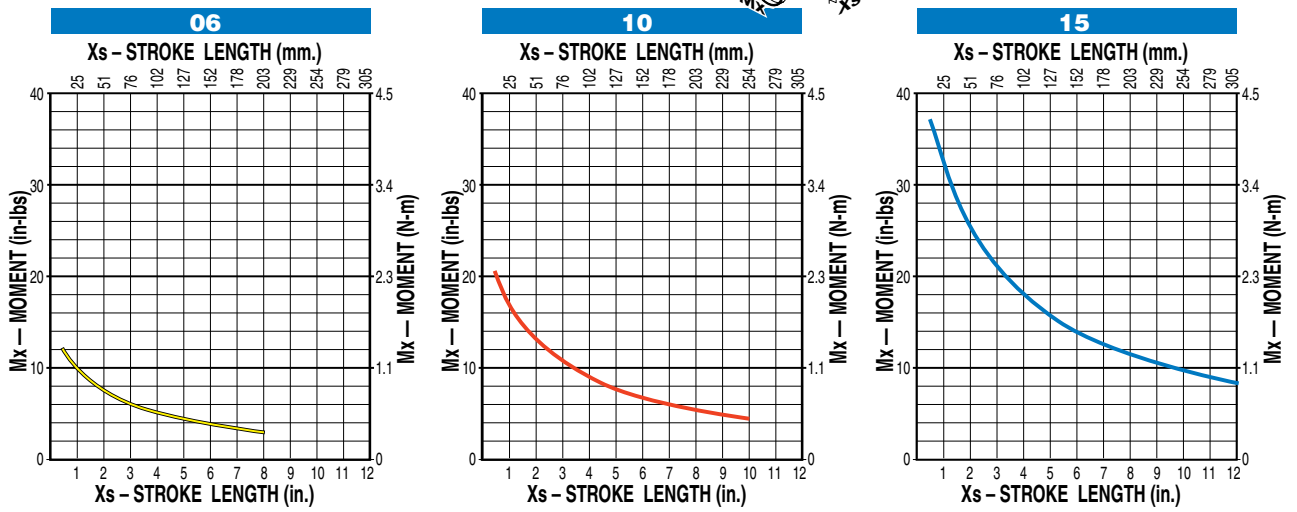
SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

LOAD VS EXTENDED LENGTH



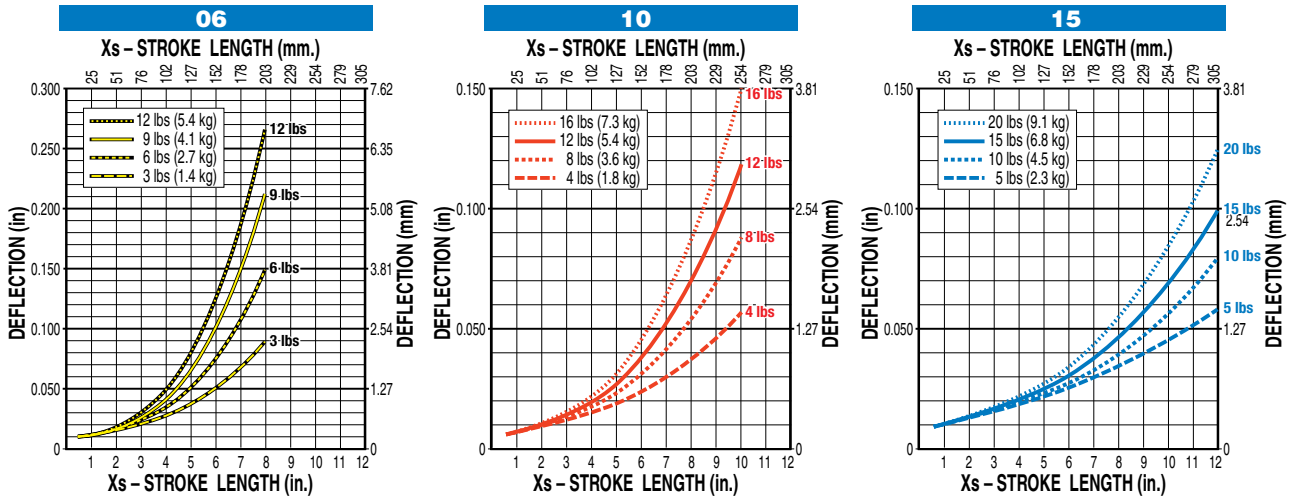


BENDING MOMENTS



GUIDE ROD DEFLECTION

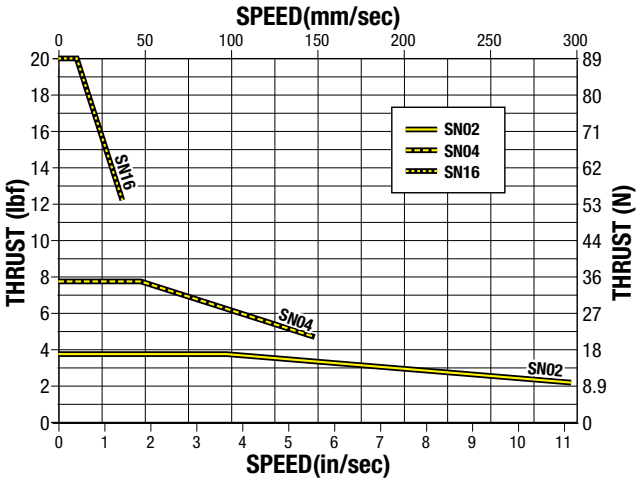
NOTE: Deflection is measured at the tooling plate. Excessive defelection may impact actuator life. Contact Tolomatic for assistance



SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

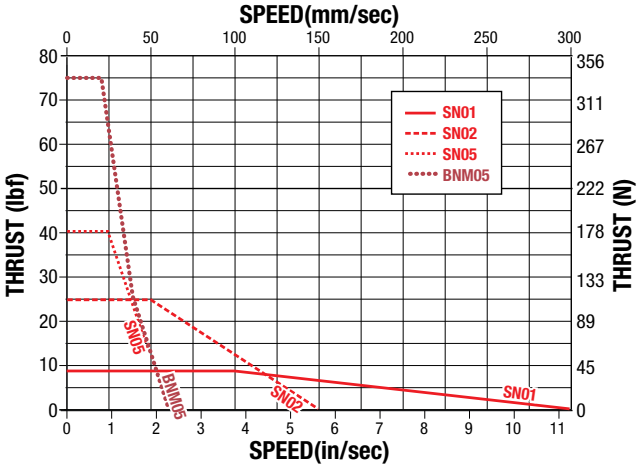
PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

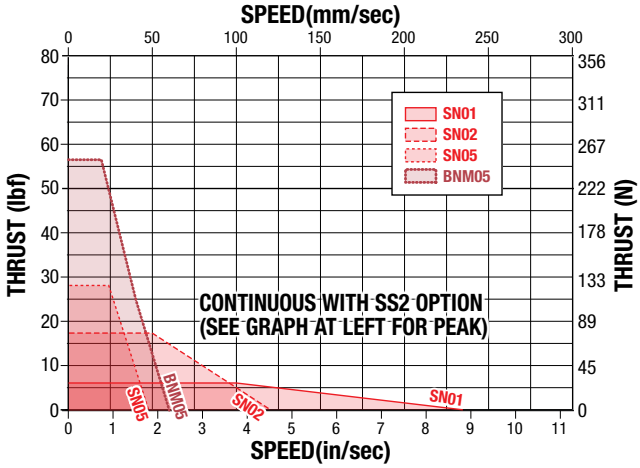
SPEED vs THRUST - ERD06 ACTUATOR WITH NEMA11 MOTOR



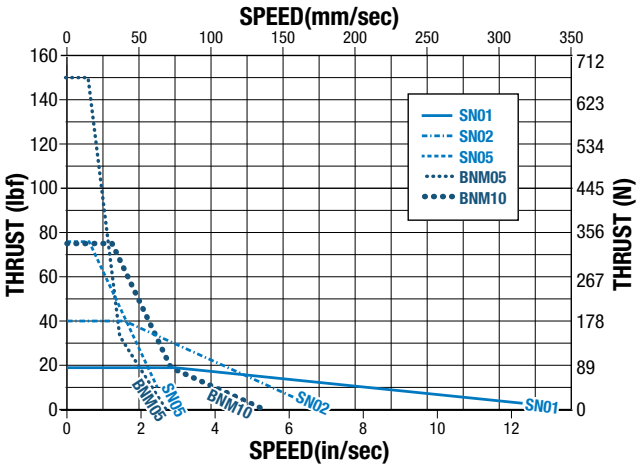
SS2 OPTION IS NOT AVAILABLE FOR THE 06 SIZE

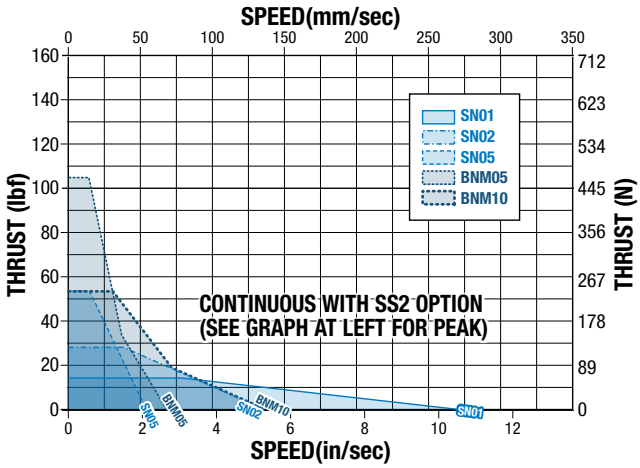
SPEED vs THRUST - ERD10 ACTUATOR WITH NEMA17 MOTOR





SPEED vs THRUST - ERD15 ACTUATOR WITH NEMA23 MOTOR



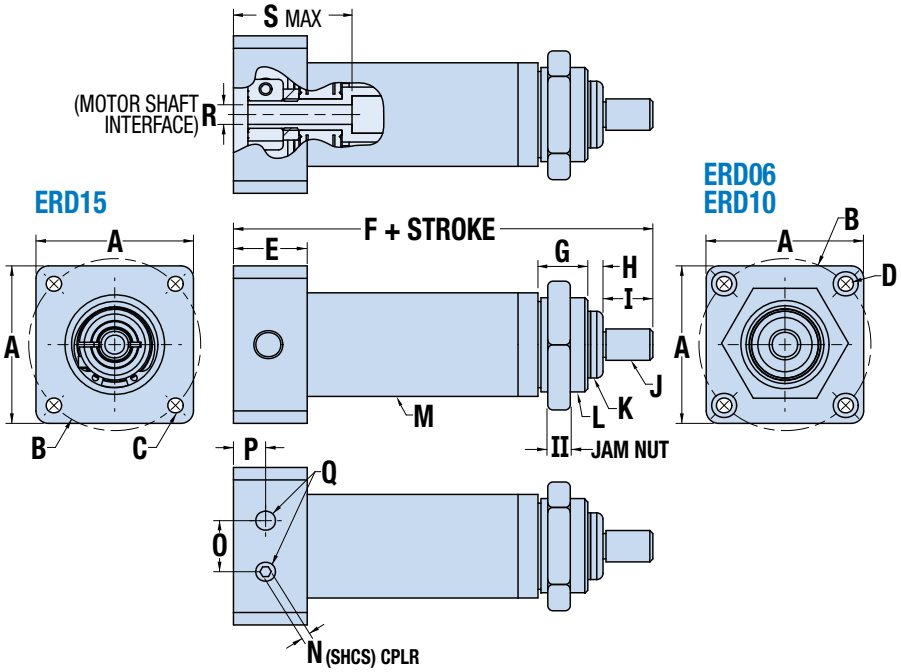


ERD – Electric Rod-Style Actuator

DIMENSIONS

3D CAD available at www.tolomatic.com

ACTUATOR

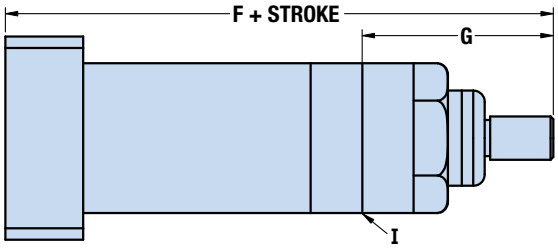


		ERD06	ERD10	ERD15
A	in	1.125	1.580	2.220
	mm	28.58	40.13	56.39
B	in	Ø1.287	Ø1.725	Ø2.625
	mm	Ø32.69	Ø43.82	Ø66.68
C	in	-	-	-
	mm	-	-	M4 x 0.8

		ERD06	ERD10	ERD15
D	in	Ø.136	Ø.154	-
	mm	Ø3.45	Ø3.91	-
E	in	1.400	0.740	0.850
	mm	35.56	18.80	21.59
F	in	3.88	4.20	5.40
	mm	98.5	102.3	137.2

		ERD06	ERD10	ERD15
G	in	0.500	0.500	0.600
	mm	12.70	12.70	15.24
H	in	0.153	0.153	0.153
	mm	3.89	3.89	3.89
I	in	0.375	0.500	0.750
	mm	9.53	12.70	19.05
J	in	-	-	-
	mm	M6 x 1.0	M8 x 1.25	M12 x 1.75
K	in	Ø.443	Ø.669	Ø1.041
	mm	Ø11.25	Ø17.00	Ø26.40
L	in	-	-	-
	mm	M16 x 1.5	M24 x 1.5	M34 x 1.5
II	in	0.236	0.236	0.315
	mm	6.00	6.00	8.00
M	in	Ø.669	Ø1.040	Ø1.638
	mm	Ø17.00	Ø26.42	Ø41.61
N	in	0.098	0.098	0.098
	mm	2.50	2.50	2.50
O	in	0.512	0.512	0.512
	mm	13.00	13.00	13.00
P	in	0.264	0.323	0.298
	mm	6.71	8.20	7.57
Q	in	(2) M4 x 0.7 ↓↧ .10	(2) M6 x 1.0 ↓↧ .31	(2) M6 x 1.0 ↓↧ .50
	mm	(2) M4 x 0.7 ↓↧ 2.5	(2) M6 x 1.0 ↓↧ 7.9	(2) M6 x 1.0 ↓↧ 12.7
R	in	Ø.197	Ø.197	Ø.250
	mm	Ø5.00	Ø5.00	Ø6.35
S	in	1.100	1.100	1.250
	mm	27.94	27.94	31.75

IP67 OPTION DIMENSIONS



IP OPTION

		ERD06	ERD10	ERD15
F	in	4.59	4.79	6.00
	mm	116.6	121.8	152.1
G	in	1.744	1.739	2.088
	mm	44.30	44.17	53.04
I		Surface for mounting options		

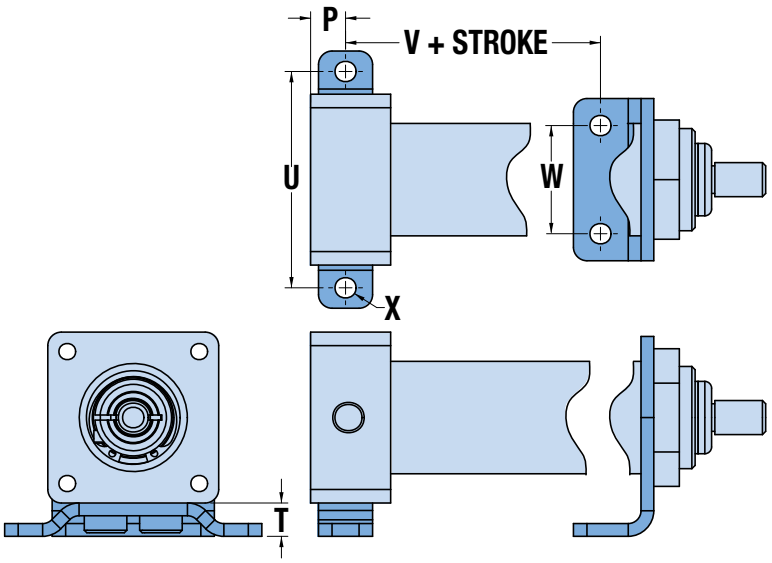
IP option replaces the Jam Nut (II in table above)

ERD – Electric Rod-Style Actuator

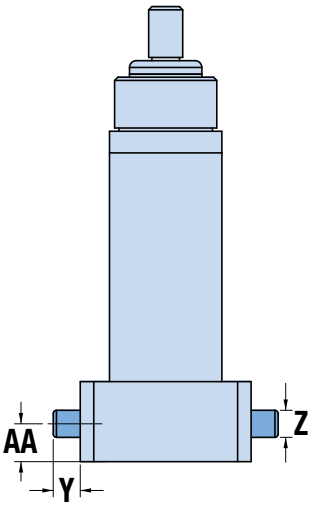
DIMENSIONS

3D CAD available at www.tolomatic.com

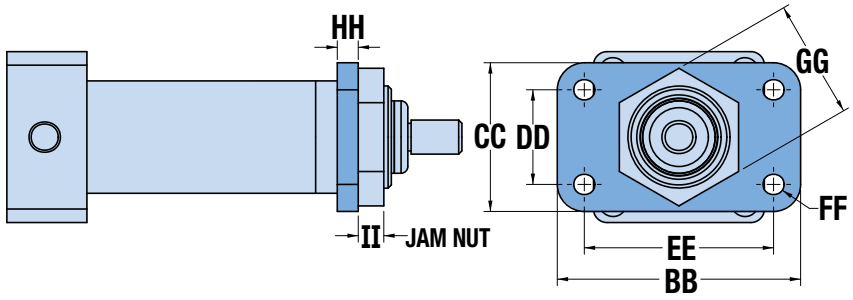
FM2 - FOOT MOUNT



TRR - TRUNNION MOUNT



FFG - FRONT FLANGE



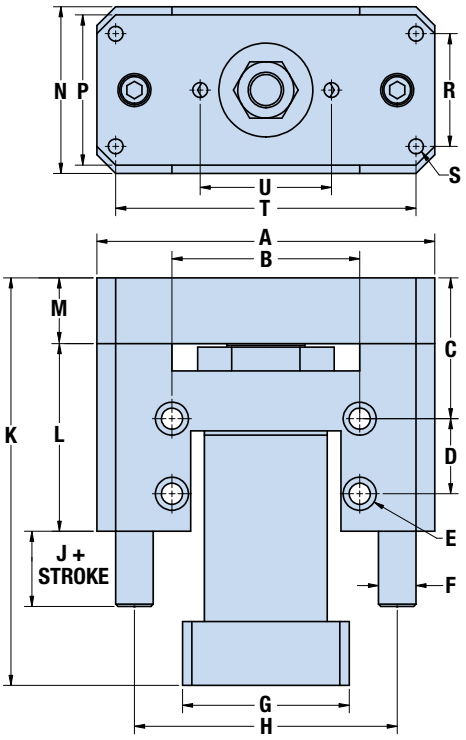
		ERD06	ERD10	ERD15
P	in	0.264	0.323	0.298
	mm	6.71	8.20	7.57
Q	in	(2) M4 x 0.7 ↧.10	(2) M6 x 1.0 ↧.31	(2) M6 x 1.0 ↧.50
	mm	(2) M4 x 0.7 ↧2.5	(2) M6 x 1.0 ↧7.9	(2) M6 x 1.0 ↧12.7
R	in	Ø.197	Ø.197	Ø.250
	mm	Ø5.00	Ø5.00	Ø6.35
S	in	1.100	1.100	1.250
	mm	27.94	27.94	31.75
T	in	0.259	0.308	0.406
	mm	6.58	7.82	10.31
U	in	1.750	2.00	2.600
	mm	44.45	50.80	66.04
V	in	2.270	2.357	3.165
	mm	57.66	59.87	80.39
W	in	0.625	1.00	1.250
	mm	15.88	25.4	31.75
X	in	Ø.154	Ø.194	Ø.221
	mm	Ø3.91	Ø4.93	Ø5.61
Y	in	0.250	0.250	0.430
	mm	6.35	6.35	10.92
Z	in	Ø.1878 / Ø.1876	Ø.2503 / Ø.2501	Ø.3753 / Ø.3751
	mm	Ø4.770 / Ø4.765	Ø6.358 / Ø6.353	Ø9.533 / Ø9.528
AA	in	1.221	0.350	0.425
	mm	31.01	8.89	10.80
BB	in	1.750	2.250	2.500
	mm	44.45	57.15	63.50
CC	in	1.000	1.375	1.750
	mm	25.40	34.93	44.45
DD	in	0.500	0.875	1.250
	mm	12.70	22.23	31.75
EE	in	1.250	1.750	2.000
	mm	31.75	44.45	50.80
FF	in	Ø.154	Ø.194	Ø.221
	mm	Ø3.91	Ø4.93	Ø5.61
GG	in	0.709	1.102	1.575
	mm	18.00	28.00	40.00
HH	in	0.194	0.194	0.194
	mm	4.93	4.93	4.93
II	in	0.236	0.236	0.315
	mm	6.00	6.00	8.00

ERD – Electric Rod-Style Actuator

DIMENSIONS

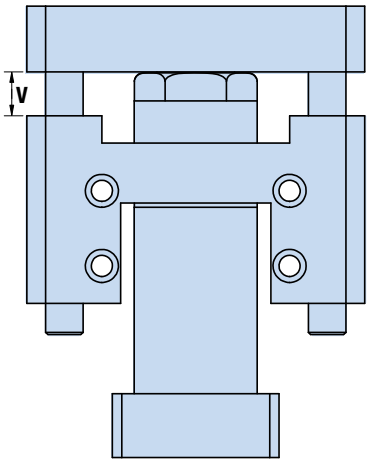
3D CAD available at www.tolomatic.com

GD2 – GUIDED ERD



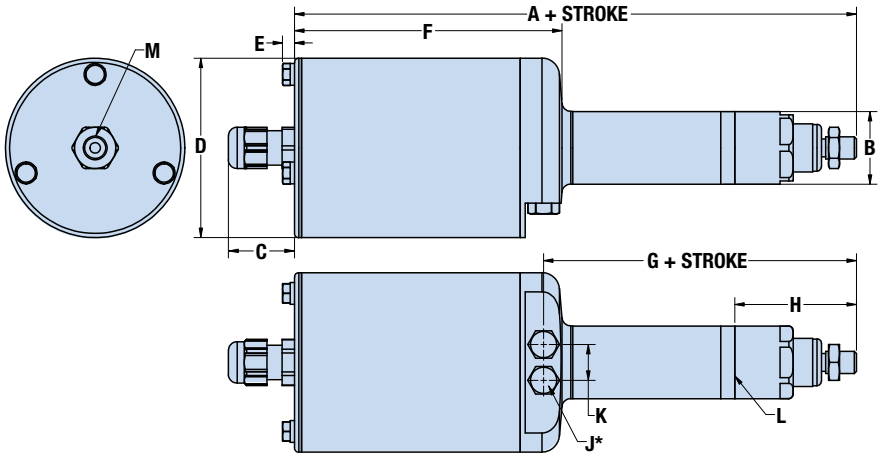
GUIDED ERD WITH IP67 OPTION

ERD STROKE IS REDUCED BY DIMENSION "V"



		ERD06	ERD10	ERD15
A	in	3.000	3.500	4.500
	mm	76.20	88.90	114.30
B	in	1.625	2.000	2.500
	mm	41.28	50.80	63.50
C	in	1.125	1.250	1.875
	mm	28.58	31.75	47.63
D	in	1.000	1.000	1.000
	mm	25.40	25.40	25.40
E Ø	in	0.194	0.221	0.281
	mm	4.93	5.61	7.14
F Ø	in	0.250	0.375	0.500
	mm	6.35	9.53	12.70
G	in	1.125	1.580	2.220
	mm	28.58	40.13	56.39
H	in	2.250	2.750	3.500
	mm	57.15	69.85	88.90
J	in	1.000	1.000	1.000
	mm	25.40	25.40	25.40
K	in	3.910	4.244	5.428
	mm	99.31	107.80	137.87
L	in	2.000	2.000	2.500
	mm	50.80	50.80	63.50
M	in	0.500	0.625	0.875
	mm	12.70	15.88	22.23
N	in	1.125	1.580	2.220
	mm	28.58	40.13	56.39
P	in	1.000	1.500	2.000
	mm	25.40	38.10	50.80
R	in	0.625	1.000	1.500
	mm	15.88	25.40	38.10
S	in	–	–	–
	mm	M4X0.7	M5X0.8	M6X1.0
T	in	2.625	3.000	4.000
	mm	66.68	76.20	101.60
U	in	1.000	1.375	1.750
	mm	25.40	34.93	44.45
V	in	0.716	0.587	0.585
	mm	18.19	14.91	14.86

SS2 – STAINLESS STEEL BODY WITH PROTECTIVE MOTOR COVER AND IP67 UPGRADE



		ERD06	ERD10	ERD15
A	in	–	8.03	9.33
	mm	–	204.0	237.0
B	in	–	1.040	1.638
	mm	–	26.42	41.61
C	in	–	0.945	0.945
	mm	–	24.00	24.00
D	in	–	2.563	3.543
	mm	–	65.10	89.99

		ERD06	ERD10	ERD15
E	in	–	0.173	0.173
	mm	–	4.39	4.39
F	in	–	3.976	4.192
	mm	–	100.99	106.48
G	in	–	4.471	5.660
	mm	–	113.56	143.76
H	in	–	1.739	2.088
	mm	–	44.17	53.04
J*	in	–	–	–
	mm		M6 x 1.0	M6 x 1.0

		ERD06	ERD10	ERD15
K	in	–	0.512	0.512
	mm	–	13.00	13.00

L Surface for mounting options

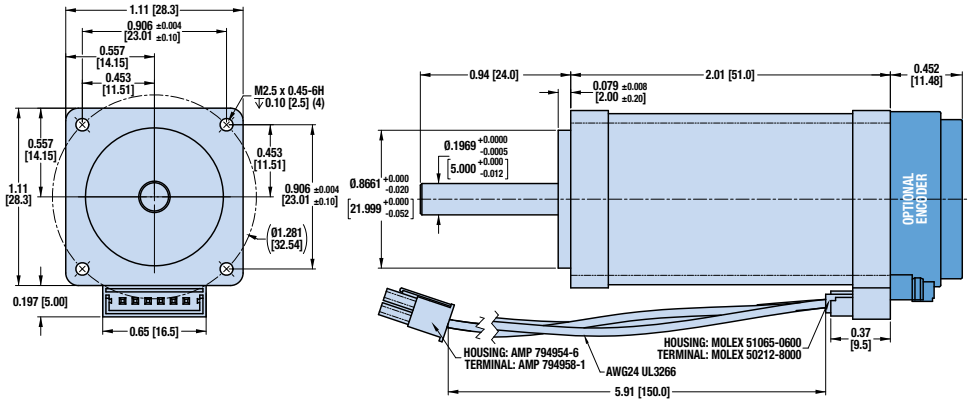
M **Available cable exit options:**
G1: 1 cord grip (motor, no encoder)
E1: 2 cord grips (motor, with encoder)
no cord grips 1/2" NPT tapped hole
no cord grips M20 x 1.5 tapped hole

*Unit ships standard with hex bolts in these tapped holes

TOLOMATIC MOTOR DIMENSIONS

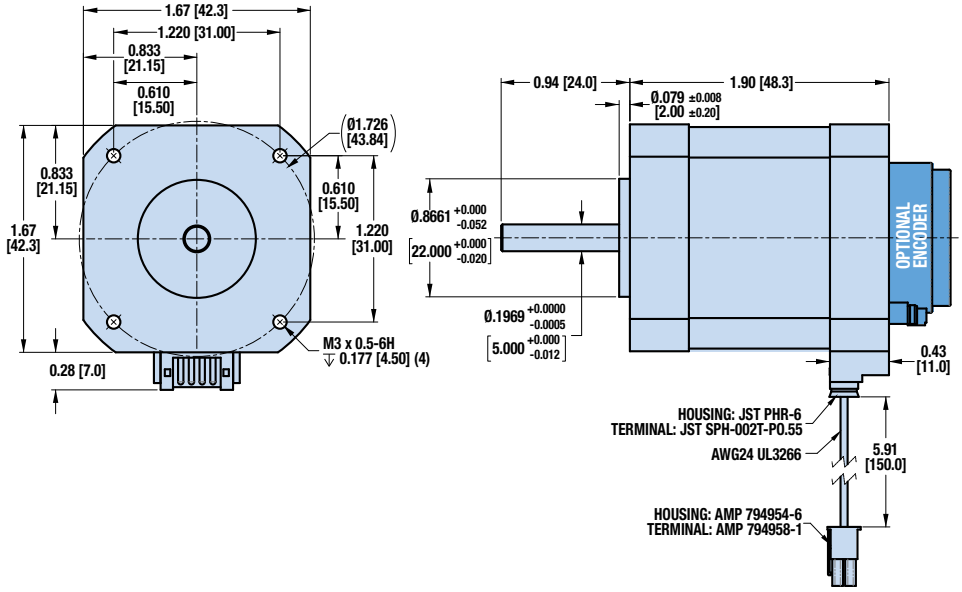
3D CAD available at www.tolomatic.com

NEMA11 (ERD06) DIMENSIONS



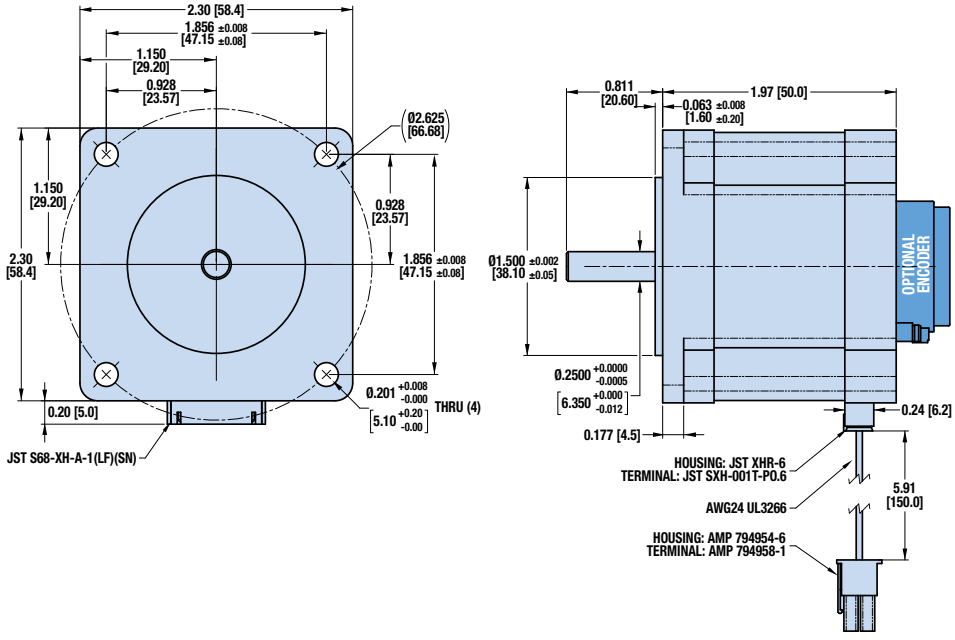
Code	Description
AMS1A1C1	NEMA11 motor no encoder (ERD06)
AMS1A1A1	NEMA11 motor with encoder (ERD06)

NEMA17 (ERD10) DIMENSIONS



Code	Description
AMS1B1C1 AMS1B1G1	NEMA17 motor no encoder (ERD10)
AMS1B1A1 AMS1B1E1	NEMA17 motor with encoder (ERD10)

NEMA23 (ERD15) DIMENSIONS



Code	Description
AMS1C1C1 AMS1C1G1	NEMA23 motor, no encoder (ERD15)
AMS1C1A1 AMS1C1E1	NEMA23 motor, with encoder (ERD15)

ALTERNATIVE MOTOR DIMENSIONS

3D CAD available at www.tolomatic.com

MOTOR DIMENSIONS – NEMA MOTOR MOUNT

The ERD actuator is designed to accommodate NEMA standard stepper and servo motors.

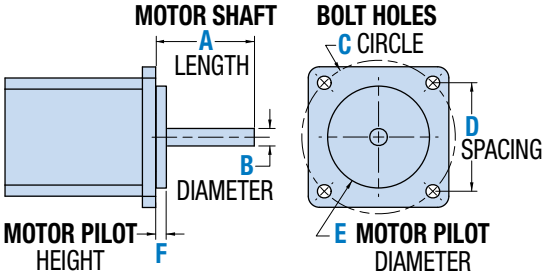
ACTUATOR	SIZE
ERD06	NEMA11
ERD10	NEMA17
ERD15	NEMA23

The only limiting factors are the motor shaft diameter and length. NEMA standard motors from the companies in the table at right have been found to be compatible with the ERD actuator. (*NOT a complete listing)

ERD Compatible NEMA Motor Suppliers*
Anaheim Automation
Animatics
Applied Motion Products
Automation Direct
Cool Muscle
Electrocraft
Fastech
IMS / Scheider Electric
JVL
LIN Engineering
Nippon Pulse Motor
Omega
Oriental Motor
Parker
Sanyo Denki
+ Others

When any motor has been selected for use with the ERD actuator it is important to confirm the motor is compatible with the dimensions in the table below.

				ERD06	ERD10	ERD15
MOTOR SHAFT	LENGTH MIN.	A	in	0.50	0.50	0.50
			mm	12.7	12.7	12.7
	LENGTH MAX.		in	1.100	1.100	1.250
			mm	27.94	27.94	31.75
	DIAMETER	B	in	0.197	0.197	0.250
			mm	5.00	5.00	6.35
BOLT HOLE	CIRCLE	C	in	1.287	1.725	2.625
			mm	33.69	43.82	66.68
	SPACING	D	in	0.910	1.220	1.856
			mm	23.11	30.99	47.14
MOTOR PILOT	DIAMETER MAX.	E	in	0.980	0.980	1.550
			mm	24.90	24.90	39.37
	HEIGHT MAX.	F	in	0.090	0.130	0.130
			mm	2.29	3.30	3.30



MOTOR DIMENSIONS – IEC MOTOR MOUNT OPTION

The ERD actuator with IEC option is designed to accommodate IEC standard servo motors.

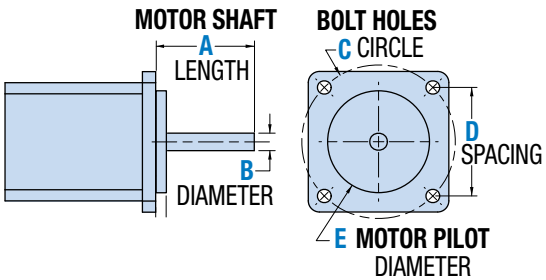
ACTUATOR	SIZE
ERD10	IEC 40mm
ERD15	IEC 60mm

IEC standard motor from the companies in the table to the right have been found to be compatible with the ERD actuator with the IEC option. (*NOT a complete listing)

ERD Compatible IEC Motor Suppliers*
Allen Bradley
Bosch Rexroth
Emerson
Lenze
Mitsubishi
Omron
Panasonic
Yaskawa
+ Others

When any motor has been selected for use with the ERD actuator it is important to confirm the motor is compatible with the dimensions in the table below.

				ERD10	ERD15
MOTOR SHAFT	LENGTH	A	in	0.98	1.18
			mm	25.0	30.0
	DIAMETER	B	in	0.31	0.43, 0.47 or 0.55
			mm	8.0	11.0, 12.0 or 14.0
BOLT HOLE	CIRCLE	C	in	1.81	2.76
			mm	46.0	70.0
	SPACING	D	in	1.28	1.97
			mm	32.53	449.50
MOTOR PILOT	DIAMETER	E	in	1.18	1.97
			mm	30.0	50.0

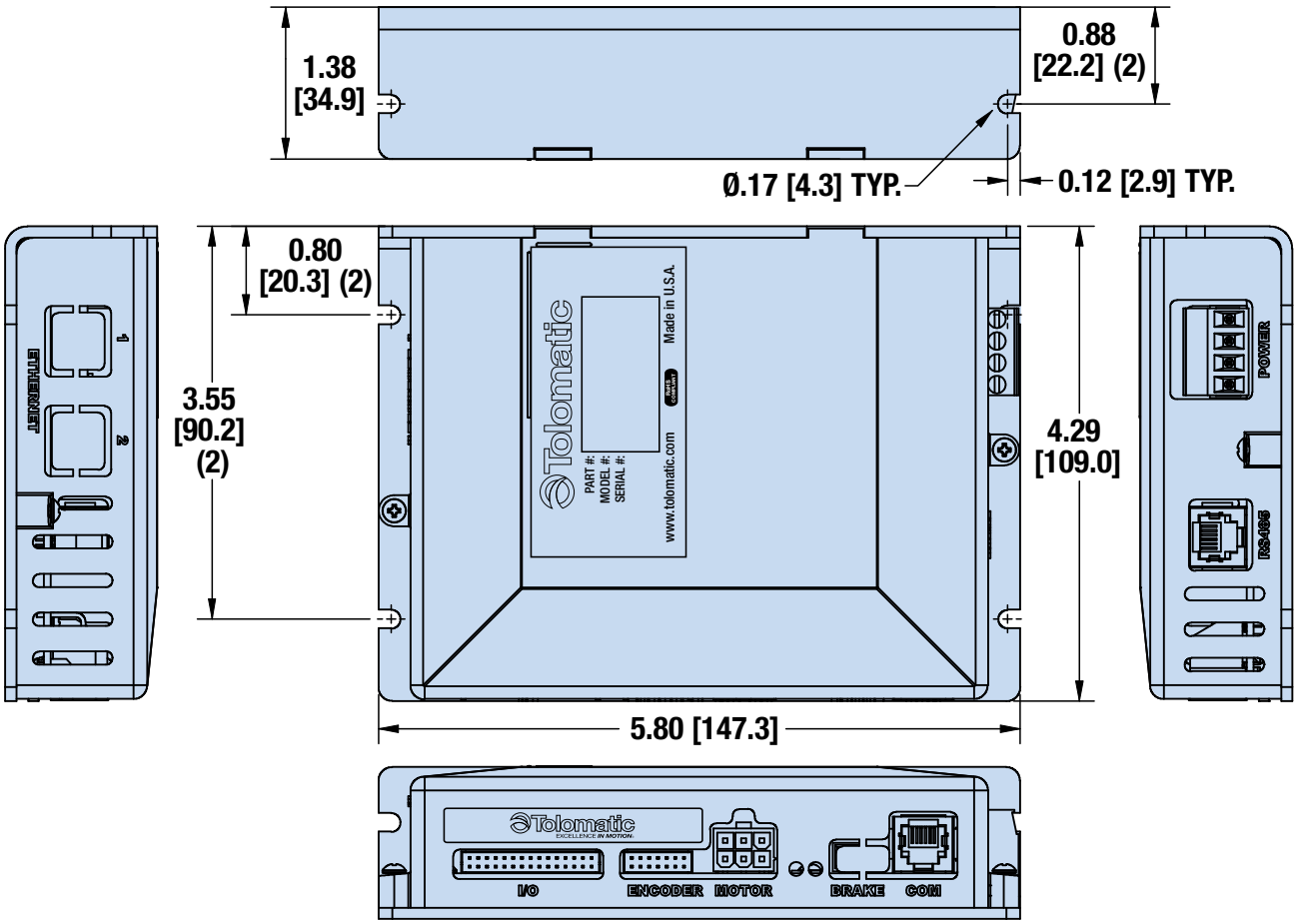


DIMENSIONS

3D CAD available at www.tolomatic.com

SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

ACS DRIVE/CONTROLLER (3604-9651) DIMENSIONS



ERD – Electric Rod-Style Actuator

SIZE: **ALL**

SWITCHES

ERD actuators offer a wide range of sensing choices. There are 6 switch choices: reed, solid state PNP (sourcing) or solid state NPN (sinking); normally open; with flying leads or quick-disconnect.

Commonly used for end-of-stroke positioning, these switches allow clamp-on installation anywhere along the entire actuator length. The internal magnet, located on the thrust tube, is a standard feature. Switches can be installed in the field at any time.

Switches are used to send digital signals to PLC (programmable logic controller), TTL, CMOS circuit or other controller device. Switches contain reverse polarity protection. Solid state QD cables are shielded; shield should be terminated at flying lead end.

All switches are CE rated, IP67 rated and are RoHS compliant. Switches feature bright red or green LED signal indicators.

RoHS COMPLIANT CE

	Order Code	Part Number	Lead	Switching Logic	Power LED	Signal LED	Operating Voltage	**Power Rating (Watts)	Switching Current (mA max.)	Current Consumption	Voltage Drop	Leakage Current	Temp. Range	Shock / Vibration	IP Rating
REED	RY	2190-9082	5m	SPST Normally Open	—	Red	5 - 240 AC/DC	**10.0	100mA	—	3.0 V max.	—	14 to 158°F [-10 to 70°C]	30 G / 9 G	67
	RK	2190-9083	QD*												
SOLID STATE	TY	2190-9088	5m	PNP (Sourcing) Normally Open	—	Green	5 - 30 VDC	**3.0	200mA	8 mA @ 24V	1.0 V max.	0.01 mA max.		50 G / 9 G	
	TK	2190-9089	QD*												
	KY	2190-9090	5m	NPN (Sinking) Normally Open	—	Red									
	KK	2190-9091	QD*												

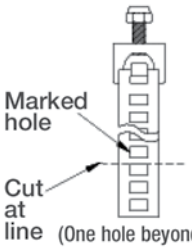
*QD = Quick-disconnect Enclosure classification IEC 529 IP67 (NEMA 6) CABLES: Robotic grade, oil resistant polyurethane jacket, PVC insulation

⚠ **WARNING: Do not exceed power rating (Watt = Voltage x Amperage). Permanent damage to sensor will occur.

SWITCH INSTALLATION - FIELD REPLACEMENT INSTRUCTIONS

STEP 1:
Loosen screw and nut.

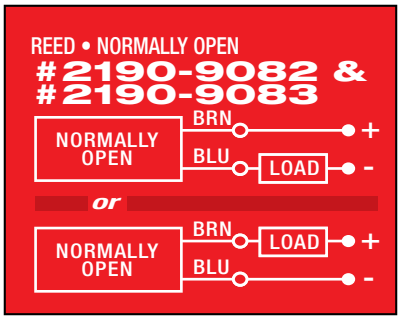
STEP 2:
Place sensor and wrap the band around the ERD cylinder. Position the hook with the nearest hole on the band and mark the hole with a permanent marker.

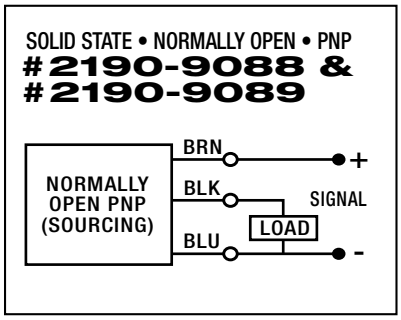


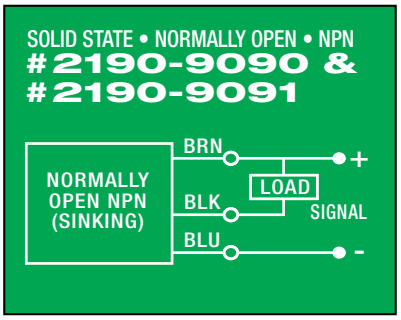
STEP 3:
Remove mounting assembly. Cut the band at the nearest edge of the next hole. (The one that's furthest away from the mounting head.)

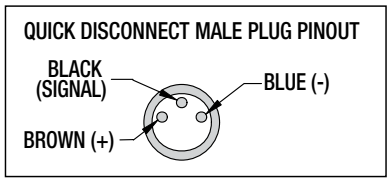
STEP 4:
Replace the sensor and mounting assembly. Wrap the band and put the chosen hole on the hook. Position the switch and tighten. Tighten nut for steadying.

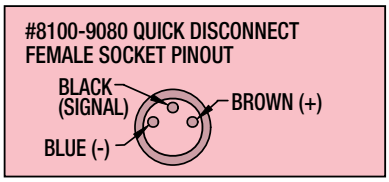
WIRING DIAGRAMS





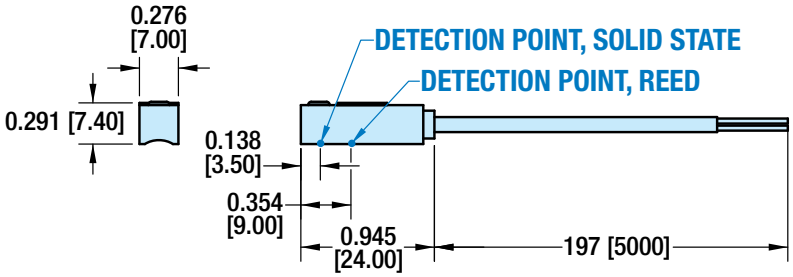




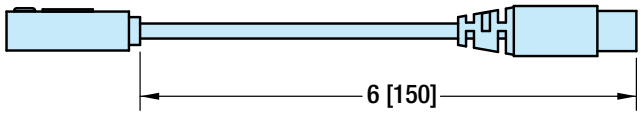


SWITCH DIMENSIONS

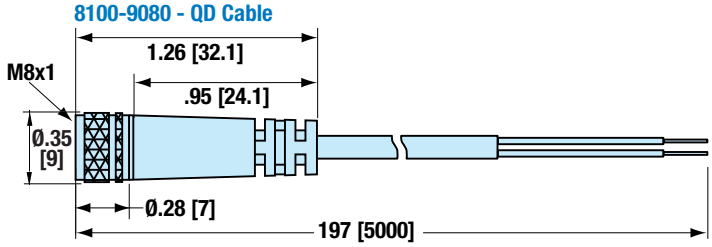
☐ Y - direct connect



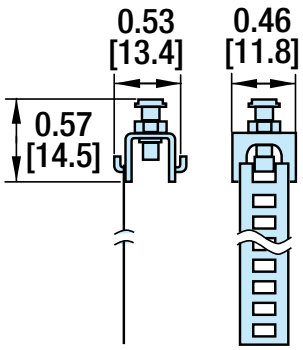
☐ K - QD (Quick-disconnect) switch



8100-9080 - QD Cable



SWITCH CLAMP
2190-1079

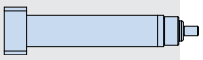


APPLICATION DATA WORKSHEET

Fill in known data. Not all information is required for all applications

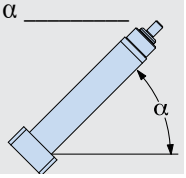
ORIENTATION

☐ Horizontal



☐ Vertical

☐ Incline °
α _____



☐ Load supported by actuator OR ☐ Load supported by other mechanism

MOVE PROFILE

EXTEND

Move Distance _____
☐ inch (US Standard) ☐ millimeters (Metric)

Move Time _____sec
Max. Speed _____
☐ in/sec ☐ mm/sec

Dwell Time After Move _____sec

RETRACT

Move Distance _____
☐ inch ☐ millimeters

Move Time _____sec
Max. Speed _____
☐ in/sec ☐ mm/sec

Dwell Time After Move _____sec

NO. OF CYCLES _____

☐ per minute ☐ per hour

HOLD POSITION?

☐ Required ☐ Not Required

☐ After Move ☐ During Power Loss

NOTE: If load or force changes during cycle use the highest numbers for calculations

EXTEND	RETRACT
LOAD _____	**LOAD** _____
☐ lb. (U.S. Standard) ☐ kg. (Metric)	☐ lb. (U.S. Standard) ☐ kg. (Metric)
FORCE _____	**FORCE** _____
☐ lb. (U.S. Standard) ☐ kg. (Metric)	☐ lb. (U.S. Standard) ☐ kg. (Metric)

STROKE LENGTH _____

☐ inch (US Standard) ☐ millimeters (Metric)

PRECISION

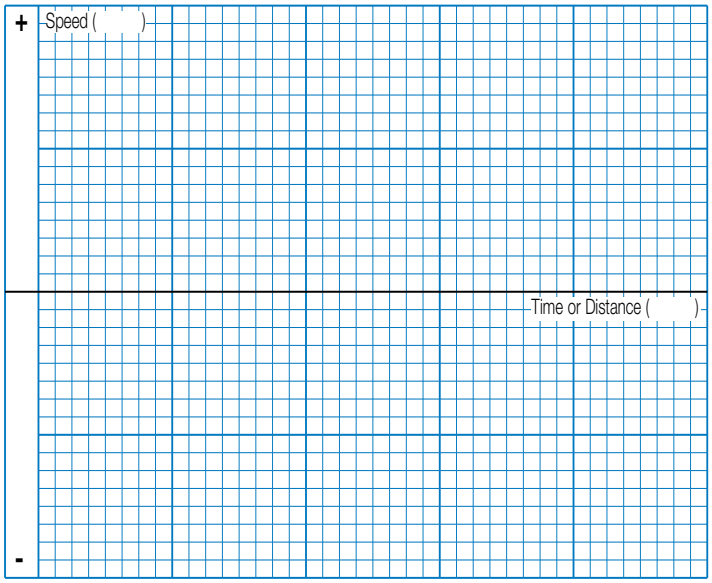
Repeatability _____
☐ inch ☐ millimeters

OPERATING ENVIRONMENT

Temperature, Contamination, Water, etc.

_____
_____
_____

MOTION PROFILE



Graph your most demanding cycle, including accel/decel, velocity and dwell times. You may also want to indicate load variations and I/O changes during the cycle. Label axes with proper scale and units.

CONTACT INFORMATION

Name, Phone, Email
Co. Name, Etc.

_____
_____
_____

STOP **USE THE TOLOMATIC SIZING AND SELECTION SOFTWARE AVAILABLE ON-LINE AT www.tolomatic.com OR... CALL TOLOMATIC AT 1-800-328-2174.** We will provide any assistance needed to determine the proper actuator for the job.

FAX 1-763-478-8080 **EMAIL help@tolomatic.com**

ERD – Electric Rod-Style Actuator

Selection Guidelines

SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

1 ESTABLISH MOTION PROFILE

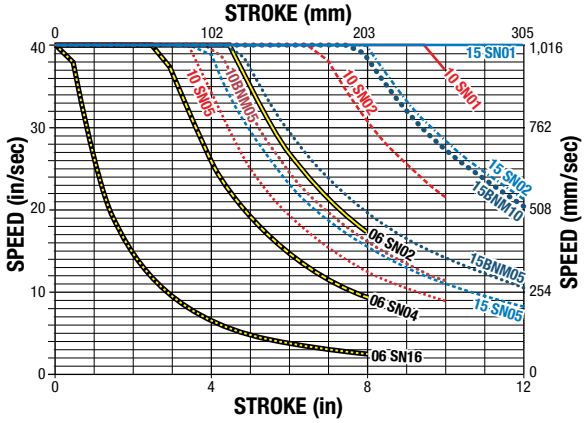
Using the application stroke length, desired cycle time, loads and forces, establish the motion profile details including linear velocity and thrust in each of its segments.

2 SELECT ACTUATOR SIZE AND SCREW TYPE

Based on the required velocities and thrust select a size and screw type and lead of the ERD actuator.

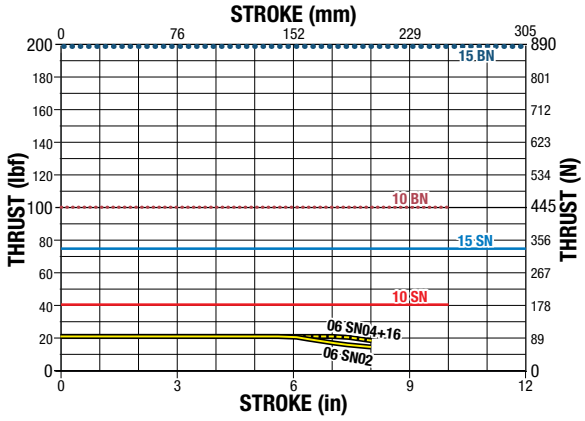
3 VERIFY CRITICAL SPEED OF THE SCREW

Verify that the application's peak linear velocity does not exceed the critical speed value for the size and lead of the screw selected.



4 VERIFY AXIAL BUCKLING STRENGTH OF THE SCREW

Verify that the peak thrust does not exceed the critical buckling force for the size of the screw selected.

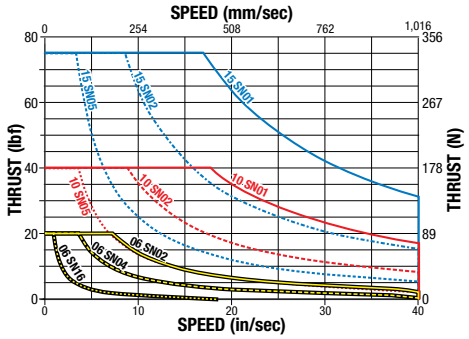


5 ESTABLISH TOTAL TORQUE REQUIREMENTS

Calculate total system inertia. The peak and RMS torque required from the motor to overcome internal friction, external forces and accelerate/decelerate the load.

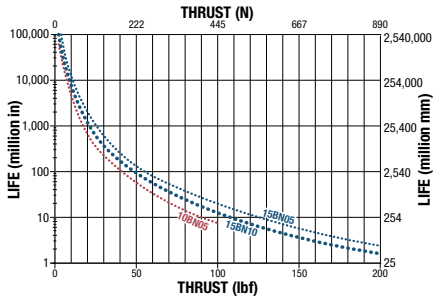
6 VERIFY PV VALUE (IF ACME)

Verify that the PV value does not exceed the PV value for the size of the screw selected.



7 CALCULATE LIFE (IF BALL SCREW)

Determine the practical load of the system to calculate the L10 estimated life.



8 DETERMINE IF LOAD GUIDANCE IS NEEDED

If application requires carrying a load, anti-rotate, a tooling plate or there is risk of side loading the rod, choose the guided option. (GD2)

9 DETERMINE IF INGRESS PROTECTION AGAINST DUST AND WATER IS NEEDED.

If actuator is in contact with dust particulate, water or washdown environment choose the IP67 option. (IP67)

10 DETERMINE IF ENVIRONMENT IS CORROSIVE OR WASH DOWN

If corrosion resistance is required, choose from two options of stainless steel components

- (SS1) ERD with all stainless steel components
- (SS2) ERD with all stainless steel components and protective motor cover.

11 SELECT MOUNTING AND SENSOR CHOICES

Mounting options include: TRN trunnion mount, FFG front flange mount, FM2 foot mount. 6 sensor choices include: reed, solid state PNP or NPN, all in normally open, with flying leads or quick-disconnect couplers.

12 SELECT ACTUATOR CONTROL SOLUTION

Add an extremely easy to use drive and motor combination to power the actuator.

SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

SERVICE PARTS ORDERING

ERD ACTUATOR REPLACEMENT KITS

Code	Description	ERD SIZE		
		06	10	15
FFG	Front Flange Mount Kit	2190-1025	2191-1025	2192-1025
FM2	Foot Mount Kit	2190-9001	2191-9001	2192-9001
TRR	Trunnion Mount	1820-1003 (order 2)	0610-1044 (order 2)	6000-1785 (order 2)
GD2	Guide Kit	2190-9051	2191-9051	2192-9051
IP67	IP67 Kit	2190-9201	2191-9201	2192-9201

ERD SWITCHES

To order switch kits use configuration code for switch preceded by SW and actuator code.

EXAMPLE: SWERD15KK3

KIT ACTUATOR SIZE SWITCH CODE QUANTITY

The example is for 3 Solid State NPN, Normally Open Switches with Quick-disconnect couplers. Each switch is complete with Bracket, Set Screw, Switch and mating QD cable.

To order switch ONLY see part number in table

Code	**Switch ONLY Part No.	Lead	Normally	Sensor Type
RY	2190-9082	5m (197 in)	Open	Reed
RK	2190-9083*	Quick-disconnect		
TY	2190-9088	5m (197 in)	Open	Solid State PNP
TK	2190-9089*	Quick-disconnect		
KY	2190-9090	5m (197 in)	Open	Solid State NPN
KK	2190-9091*	Quick-disconnect		

**Also order clamp assembly #2190-1079

*Also order mating QD cable #8100-9080

ACS DRIVE/CONTROLLER, CABLES & MOTOR REPLACEMENT PARTS

Part No.	Description
3604-9651	Actuator Control Solution
3604-1766	Motor Power Cable (3 m)
3604-1767	Motor Power Cable (5 m)
3604-1769	Encoder Cable (3 meter length)
3604-1768	Encoder Cable (5 meter length)
3604-1771	I/O Cable (3 meter length)
3604-1770	I/O Cable (5 meter length)
3604-9044	Starter Kit (includes RJ 12 cable; D-Sub to RJ converter; USB to RS232 Converter and Tolomatic Motion Interface CD)
2190-1304	Input Power Connector (3 meter length)
3604-9526	Tolomatic Motion Interface CD
3604-1795	USB to RS232 Converter
3604-9043	RJ cable and D-Sub to RJ Converter Combo

Code	Part No.	Description
AMS1A1C1	3604-1779	NEMA11 motor no encoder (ERD06)
AMS1A1A1	3604-1780	NEMA11 motor with encoder (ERD06)
AMS1B1C1 AMS1B1G1	3604-1775	NEMA17 motor no encoder (ERD10)
AMS1B1A1 AMS1B1E1	3604-1776	NEMA17 motor with encoder (ERD10)
AMS1C1C1 AMS1C1G1	3604-1777	NEMA23 motor, no encoder (ERD15)
AMS1C1A1 AMS1C1E1	3604-1778	NEMA23 motor, with encoder (ERD15)

ERD – Electric Rod-Style Actuator

ERD ORDERING

MOTOR ORDERING

BASE MODEL | **OPTIONS**

ERD	10	SN02	SM152.4	LMI	SS2	FFG	KK2	AM	S1	B1	E1

MODEL

ERD	Rod-Style Actuator

SIZE

06	**10**	**15**

NUT/SCREW COMBINATIONS

SIZE	CODE	TURNS/in (TPI)
06	SN	02, 04, 16
10	SN	01, 02, 05
10	BNM	05 mm lead
15	SN	01, 02, 05
15	BNM	05, 10 mm lead

STROKE LENGTH

SM_ _ _ Enter desired stroke length in millimeters (25.4mm = 1 inch)

MAXIMUM STROKE		
	ERD	
SIZE	*mm*	in
06	*203.2*	8
10	*254.0*	10
15	*304.8*	12

Contact Tolomatic with requests for longer strokes

MOTOR MOUNTING

LMI	In-line motor mount

Not all codes listed are compatible with all options. Contact Tolomatic with any questions.

IEC MOTOR MOUNT OPTION

—	06 size (not available)
IEC1	10 size (40mm B.C., 7mm shaft dia.)
IEC1	15 size (60mm B.C., 11mm shaft dia.)
IEC2	15 size (60mm B.C., 12mm shaft dia.)
IEC3	15 size (60mm B.C., 13mm shaft dia.)

(see page ERD_20)

ACTUATOR GUIDE

GD2	Guided unit with 2 guide shafts & tooling plate

ENVIRONMENTAL PROTECTION

SS1	Stainless steel actuator
SS2_*	Stainless steel actuator with protective motor cover
SS21	NPT 1/2" conduit thread
SS22	M20x2.5 conduit thread
SS23	Cord grip(s), *1 or 2 grips determined by encoder choice*
IP67	Ingress protection rating, dust protection, temporary immersion in water

***NOTE: Only Tolomatic motors are available with the SS2 option**
SS2 includes IP67 option

***SS2 is not available for the 06 size or GD2 option**
IEC is not available with the SS2 option

ACTUATOR MOUNTING

FFG**	Front Flange Mount
TRR	Trunnion Mounting, Rear
FM2**	Foot Mount

***NOTE: Foot Mount, Front Flange Mount and Switches are shipped together with the actuator but are not installed by Tolomatic.**

SWITCHES**

TYPE	LOGIC	NORMALLY	QUICK-DISCONNECT	CODE	QUANTITY	LEAD LENGTH	
REED	SPST	Open	No	RY	After code enter quantity desired	5 m (16.4 feet)	6 in (152mm) to QD connector w/ 5m lead
			Yes	RK			
SOLID STATE	PNP	Open	No	TY			
			Yes	TK			
	NPN	Open	No	KY			
			Yes	KK			

***NOTE: Foot Mount, Front Flange Mount and Switches are shipped together with the actuator but are not installed by Tolomatic.**

MOTOR ORDER CODE

AM	Tolomatic Motor

MOTOR TYPE

S1	Stepper Motor

FRAME SIZE

A1	11 Frame Motor (ERD06)
B1	17 Frame Motor (ERD10)
C1	23 Frame Motor (ERD15)

NOTE: Each ERD size has only one motor size choice

MOTOR OPTIONS

A1	Encoder
C1	No Encoder
E1	Encoder with SS2 option
G1	No Encoder SS2 option

SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

ACS DRIVE/CONTROLLER & CABLES ORDERING

Item No.	Part No.	Description
1.	3604-9651	Actuator Control Solution
2.	3604-1766	Motor Power Cable (3 m)
	3604-1767	Motor Power Cable (5 m)
3.	3604-1769	Encoder Cable (3 meter length)
	3604-1768	Encoder Cable (5 meter length)
4.	3604-1771	I/O Cable (3 meter length)
	3604-1770	I/O Cable (5 meter length)
5.	3604-9043	Starter Kit (includes RJ 12 cable; D-Sub to RJ converter; USB to RS232 Converter and Tolomatic Motion Interface CD)

NOTE: All 5 items from table at left are required for complete ACS system. Order by part numbers (not configuration code)

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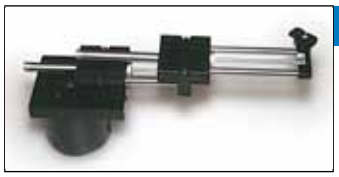
EXCELLENT CUSTOMER SERVICE & TECHNICAL SUPPORT

Our people make the difference! Expect prompt, courteous replies to all of your application and product questions.

INDUSTRY LEADING DELIVERIES

Standard catalog products are built to order and ready-to-ship in 5 days or less. Modified and custom products ship weeks ahead of the competition.



INNOVATIVE PRODUCTS

From standard catalog products... to modified products... to completely unique custom products, Tolomatic designs and builds the best solutions for your challenging applications.

SIZING & SELECTION SOFTWARE

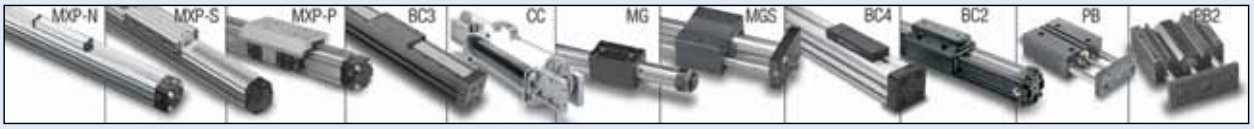
Windows® compatible, downloadable from our website – FREE – the best tool of its kind on the market! Product selection has never been easier.

3D MODELS & 2D DRAWINGS AVAILABLE ON THE WEB

Easy to access CAD files are available in many popular formats.

ALSO CONSIDER THESE OTHER TOLOMATIC PRODUCTS:

PNEUMATIC PRODUCTS



RODLESS CYLINDERS: Band Cylinders, Cable Cylinders, MAGNETICALLY COUPLED CYLINDERS/SLIDES; GUIDED ROD CYLINDER SLIDES
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