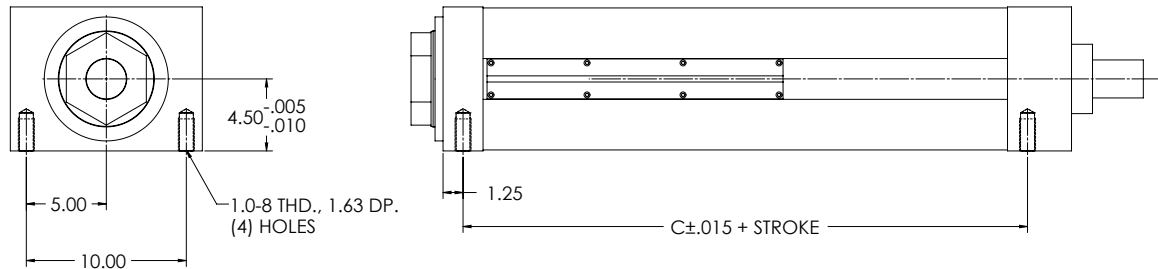


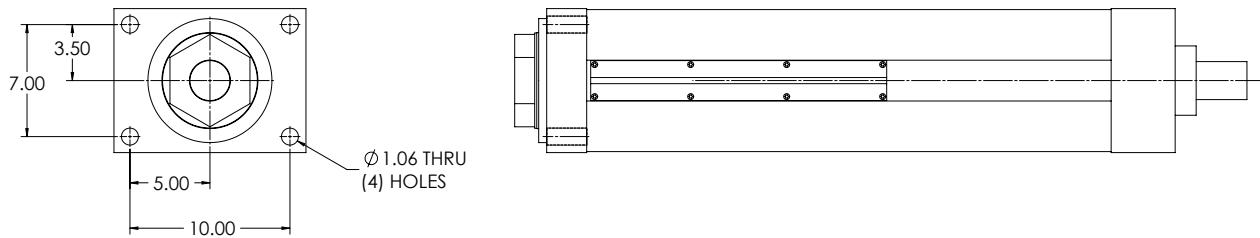
DIMENSIONED DRAWINGS FOR THE ELIMINATOR SD ACTUATOR

Dimensions are in inches and are subject to change without notice.

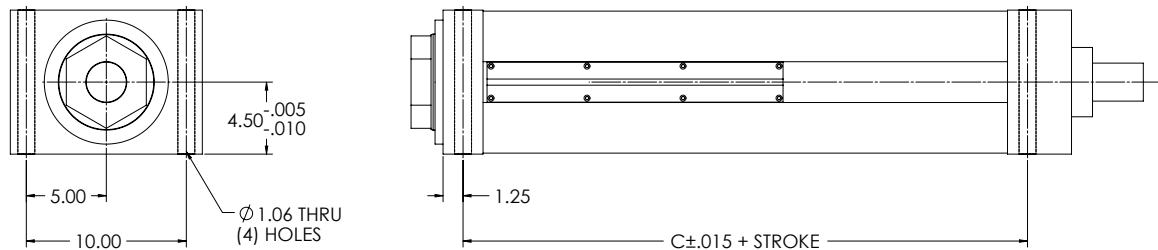
Bottom Mount Dimensions



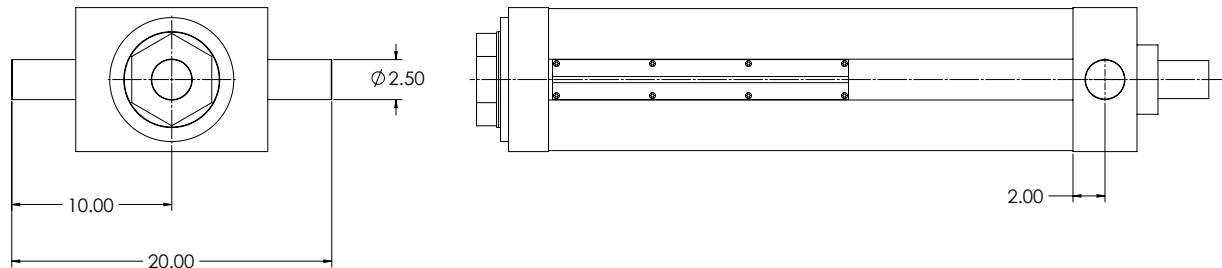
Front Flange Dimensions



Foot Mount Dimensions



Trunnion Mount Dimensions



SD Mounting Dimensions (Bottom Mount, Front Flange, Foot Mount, Trunnion Mount)

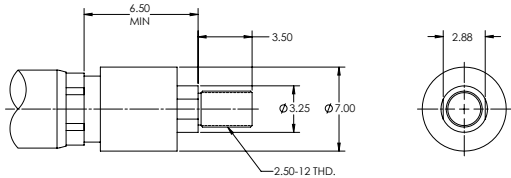
Model	C
SD930	23.28
SD948	23.28
SD966	23.28
SD999	25.88

DIMENSIONED DRAWINGS FOR THE ELIMINATOR SD ACTUATOR

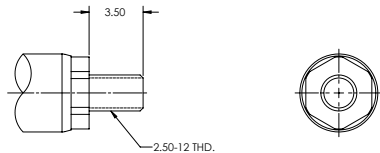
Dimensions are in inches and are subject to change without notice.

Rod End Options

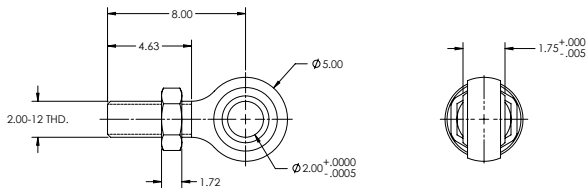
Self-Aligning Coupler



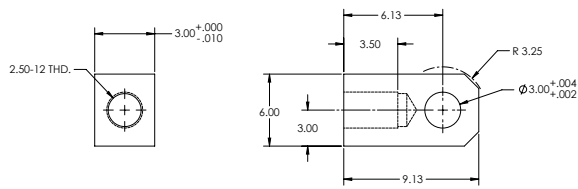
Male Thread



Spherical Rod Eye



Female Eye



ORDERING GUIDE FOR THE ELIMINATOR SD ACTUATOR

Ordering Information

S	D				-			-			-			-					
Base No. (Capacity) SD930 (30,000 lbf) SD948 (48,000 lbf) SD966 (66,000 lbf) SD999 (100,000 lbf)					Unit Mounting Option MB: Bottom Mount FF: Front Flange MF: Foot Mount TR: Rear Trunnion*					Motor Position 1, 2, 3, 4 0 = In-Line 					N.C. Switch Qty 0, 1, 2, 3, etc.				
Std. Stroke Length 06: 6 in. 12: 12 in. 18: 18 in. 24: 24 in. 30: 30 in. 36: 36 in. 42: 42 in. 48: 48 in.					Rod End Option E: Female Eye F: Female Thread A: Self-Aligning Coupler M: Male Thread S: Spherical Rod Eye					Gearbelt Reduction 00: In-Line/Direct Coupled 10: 1:1 20: 2:1					N.O. Switch Qty 0, 1, 2, 3, etc.				
					Configuration L: In-Line U: Parallel Offset					Switch Type A: Hall Sourcing PNP B: Hall Sinking NPN C: Reed D: Switch Tracks / No Switches X: Solid Cover / No Switches									

For custom stroke lengths, contact EDrive.

* Rear Trunnion not available for SD999

Glossary

Alignment

Alignment of the actuator, parallel to the line of motion, is critical. Also, the end effector connection must be designed to prevent any transfer of bending moments back to the actuator.

B10 Life

B10 Life is expressed in total revolutions or inches of travel a properly maintained ball screw will operate under a rated load. 90% of all systems operated at this rated load will meet or exceed this rating. Although 10% may not reach a million inches, 50% could exceed 5 million inches.

Life under load (B10 life) is predictable; severe load applications can generally be compensated for by providing additional capacity.

Contamination

Contamination of the ball screw system is the leading cause of premature failure. Providing a continuous, low pressure, air purge to the system is a good way to ensure clean operation.

Force

Force, when calculating the required force, consider the force to accelerate the mass as well as the force to overcome the friction and the applied force. For sizing the system, consider the maximum force and duration. For evaluating life under varying loads, calculate the root mean cube equivalent load which weights the different load levels by the typical length traveled under that load.

Impact

Impact is unacceptable to ball screws as well as anti-friction bearings. Severely shortened life and/or catastrophic failure are the results. Avoid impact or provide a mechanical system to buffer the ball screw assembly from shock loads.

IP69K Rating

IP69K is the highest rating available on the internationally recognized scale for ingress protection (IP) against solids and liquids. EDrive SP, SPL and VP actuators have undergone rigorous testing to satisfy these IP69K standards making them ideal for food processing and medical applications requiring high-pressure and high-temperature washdown.



Linear Velocity

Linear velocity is limited by (1): the maximum ball screw rpm without “whipping” of the ball screw shaft; (2) critical speeds for the ball nut assembly (beyond which the motion of the balls becomes erratic and performance life suffers).

Lubrication

Good lubrication is essential. Do not mix lubricants. Refer to the Service Manual to determine the correct lubricant. Important: Oil systems are shipped dry. Lubrication lines must be connected, and the reservoir and all connections filled prior to operating the actuator. Grease systems come pre-lubricated but should be periodically inspected (if applicable) to ensure adequate lubricant to critical areas of the ball screw.

Maximum Acceleration

Maximum acceleration of ball screw assembly is approximately 32 ft/s², above this level, unit life becomes shorter and less predictable.

Side Loads

Side loads are undesirable. Almost any force not coaxial to the actuator compromises potential life.

Stiffness

System stiffness is an essential attribute of high accuracy positioning systems. Specifying 0.0005 inch positioning accuracy and repeatability without considering spring rate may result in disappointing performance. For precision light duty applications a spring constant of 1 x 10⁶ lbs/in is acceptable and a range of 3 x 10⁶ to 6 x 10⁶ lbs/in may be necessary for higher load applications.

Technical FAQ

How do I install/tension the gearbelt and how tight should it be?

Belt tensioning procedures vary from product to product. Please refer to the Service Information section of the website for more specific information.

How do I lubricate my actuator?

Lubrication methods and the choice of lubricant may vary from product to product. Please refer to the Service Information section of our website for this information.

What is the rated operating temperature range?

The normal rated operating temperature range for most EDrive actuators is -20°F to 175°F. For help specifying actuators which require operation outside of this temperature range contact sales@joycedayton.com or speak with our customer service team at (937) 294-6261.





What does B10 Life mean?

B10 life is expressed in total revolutions or inches of travel a properly maintained ball screw will operate under a rated load. 90% of all systems operated at this rated load will meet or exceed this rating. Although 10% may not reach a million inches, 50% could exceed 5 million inches. Life under load (B10 life) is predictable; severe load applications can generally be compensated for by providing additional capacity.

Does EDrive offer an integrated load cell option for actuators?

Yes. EDrive offers an Integrated Load Cell option for many of our products. This option combines force measurement with heavy-duty and precise linear motion. It provides a clean, simple, rugged, and economical capability to directly and continuously monitor axial force while simultaneously applying that force. Examples of products with the Load Cell option include HDL and SPL actuators.

IP69K Rating - What does it mean and why is it preferred?

IP69K indicates the highest rating available on the internationally recognized scale for classifying ingress protection against dust and high-temperature, high-pressure liquids. Products with IP69K protection are ideal for use in industries such as Food Processing and Medical Equipment applications where equipment must routinely withstand rigorous washdown procedures.

How to Select an Actuator

Selection Guidelines

1. Define the Motion Profile

Gather all the necessary application details including application stroke length, loads and forces, total cycle time, and duty cycle to define the required velocities in forces in each of the motion profile segments. The EDrive application worksheet can be used to gather this necessary information.

2. Calculate Equivalent Load

Using the segment stroke lengths and forces, calculate the equivalent load of the application using the formula found in the “How to Calculate Equivalent Load” section.

3. Select Actuator Size

Select an actuator size capable of the required stroke, peak linear velocity, and peak force from the application requirements. Verify that the applications peak linear velocity as well as peak force do not exceed the max values of the size actuator selected. Standard stroke lengths are available in increments of 6 inches, but in-between lengths are available upon request.

4. Calculate B10 Life

Using the calculated equivalent load, determine the estimated B10 life of the selected actuator size from the Life Vs. Load charts. It is possible the actuator selection may need to be adjusted to achieve a desirable B10 life.

5. Environmental Considerations

Determine the environmental requirements of the application. If ingress protection against dust and/or water is needed, select a series actuator with a higher IP rating. If the ambient temperature of the application is not within the operating range of the selected actuator, contact EDrive.

6. Select a Motor Configuration

Select a parallel offset or inline motor mounting configuration. If parallel offset, select between a standard 1:1 or 2:1 reduction ratio.

7. Establish Total Torque Requirements

Total system inertia values can be found in the product spec charts. Calculate the peak and the RMS torque and speeds required from the motor for the motion profile.

8. Select a Motor

Use the calculated torque and speed values to select a motor and reduction ratio (if applicable) to select an appropriate motor for the application. The motor part number is to be included at the end of the EDrive part number string.

9. Select Actuator Mounting and Rod End Options

Actuator mounting and rod end options can be found in the dimensioned drawings section for each product line. When selecting a trunnion mounted actuator, select either front trunnion or rear trunnion as the actuator will not come equipped with both. For custom mounting options contact EDrive.

10. Select Optional Position Sensors

The 6 standard sensor options to choose from include reed, PNP, and NPN switch types all offered as normally open or normally closed with 6 foot flying leads.

11. Configure Part Number

Ordering guides are found with each product. Based upon all of the selections made in the previous steps, configure the complete actuator part number to send to EDrive for quoting.

Calculations

Equivalent Load

The equivalent load is the average force over the working stroke, weighted proportionately to the distance traveled. For constant force loads, the equivalent load is the same as the typical or average load. Where forces vary due to gravity, angle of actuator, acceleration and deceleration, friction, and changing dynamic loads at different positions, it is best to determine the equivalent load in order to most accurately predict the B10 life of the actuator.

$$F_e = \sqrt[3]{\frac{L_1(F_1)^3 + L_2(F_2)^3 + L_3(F_3)^3 + L_4(F_4)^3 + \dots + L_n(F_n)^3}{L}}$$

F_e = Equivalent Load (lbf)

F_n = Calculated force for segment "n" (lbf)

L_n = Travel distance for segment "n" (in)

L = The total travel of all segments (in)

Drive Torque

Edrive considers its ball screw actuators to be 90% efficient. When a 2:1 belt ratio is used, the required input torque is halved. Due to variations in actuator efficiency, it is recommended when sizing a motor to have some excess torque.

$$T_d = \frac{F \times L}{2 \pi \epsilon}$$

T_d = Drive Torque at Ball Screw (in-lb)

F = Output Force (lbf)

L = Ball Screw Lead (in)

ϵ = Efficiency

Holding Torque

Due to the high efficiency of the ball screw, torque is required to hold a stationary load. Otherwise the actuator will freely backdrive. If holding position without power to the motor is required, a motor brake is recommended. When a 2:1 belt ratio is used, the required holding torque is halved. Due to variations in actuator efficiency, it is recommended when sizing a motor to have some excess torque.

$$T_h = \frac{F \times L \times \epsilon}{2 \pi}$$

T_h = Holding Torque at Ball Screw (in-lb)

F = Output Force (lbf)

L = Ball Screw Lead (in)

ϵ = Efficiency

Drive RPM

When a 2:1 belt ratio is used, the required input RPM is doubled.

$$RPM = \frac{V \times 60}{L}$$

RPM = Rotations Per Minute

V = Linear Velocity of Actuator (in/sec)

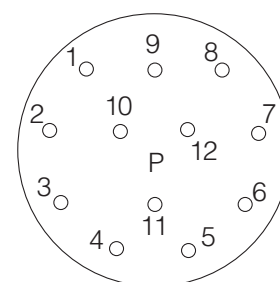
L = Screw Lead (in)

Wiring Diagrams

FB6402 HD Load Cell Wiring Diagram

Rated Output, Typical	2 mV/V
Combined error	0.25% F.S.
Non-Repeatability	0.05% F.S.
Zero Balance	1% R.O.
Temperature Range Compensated	50°F to 120°F
Temperature Effect, Output	0.0008% of load / °F
Temperature Effects, Zero Balance	0.02% / R.O. / °F
Bridge Impedance, Typical	700 ohms
Excitation Voltage, Typical	10 VDC or VAC rms
Excitation Voltage, Maximum	15 VDC or VAC rms
Insulation resistance	>5,000 megohms at 50 VDC
Overload, Safe	150% over Capacity
Overload, Ultimate	200% over Capacity
Deflection at Rated Capacity, Approx.	0.0015 inch
Construction	Tool Steel

Cable Pin Configuration	Receptacle Type		Load Cell Cable	
1	Green	+ Excitation	Gray	+ Excitation
2	Black	- Excitation	Gray stripe	- Excitation
3	White	+ Signal	Orange	+ Output
4	Red	- Signal	Orange stripe	- Output

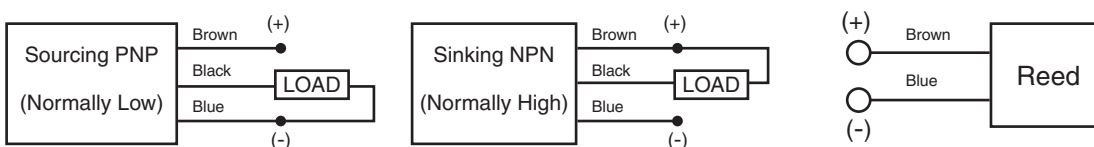


View of
Receptacle

FB6422 Hall Effect Reed Limit Switches

Actuator Limit Switch

Supplied with Hall Effect or Reed type switches which are for “home” sensing and over-travel protection only. They should not be used to position the actuator.



	Configuration	State	Voltage (VDC Typ.)	Current (mA Max.)	Type	Part Number
A	Hall Effect, Sourcing	N.O.	5-24	500	PNP	MLE-K06
A	Hall Effect, Sourcing	N.C.	5-24	500	PNP	MLE-Q06
B	Hall Effect, Sinking	N.O.	5-24	500	NPN	MLE-G06
B	Hall Effect, Sinking	N.C.	5-24	500	NPN	MLE-J06

	Configuration	State	Contact Rating (VA)	Switching Voltage (Max.) V(AC/DC)	Switching Current (Max.) (mA)	Carry Current (Max.)	Part Number
C	Reed	N.O.	10	100	500	1 A	MLE-D06
C	Reed	N.C.	3	30	200	500 mA	MLE-T06

PVC Jacket	PVC Jacket, 24 AWG, 105 strand, (+) Brown, (-) Blue, (load) Black
Length	6 feet
Switch Response	0.01 mS
Operating Temperature	-10 to 60 degrees C
Shock Resistance	50 g. Hall, 10 g. Reed
Vibration Resistance	30 g.
Magnetic Field Required	40 gauss minimum, no upper limit



For standard, or fully customized, electric actuators, look to EDrive Actuators. As part of the Joyce/Dayton family, we deliver linear motion solutions you can trust. Contact our experienced staff today!



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joycedayton.com/edrive

