Soft Shift® Solenoids

Duty Cycle

Duty cycle is determined by: ON time/(ON + OFF time).

For example: a solenoid is actuated for 30 seconds, then off for 90 seconds. *30 sec ON / (30 Sec ON + 90 sec OFF) = 30/120 = 1/4 or 25% duty cycle.*

Saia-Burgess Soft Shift solenoids are rated for various duty cycles ranging from continuous to 10% duty.

Note that maximum ON time for a particular application can be a factor which overrides the duty cycle rating. For example, at 25% duty cycle, the maximum ON time for a given Soft Shift solenoid is 36 seconds. If, however, the solenoid is operated at a cycle rate which enables the unit to return to ambient temperature between ON cycles, then the maximum ON time is extended somewhat. In the above example, this extended ON time is 44 seconds. Maximum ON time ratings are listed on the individual model specification pages.

Life

When selecting a Soft Shift solenoid, as with any other solenoid style, it is important to consider the effects of heat on life. When used with a constant voltage supply, an increase in coil temperature reduces the work output and the life of the unit. Standard life is 10,000,000 operations.

Power Requirements

Voltage applied to the solenoid must be matched to the coil wire size for proper operation. Solenoids are cataloged in coil awgs ranging from #23 up to #35 to accommodate your input power. Refer to the individual model specification pages for coil wire awg recommendations. Many other coil awg sizes are available. Please feel free to contact our application engineering department for availability.

Applications

Applications for the Soft Shift solenoid include office machinery, medical equipment, keypad testing, locking devices, motion control, hot water solar controllers, robotics, air dampers, optical shutter equipment, and a variety of other industrial applications as well as military uses.

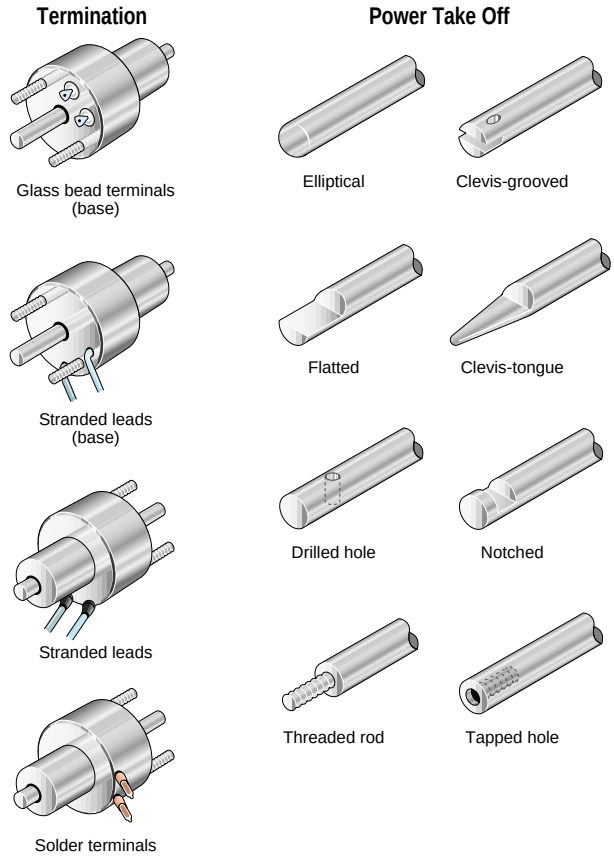
Our catalog versions are typically designed to utilize the maximum possible stroke capability for each size. Also, the force curves are essentially horizontal. This permits use in applications where quiet operation is a primary concern or where the load to be moved is sensitive to vibration or shock.

A medical fluid analyzer is a good example. The tubes through which fluids are flowing cannot withstand great shock. Excessive shock could cause breakage of the tubes which could then cause a leak of an infectious fluid, for example.

Soft Shift solenoids also contain cushion washers to aid quiet, shock-free operation. In addition, voltage can be applied slowly to take advantage of a slow energizing capability. The de-energizing part of the cycle is also controllable.

A Soft Shift solenoid is also a good choice for long life applications in that its two bearings de-sensitize the unit to side loading. The closed construction also keeps out contaminants, which makes it ideal for rugged applications such as paper mills (pictured below).

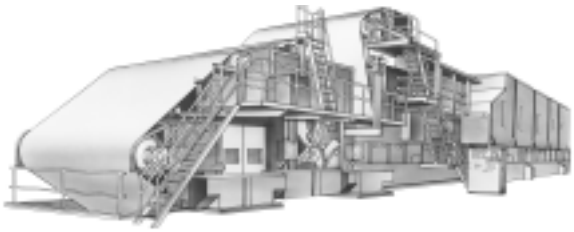
Typical Examples of Custom Features



Options and Modified Designs

Even though many solenoid designs are in stock, our customers often require a product with unique features or performance capabilities. In fact, almost 80% of all solenoids that we make are either modified or custom built to meet our customers' exact application requirements.

So, if you don't find what you're looking for in the catalog, give us a call to discuss your needs with one of our application engineers.



Soft Shift® Selection

Soft Shift solenoids are available in five sizes. Use the selection overview chart to determine which size offers the desired performance and mechanical specifications. Refer to the individual size specification pages for complete performance and mechanical data.

Soft Shift Selection Overview

Size	Package Dimensions (in) Dia.	Length	Maximum Stroke in ± 0.03	Force (lbs) @ Maximum Stroke and Specified Duty Cycle 100%	50%	25%	10%
2EP	1.125	0.996	0.16	1.0	1.4	2.0	3.8
3EP	1.312	1.232	0.25	1.0	1.9	2.3	4.3
4EP	1.562	1.471	0.30	2.0	3.0	4.3	7.5
5EP	1.875	1.935	0.40	3.0	4.5	7.0	12.5
6EP	2.250	2.214	0.42	7.0	9.6	16.0	29.5

All data is at 20°C coil temperature. Force outputs degrade with elevated temperatures.

How to Use Soft Shift Performance Charts

1. Select one of the four columns which provides the appropriate duty cycle. (For example 50%.)

2. Reading down this column provides a variety of performance and electrical data including maximum on time, watts, and amp turns.

3. Following down the column further into the VDC ratings, select the voltage which most closely matches your supply voltage. (For example, 12.5 for a 12 VDC power supply.)

4. Read across (to the left) to select the awg suffix to complete the part number when ordering. (In this example using our 2EP chart, 30 awg is required, thus to order, specify: 191995-030.

Performance

Maximum Duty Cycle	100%	50%	25%	10%
Maximum ON Time (sec) when pulsed continuously	∞	100	36	7
Maximum ON Time (sec) for single pulse	∞	162	44	8
Watts (@ 20°C)	7	14	28	70
Ampere Turns (@ 20°C)	425	602	849	1350

Coil Data

awg (0XX)	Resistance (@20°C)	# Turns	VDC (Nom)	VDC (Nom)	VDC (Nom)	VDC (Nom)
24	0.68	130	2.2	3.2	4.5	7.1
25	1.16	174	2.8	4.0	5.7	9.0
26	1.96	231	3.6	5.1	7.2	11.5
27	3.16	296	4.5	6.4	9.0	14.4
28	5.10	378	5.7	8.1	11.5	18.2
29	6.94	423	7.0	9.9	13.9	22.0
30	11.03	530	8.8	12.5	17.7	28.0
31	16.85	649	11.0	15.6	22.0	35.0
32	28.15	858	13.9	19.8	28.0	44.0
33	42.75	1036	17.5	25.0	35.0	56.0
34	69.56	1312	23.0	32.0	45.0	72.0
35	112.00	1674	29.0	40.0	57.0	91.0

Soft Shift® Size 5EP

Part Number: 193015-0XX

Performance

Maximum Duty Cycle	100%	50%	25%	10%
Maximum ON Time (sec) when pulsed continuously[1]	∞	100	36	10
Maximum ON Time (sec) for single pulse[2]	∞	160	44	13
Watts (@ 20°C)	21	42	84	210
Ampere Turns (@ 20°C)	1015	1440	2030	3210

Coil Data

awg (0XX)[3]	Resistance (@20°C)	# Turns[4]	VDC (Nom)	VDC (Nom)	VDC (Nom)	VDC (Nom)
23	2.70	384	7.2	10.1	14.3	23.0
24	4.30	486	9.0	12.7	18.0	28.0
25	6.66	590	11.5	16.2	23.0	36.0
26	10.30	737	14.0	20.0	28.0	44.0
27	15.70	900	17.7	25.0	35.0	56.0
28	26.60	1190	23.0	32.0	45.0	72.0
29	38.00	1380	28.0	40.0	56.0	89.0
30	62.10	1768	36.0	51.0	71.0	113.0
31	96.10	2166	45.0	64.0	90.0	143.0
32	157.00	2816	57.0	80.0	113.0	179.0
33	241.00	3432	71.0	101.0	143.0	226.0

[1] Continuously pulsed at stated watts and duty cycle

[2] Single pulse at stated watts (with coil at ambient room temperature 20°C)

[3] Other coil awg sizes available — please consult factory

[4] Reference number of turns

Specifications

Stroke	0.400 ± 0.030 inches (10.16 ± 0.762 mm)
Dielectric Strength	1000 VRMS (23 awg); 1200 VRMS (24-33 awg)
Recommended Minimum Heat Sink	Maximum watts dissipated by solenoid are based on an unrestricted flow of air at 20°C, with solenoid mounted on the equivalent of an aluminum plate measuring 7½" square by ⅛" thick
Coil Resistance	±5% tolerance on all coil awg
Spring Rate	4.41 lb/in; 0.45 lb ±30% preload reference
Weight	12 oz (340.2 gms)
Dimensions	Ø1.875" x 1.935" (See page D10)

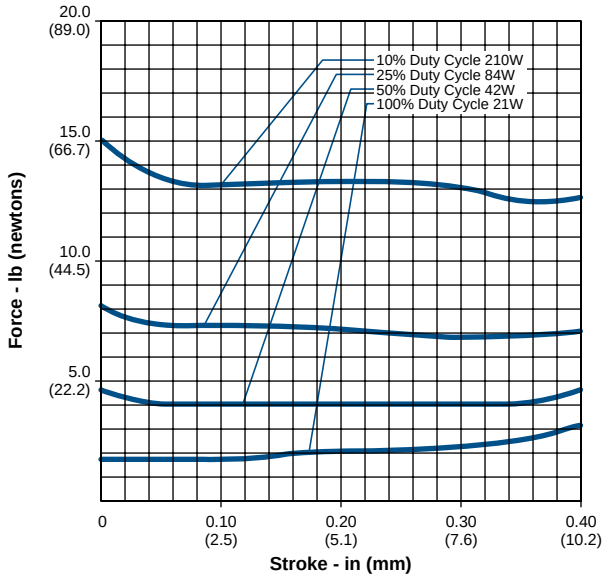
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 35 VDC, specify 193015-027).

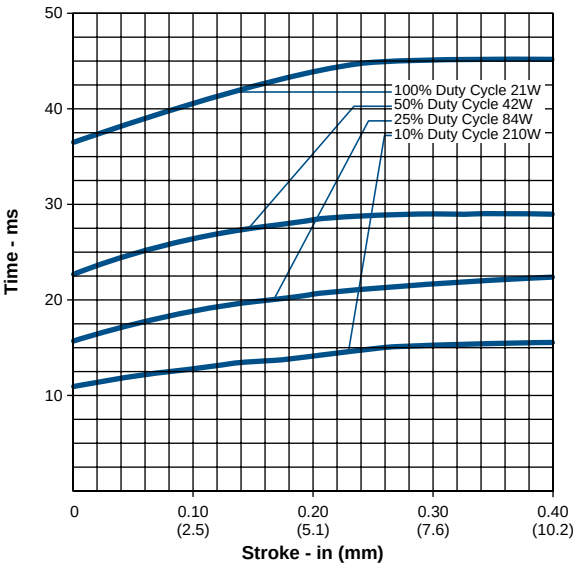
Please see www.ledex.com (click on Stock Products tab) for our list of stock products available through our North American distributors.

All specifications subject to change without notice.

Size 5EP — Typical Force @ 20°C



Size 5EP — Typical Speed @ No Load, 20°C



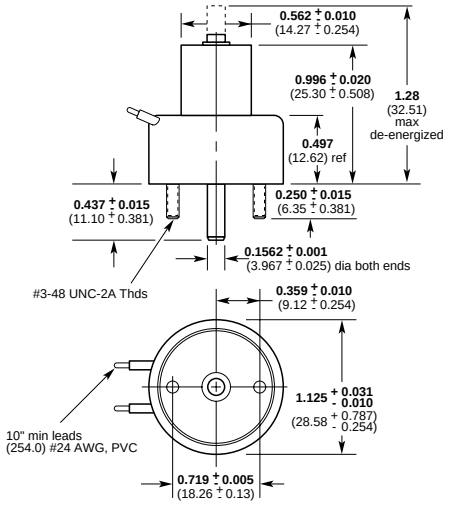
Force values for reference only.

Soft Shift® Dimensions

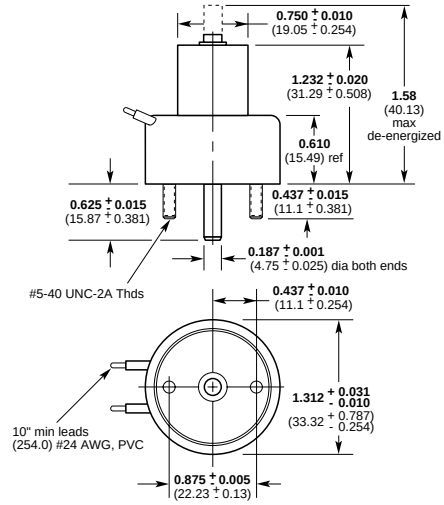
inches (mm)

All solenoids are illustrated in energized state

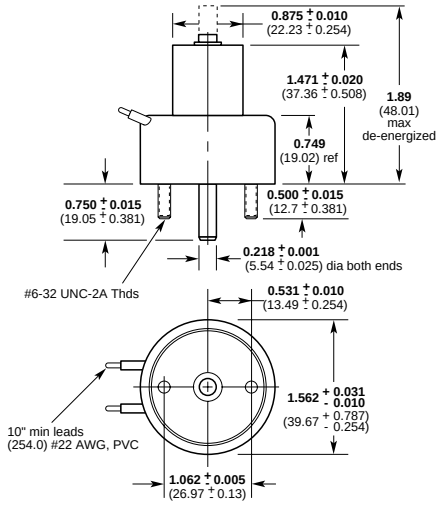
Size 2EP



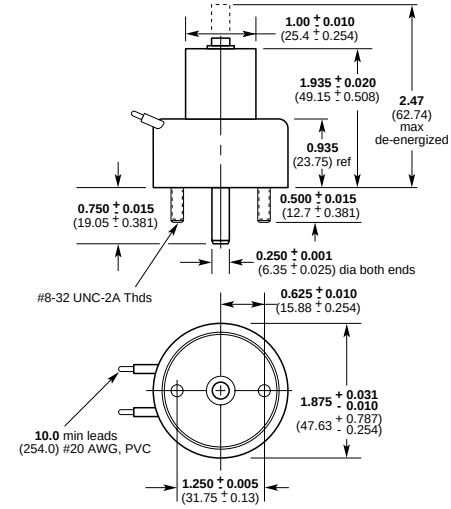
Size 3EP



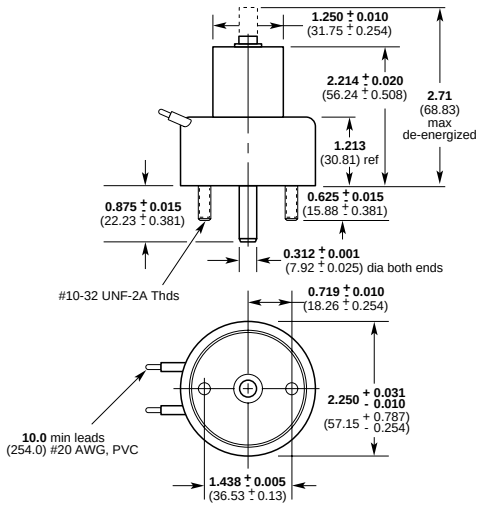
Size 4EP



Size 5EP



Size 6EP



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