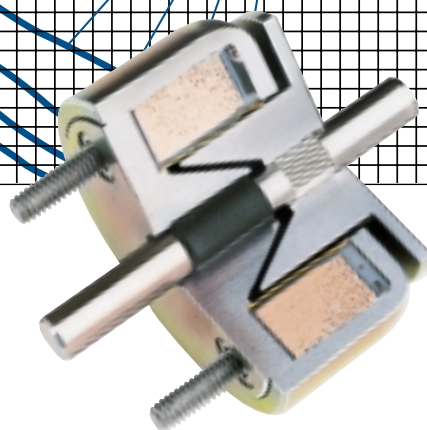
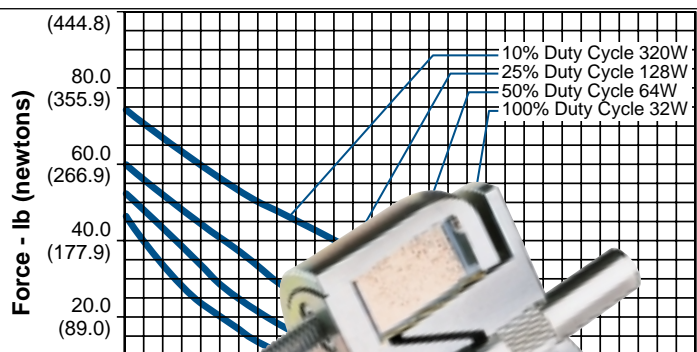


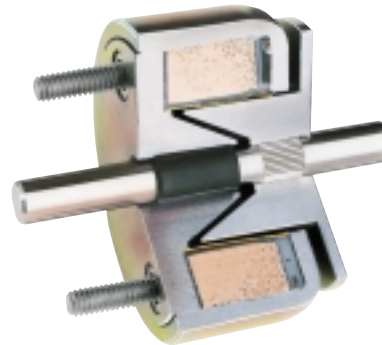
Ledex® Low Profile Linear Solenoids



Ledex® Low Profile Solenoids



- Linear actuation
- Space-saving, low-profile configuration
- Ideal for high force, short stroke applications
- Forces to 190 lbs.
- Stroke lengths to 0.7 inches



All catalog products manufactured after April 1, 2006 are RoHS Compliant

The low profile shape, besides contributing to smaller size, optimizes the magnetic flux paths for maximum force versus stroke characteristics. The construction of the plunger assembly provides an auxiliary flux path which permits a significant increase in force. The low profile solenoid construction not only provides long life, but also provides a rugged design for both military and commercial applications.

Conical Face vs. Flat Face Plunger Design

Conical-faced designs extend the useful range of a solenoid to provide higher forces for strokes typically over 0.060 inches. The pole surface area is greater and the distance between the tapered cone faces is approximately one-half that of the gap between the land faces (for 30° angles), providing the effect of a closer air gap.

While some of the force component is lost because

the force vector is not parallel with the plunger motion, the shorter gap and higher flux density combine to provide more output force for longer strokes.

For shorter strokes, the magnetic flux density increases and causes the iron to saturate rapidly as the poles move closer, thus reducing the efficiency of the conical-faced design. At this point, the flat-faced plunger is more efficient.

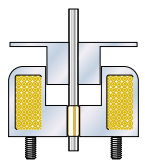
The main advantage of the flat-faced pole over the conical is that the full component of force is usable because the force vector is parallel with the pole motion.

Applications

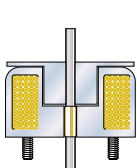
The reliability and high performance of Low Profile solenoids make them an ideal choice for applications in which consistent, reliable operation is critical.

- Pumps
- Machine tools
- Packaging machines
- Cranes
- Instruments
- Flow controls
- Trucks and buses
- Computer peripherals

Flat Face: Higher efficiency for shorter strokes

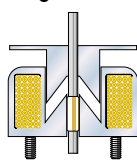


De-Energized

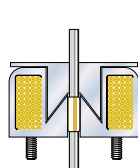


Energized

Conical Face: Higher force for longer strokes



De-Energized



Energized

Ledex® Low Profile Solenoids

Why Low Profile solenoids provide such high force and rapid response.

A key to the efficiency and compact form factor of the low profile solenoid is our special precision coil-winding process. With maximum copper packed into the allowable space, each solenoid develops tremendous force for its size and power input. The low profile form, in addition to contributing to smaller size, permits maximum pole face surface area for the magnetic flux.

Another factor that contributes to high

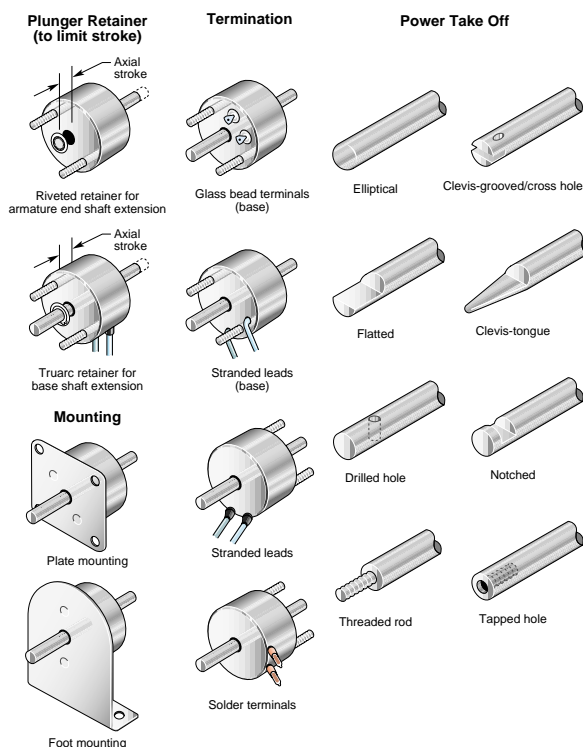
efficiency is the additional iron surface on the external portion of the plunger; it provides an auxiliary flux path and a significant increase in force.

The force is also affected by other interrelated features, such as the length of the iron path, the magnetic saturation properties of the solenoid case and plunger, and the area and shape of the pole pieces.

The enclosed construction of the solenoid not only provides an iron path with minimum losses at the ring gap, but also provides a rugged design for critical environment applications

Typical Examples of Custom Features

Even though many solenoid designs are in stock, our customers often require a product with unique features or performance capabilities. 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.



Design Considerations

Performance Curves

The performance curves in this section serve as guides to determine the solenoid size needed to produce a desired force at a given stroke, duty cycle, and power source. All curves were developed under the following standard test conditions: ambient temperature of 20°C, 65% relative humidity.

Starting Force

When determining an application's force requirement, apply a 1.5 safety factor. For example: a load requiring 4.5 lb of force should utilize a solenoid providing 4.5 x 1.5 or 6.75 lb of force.

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.

$30 \text{ sec ON} / (30 \text{ Sec ON} + 90 \text{ sec OFF}) = 30/120 = 1/4 \text{ or } 25\% \text{ duty cycle.}$

Ledex Low Profile 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 Ledex 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 Low Profile solenoid, as with any other solenoid style, it is important to consider factors that will affect the life of the unit. Heat, side-loading, stroke and operating environment all play an important role in determining the life you can expect in your application.

A simple, yet often overlooked method to improve Low Profile solenoid life is to minimize the side load. Maximum life can be achieved by mounting Low Profile solenoids so that the shaft travels along a vertical plane. Keeping the stroke as short as possible will also improve life.

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 #25 up to #38 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.

Ledex® Low Profile Selection

Low Profile solenoids are available in nine sizes. Use the selection 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.

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Low Profile Selection Overview

| Size* | Package Dimensions | | Max Stroke (in) | Nominal Stroke (in) | Force (lbs) @ Nominal Stroke at Specified Duty Cycle @ 20°C | | | |
|-------|--------------------|--------|-----------------|---------------------|---|-------|-------|--------|
| | Dia. | Length | | | 100% | 50% | 25% | 10% |
| OEC | 0.750 | 0.500 | 0.150 | 0.060 | 0.19 | 0.44 | 0.94 | 2.06 |
| 1EC | 1.000 | 0.530 | 0.240 | 0.080 | 0.25 | 0.50 | 1.25 | 3.20 |
| 2EF | 1.125 | 0.580 | 0.075 | 0.030 | 2.00 | 3.50 | 7.00 | 13.50 |
| 2EC | 1.125 | 0.580 | 0.240 | 0.100 | 0.25 | 1.00 | 2.00 | 3.75 |
| 3EF | 1.312 | 0.690 | 0.075 | 0.040 | 2.50 | 5.00 | 11.00 | 20.00 |
| 3EC | 1.312 | 0.690 | 0.300 | 0.120 | 0.80 | 2.00 | 3.80 | 5.60 |
| 4EF | 1.562 | 0.835 | 0.120 | 0.060 | 3.00 | 6.50 | 12.00 | 25.00 |
| 4EC | 1.562 | 0.835 | 0.250 | 0.150 | 1.00 | 2.25 | 5.50 | 11.50 |
| 5SF | 1.875 | 0.880 | 0.140 | 0.080 | 3.00 | 9.50 | 17.00 | 39.00 |
| 5EC | 1.875 | 1.035 | 0.400 | 0.200 | 2.50 | 5.00 | 10.00 | 21.00 |
| 6SF | 2.250 | 1.145 | 0.180 | 0.080 | 10.00 | 20.00 | 40.00 | 80.00 |
| 6EC | 2.250 | 1.330 | 0.400 | 0.200 | 6.00 | 13.00 | 24.00 | 43.00 |
| 7EC | 2.750 | 1.780 | 0.700 | 0.300 | 9.00 | 18.00 | 33.00 | 54.00 |
| 8EC | 3.375 | 2.165 | 0.700 | 0.300 | 27.00 | 52.00 | 90.00 | 145.00 |

All data is at 20°C coil temperature. Force outputs degrade with elevated temperatures.
* EC sizes have conical face plungers, EF and SF sizes have flat face plungers.

All specifications subject to change without notice.

How to Use Low Profile 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, 8.9 for a 9 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 OEC chart, 32 awg is required, thus to order, specify: 174534-032.

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) | 4.5 | 9 | 18 | 45 |
| Ampere Turns (@ 20°C) | 28.5 | 403 | 570 | 901 |

Coil Data

| awg (0XX) | Resistance (@20°C) | # Turns | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|-----------|--------------------|---------|-----------|-----------|-----------|-----------|
| 26 | 0.50 | 90 | 1.6 | 2.3 | 3.2 | 5.1 |
| 27 | 0.97 | 136 | 2.0 | 2.8 | 3.9 | 6.3 |
| 28 | 1.33 | 152 | 2.6 | 3.7 | 5.1 | 8.1 |
| 29 | 2.40 | 215 | 3.2 | 4.4 | 6.2 | 9.9 |
| 30 | 3.29 | 240 | 4.1 | 5.7 | 8.0 | 12.7 |
| 31 | 5.61 | 324 | 5.0 | 7.1 | 9.9 | 15.8 |
| 32 | 9.09 | 420 | 6.3 | 8.9 | 12.4 | 19.7 |
| 33 | 14.95 | 544 | 8.0 | 11.3 | 15.7 | 25.0 |
| 34 | 24.06 | 684 | 10.2 | 14.4 | 20.0 | 32.0 |
| 35 | 37.10 | 840 | 12.8 | 18.1 | 25.0 | 40.0 |
| 36 | 58.51 | 1056 | 16.1 | 23.0 | 32.0 | 50.0 |
| 37 | 78.70 | 1109 | 19.8 | 28.0 | 39.0 | 62.0 |
| 38 | 123.00 | 1370 | 25.0 | 35.0 | 49.0 | 78.0 |

Ledex® Low Profile Size OEC — Push or Pull

Medium Stroke, Conical Face

Part Number: 174534-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

Performance

| | | | | |
|--|------|-----|-----|-----|
| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 100 | 36 | 7 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 162 | 44 | 8 |
| Watts (@ 20°C) | 4.5 | 9 | 18 | 45 |
| Ampere Turns (@ 20°C) | 285 | 403 | 570 | 901 |

Coil Data

| avg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|---------------------------|-----------------------|-------------------------|--------------|--------------|--------------|--------------|
| 26 | 0.50 | 90 | 1.6 | 2.3 | 3.2 | 5.1 |
| 27 | 0.97 | 136 | 2.0 | 2.8 | 3.9 | 6.3 |
| 28 | 1.33 | 152 | 2.6 | 3.7 | 5.1 | 8.1 |
| 29 | 2.40 | 215 | 3.2 | 4.4 | 6.2 | 9.9 |
| 30 | 3.29 | 240 | 4.1 | 5.7 | 8.0 | 12.7 |
| 31 | 5.61 | 324 | 5.0 | 7.1 | 9.9 | 15.8 |
| 32 | 9.09 | 420 | 6.3 | 8.9 | 12.4 | 19.7 |
| 33 | 14.95 | 544 | 8.0 | 11.3 | 15.7 | 25.0 |
| 34 | 24.06 | 684 | 10.2 | 14.4 | 20.0 | 32.0 |
| 35 | 37.10 | 840 | 12.8 | 18.1 | 25.0 | 40.0 |
| 36 | 58.51 | 1056 | 16.1 | 23.0 | 32.0 | 50.0 |
| 37 | 78.70 | 1109 | 19.8 | 28.0 | 39.0 | 62.0 |
| 38 | 123.00 | 1370 | 25.0 | 35.0 | 49.0 | 78.0 |

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

| | |
|-------------------------------|---|
| Dielectric Strength | 1000 VRMS |
| 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 2" square by 1/8" thick |
| Coil Resistance | ±10% tolerance on all coil awg sizes |
| Weight | 0.875 oz (24.8 gms) |
| Holding Force | 1.7 lb (7.6 N) @ 105°C |
| Dimensions | Ø0.750" x 0.500" L (See page F16) |

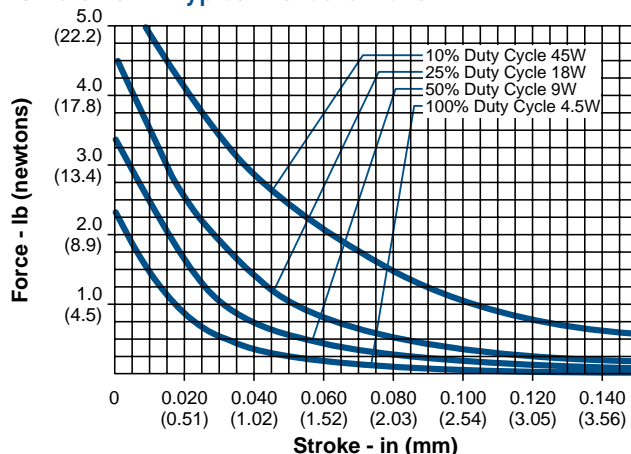
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 3.2 VDC, specify 174534-026).

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

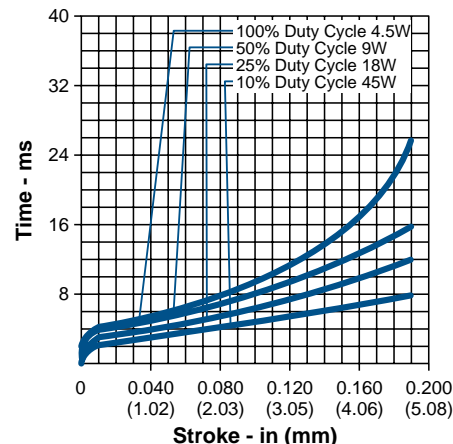
All specifications subject to change without notice.

Size OEC — Typical Force @ 20°C



Force values for reference only.

Size OEC — Typical Speed @ No Load, 20°C



Ledex® Low Profile Size 1EC — Push or Pull

Size 1EC Medium Stroke, Conical Face

Part Number: 123421-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

Performance

| | | | | |
|--|------|-----|-----|------|
| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 100 | 36 | 7 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 162 | 44 | 8 |
| Watts (@ 20°C) | 5 | 10 | 20 | 50 |
| Ampere Turns (@ 20°C) | 340 | 480 | 680 | 1075 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|---------------------------|-----------------------|-------------------------|--------------|--------------|--------------|--------------|
| 25 | 0.83 | 140 | 2.1 | 2.9 | 4.1 | 6.5 |
| 26 | 1.38 | 186 | 2.6 | 3.7 | 5.2 | 8.2 |
| 27 | 1.91 | 210 | 3.2 | 4.5 | 6.3 | 10.1 |
| 28 | 3.17 | 273 | 4.1 | 5.7 | 8.1 | 12.8 |
| 29 | 5.17 | 352 | 5.1 | 7.2 | 10.2 | 16.2 |
| 30 | 8.25 | 441 | 6.5 | 9.2 | 13.0 | 21.0 |
| 31 | 12.95 | 550 | 8.2 | 11.6 | 16.4 | 26.0 |
| 32 | 20.71 | 682 | 10.6 | 14.9 | 21.0 | 34.0 |
| 33 | 30.60 | 828 | 12.7 | 18.2 | 26.0 | 41.0 |
| 34 | 50.95 | 1078 | 16.5 | 23.0 | 33.0 | 52.0 |
| 35 | 83.92 | 1392 | 21.0 | 30.0 | 42.0 | 67.0 |
| 36 | 112.00 | 1500 | 26.0 | 37.0 | 52.0 | 83.0 |

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

| | |
|----------------------------------|---|
| Dielectric Strength | 1000 VRMS |
| 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 3" square by 1/8" thick |
| Coil Resistance | 25-35 awg, ±5%; 36 awg, ±10% |
| Weight | 1.50 oz (42.5 gms) |
| Holding Force | 5.4 lb (24.0 N) @ 105°C |
| Dimensions | Ø1.000" x 0.530" L (See page F16) |

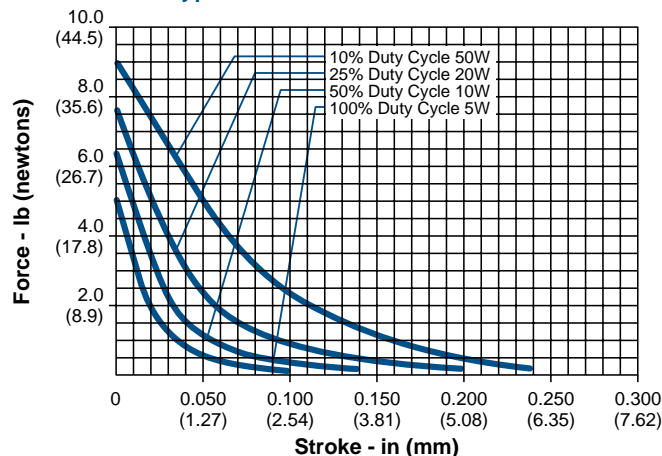
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 6.3 VDC, specify 124910-027).

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

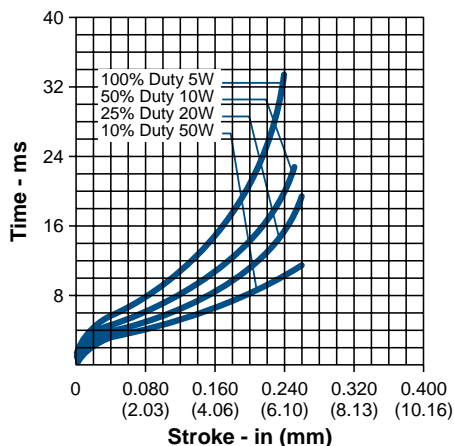
All specifications subject to change without notice.

Size 1EC — Typical Force @ 20°C



Force values for reference only.

Size 1EC— Typical Speed @ No Load, 20°C



Ledex® Low Profile Size 2EF/2EC — Push or Pull

Size 2EF Short Stroke, Flat Face

Part Number: 124911-0XX

Size 2EC Medium Stroke, Conical Face

Part Number: 123422-0XX

Performance

| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
|---|------|-----|-----|------|
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 100 | 36 | 7 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 162 | 44 | 8 |
| Watts (@ 20°C) | 7 | 14 | 28 | 70 |
| Ampere Turns (@ 20°C) | 425 | 602 | 849 | 1350 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | 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 |

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

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Specifications

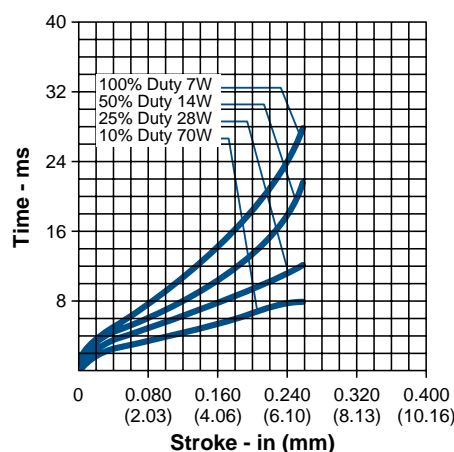
| | |
|---------------------|---|
| Dielectric Strength | 1000 VRMS |
| Recommended | Maximum watts dissipated by solenoid are based on an unrestricted flow of air at 20°C, with solenoid mounted on the equivalent of an aluminum plate measuring 3 3/8" square by 1/8" thick |
| Minimum Heat Sink | |
| Coil Resistance | 24-33 awg, ±5% |
| Weight | 2.25 oz (63.8 gms) |
| Holding Force 2EF | 12.0 lb (53.4 N) @ 105°C |
| Holding Force 2EC | 5.7 lb (25.4 N) @ 105°C |
| Dimensions | Ø1.125" x 0.580" L (See page F16) |

How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 9.0 VDC, specify 124911-027).

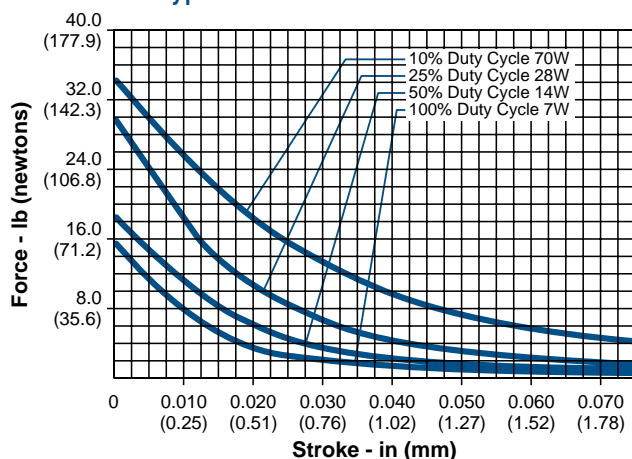
Please see www.ledex.com (click on Stock Products tab) for our list of stock products available through our North American distributors.

Size 2EF and 2EC – Typical Speed @ No Load, 20°C



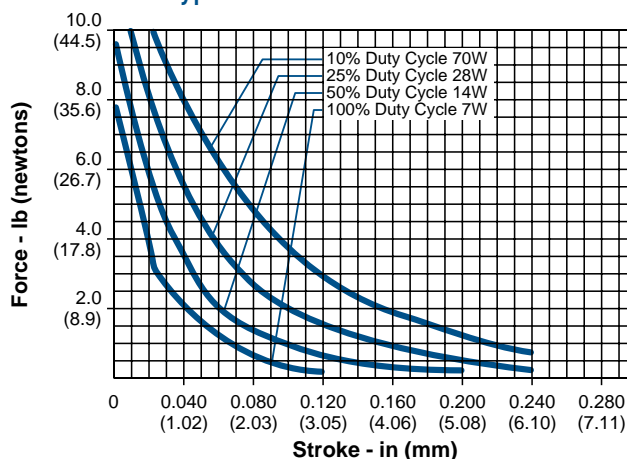
All specifications subject to change without notice.

Size 2EF— Typical Force @ 20°C



Force values for reference only.

Size 2EC — Typical Force @ 20°C



Ledex® Low Profile Size 3EF/3EC — Push or Pull

Size 3EF Short Stroke, Flat Face

Part Number: 124912-0XX

Size 3EC Medium Stroke, Conical Face

Part Number: 123423-0XX

Performance

| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
|---|------|-----|------|------|
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 100 | 36 | 8 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 162 | 44 | 9 |
| Watts (@ 20°C) | 9 | 18 | 36 | 90 |
| Ampere Turns (@ 20°C) | 535 | 756 | 1070 | 1690 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|------------------------|--------------------|----------------------|-----------|-----------|-----------|-----------|
| 23 | 0.70 | 145 | 2.6 | 3.7 | 5.2 | 8.2 |
| 24 | 1.18 | 192 | 3.3 | 4.6 | 6.6 | 10.4 |
| 25 | 1.97 | 252 | 4.2 | 5.9 | 8.4 | 13.2 |
| 26 | 3.26 | 328 | 5.3 | 7.5 | 10.6 | 16.8 |
| 27 | 5.04 | 405 | 6.7 | 9.4 | 13.3 | 21.0 |
| 28 | 8.02 | 510 | 8.4 | 11.9 | 16.8 | 27.0 |
| 29 | 12.21 | 627 | 10.4 | 14.7 | 21.0 | 33.0 |
| 30 | 19.20 | 780 | 13.2 | 18.6 | 26.0 | 42.0 |
| 31 | 31.84 | 1008 | 16.9 | 24.0 | 34.0 | 53.0 |
| 32 | 46.97 | 1215 | 21.0 | 29.0 | 41.0 | 65.0 |
| 33 | 75.30 | 1530 | 26.0 | 37.0 | 53.0 | 83.0 |

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

All catalog products manufactured after April 1, 2006 are RoHS Compliant

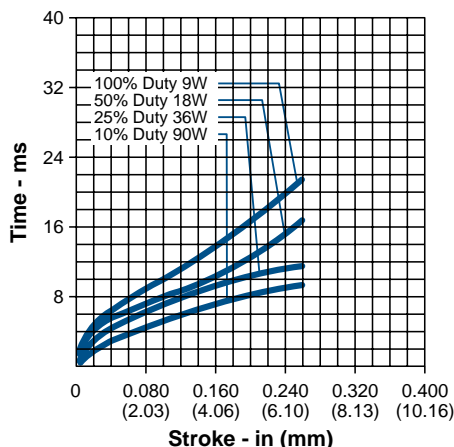
Specifications

| | |
|-------------------------------|---|
| Dielectric Strength | 23-27 awg, 1000 VRMS ; 28-33 awg, 1200 VRMS |
| 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 4 ⁵ / ₈ " square by 1/ ₈ " thick |
| Coil Resistance | 23-33 awg, ±5% |
| Weight | 3.75 oz (106.3 gms) |
| Holding Force 3EF | 26.0 lb (115.6 N) @ 105°C |
| Holding Force 3EC | 12.0 lb (53.4 N) @ 105°C |
| Dimensions | Ø1.312" x 0.690" L (See page F16) |

How to Order

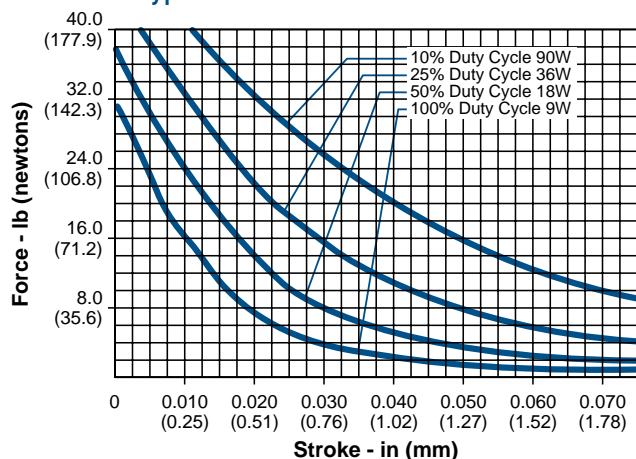
Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 13.3 VDC, specify 124912-027). Please see www.ledex.com (click on Stock Products tab) for our list of stock products available through our North American distributors.

Size 3EF and 3EC — Typical Speed @ No Load, 20°C



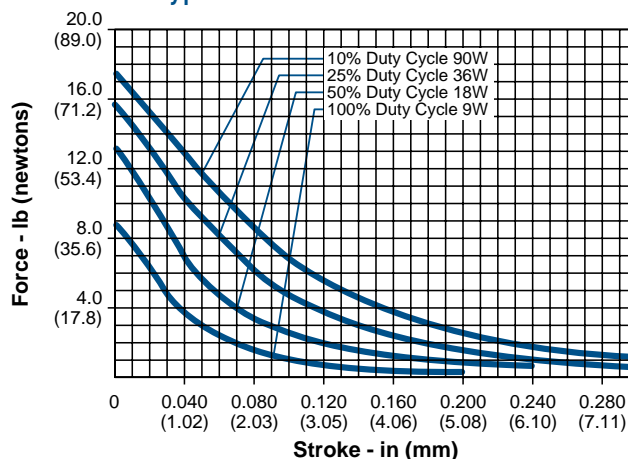
All specifications subject to change without notice.

Size 3EF— Typical Force @ 20°C



Force values for reference only.

Size 3EC— Typical Force @ 20°C



Ledex® Low Profile Size 4EF/4EC — Push or Pull

Size 4EF Short Stroke, Flat Face

Part Number: 129440-0XX

Size 4EC Medium Stroke, Conical Face

Part Number: 129409-0XX

Performance

| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
|---|------|------|------|------|
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 100 | 36 | 9 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 162 | 44 | 10 |
| Watts (@ 20°C) | 12.5 | 25 | 50 | 125 |
| Ampere Turns (@ 20°C) | 714 | 1000 | 1425 | 2250 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|------------------------|--------------------|----------------------|-----------|-----------|-----------|-----------|
| 23 | 1.59 | 266 | 4.3 | 6.0 | 8.5 | 13.4 |
| 24 | 2.20 | 301 | 5.2 | 7.3 | 10.4 | 16.4 |
| 25 | 3.54 | 384 | 6.6 | 9.2 | 13.1 | 21.0 |
| 26 | 5.67 | 486 | 8.3 | 11.7 | 16.6 | 26.0 |
| 27 | 8.76 | 600 | 10.4 | 14.6 | 21.0 | 33.0 |
| 28 | 13.80 | 748 | 13.2 | 18.5 | 26.0 | 42.0 |
| 29 | 22.60 | 975 | 16.6 | 23.0 | 33.0 | 52.0 |
| 30 | 34.80 | 1190 | 21.0 | 29.0 | 42.0 | 66.0 |
| 31 | 56.70 | 1520 | 27.0 | 37.0 | 53.0 | 84.0 |
| 32 | 88.30 | 1908 | 33.0 | 46.0 | 66.0 | 104.0 |
| 33 | 138.00 | 2360 | 42.0 | 59.0 | 83.0 | 132.0 |

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

All catalog products manufactured after April 1, 2006 are RoHS Compliant

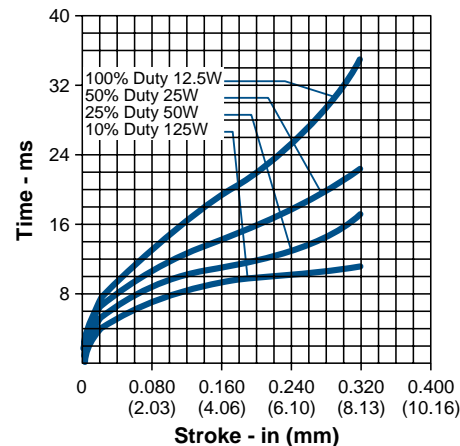
Specifications

| | |
|-------------------------------|--|
| Dielectric Strength | 23-24 awg, 1000 VRMS ; 25-33 awg, 1200 VRMS |
| 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 6¼" square by ⅛" thick |
| Coil Resistance | 23-33 awg, ±5% |
| Weight | 6.0 oz (170 gms) |
| Holding Force 4EF | 37.0 lb (164.6 N) @ 105°C |
| Holding Force 4EC | 16.0 lb (71.2 N) @ 105°C |
| Dimensions | Ø1.562" x 0.835" L (See page F17) |

How to Order

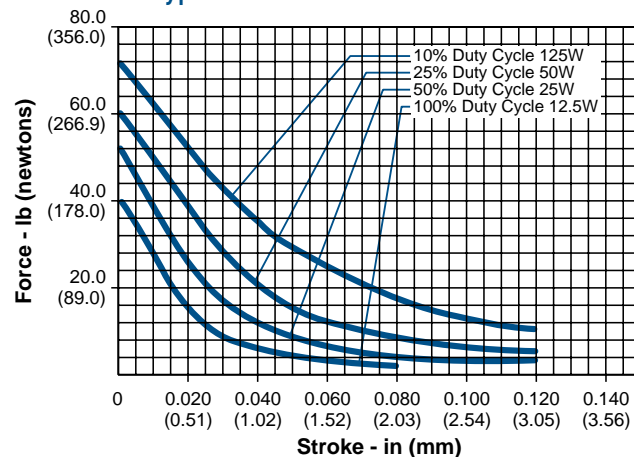
Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 21 VDC, specify 129440-027). Please see www.ledex.com (click on Stock Products tab) for our list of stock products available through our North American distributors.

Size 4EF and 4EC—Typical Speed @ No Load, 20°C



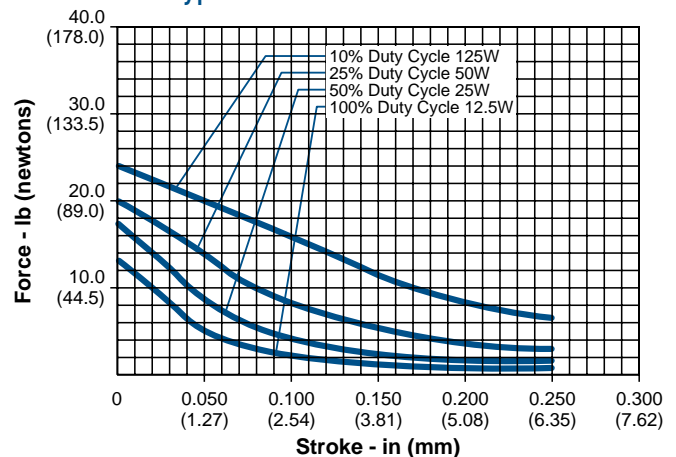
All specifications subject to change without notice.

Size 4EF— Typical Force @ 20°C



Force values for reference only.

Size 4EC— Typical Force @ 20°C



Ledex® Low Profile Size 5SF — Push or Pull

Short Stroke, Flat Face

Part Number: 129450-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

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) | 860 | 1220 | 1720 | 2730 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|---------------------------|-----------------------|-------------------------|--------------|--------------|--------------|--------------|
| 23 | 2.03 | 288 | 6.1 | 8.6 | 12.1 | 19.2 |
| 24 | 3.20 | 360 | 7.6 | 10.8 | 15.3 | 24.0 |
| 25 | 4.91 | 440 | 9.6 | 13.6 | 19.2 | 31.0 |
| 26 | 7.72 | 550 | 12.1 | 17.1 | 24.0 | 38.0 |
| 27 | 11.12 | 636 | 15.0 | 21.0 | 30.0 | 48.0 |
| 28 | 18.79 | 840 | 19.2 | 27.0 | 39.0 | 61.0 |
| 29 | 30.48 | 1088 | 24.0 | 34.0 | 48.0 | 77.0 |
| 30 | 44.86 | 1275 | 30.0 | 43.0 | 61.0 | 96.0 |
| 31 | 70.90 | 1596 | 38.0 | 54.0 | 76.0 | 121.0 |
| 32 | 109.00 | 1974 | 47.0 | 67.0 | 95.0 | 150.0 |
| 33 | 175.00 | 2496 | 60.0 | 86.0 | 121.0 | 192.0 |

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

| | |
|-------------------------------|--|
| Dielectric Strength | 23 awg, 1000 VRMS ; 24-33 awg, 1200 VRMS |
| 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 | 23-33 awg, ±5% |
| Weight | 9.0 oz (255 gms) |
| Holding Force | 58.0 lb (258.0 N) @ 105°C |
| Dimensions | Ø1.875" x 0.880" L (See page F17) |

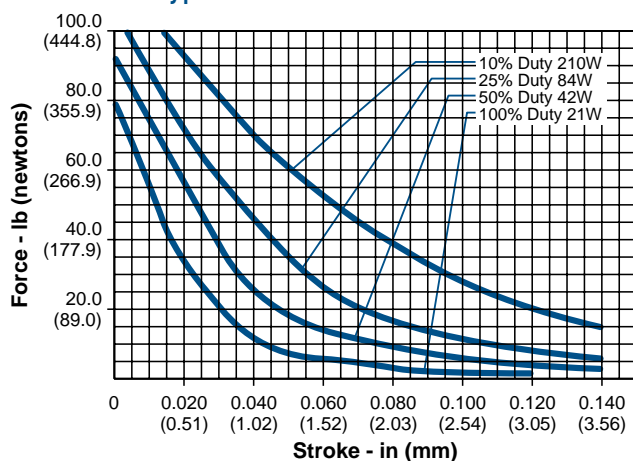
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 30 VDC, specify 129450-027).

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

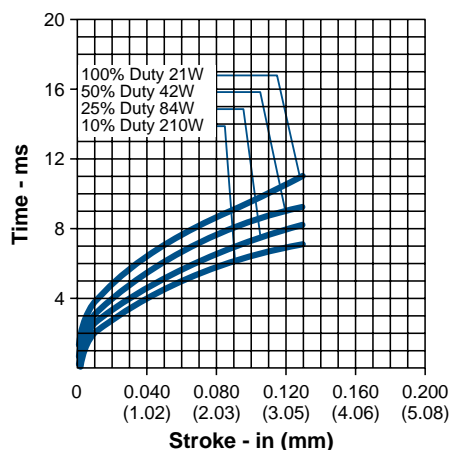
All specifications subject to change without notice.

Size 5SF— Typical Force @ 20°C



Force values for reference only.

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



Ledex® Low Profile Size 5EC — Push or Pull

Medium Stroke, Conical Face

Part Number: 129415-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

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

| | |
|-------------------------------|--|
| Dielectric Strength | 23 awg, 1000 VRMS ; 24-33 awg, 1200 VRMS |
| 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 | 23-33 awg, ±5% |
| Weight | 11.5 oz (326.0 gms) |
| Holding Force | 27.0 lb (120.1 N) @ 105°C |
| Dimensions | Ø1.875" x 1.035" L (See page F17) |

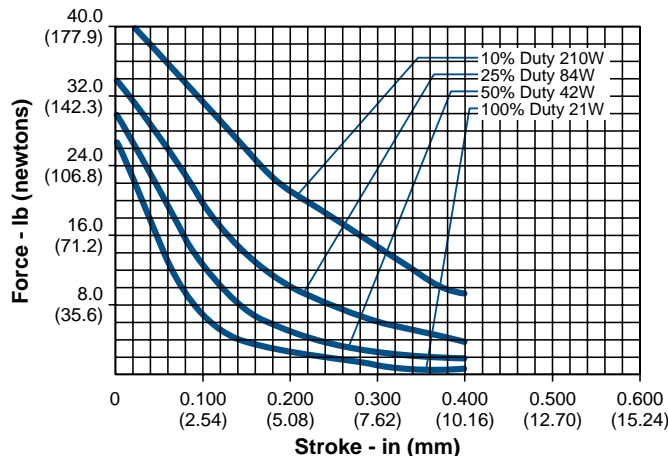
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 35 VDC, specify 129415-027).

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

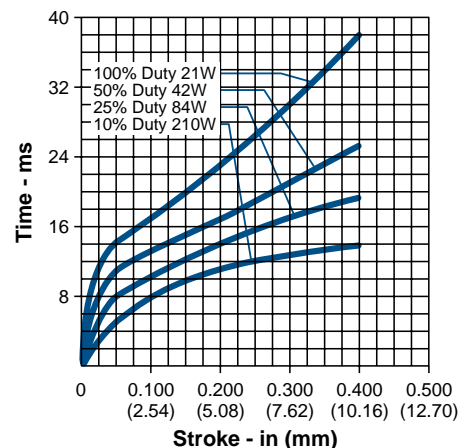
All specifications subject to change without notice.

Size 5EC— Typical Force @ 20°C



Force values for reference only.

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



Ledex® Low Profile Size 6SF — Push or Pull

Short Stroke, Flat Face

Part Number: 187789-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

Performance

| | | | | |
|--|------|------|------|------|
| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 87 | 36 | 13 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 140 | 44 | 16 |
| Watts (@ 20°C) | 32 | 64 | 128 | 320 |
| Ampere Turns (@ 20°C) | 1240 | 1760 | 2490 | 3920 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|---------------------------|-----------------------|-------------------------|--------------|--------------|--------------|--------------|
| 23 | 3.59 | 432 | 10.3 | 14.6 | 21.0 | 33.0 |
| 24 | 5.24 | 500 | 13.0 | 18.4 | 26.0 | 41.0 |
| 25 | 9.51 | 708 | 16.7 | 24.0 | 33.0 | 53.0 |
| 26 | 14.44 | 858 | 21.0 | 30.0 | 42.0 | 66.0 |
| 27 | 23.69 | 1110 | 27.0 | 38.0 | 53.0 | 84.0 |
| 28 | 38.27 | 1411 | 34.0 | 48.0 | 68.0 | 106.0 |
| 29 | 54.62 | 1638 | 41.0 | 59.0 | 83.0 | 131.0 |
| 30 | 93.67 | 2184 | 53.0 | 76.0 | 107.0 | 168.0 |
| 31 | 143.00 | 2645 | 67.0 | 95.0 | 134.0 | 211.0 |
| 32 | 223.00 | 3328 | 83.0 | 118.0 | 167.0 | 262.0 |
| 33 | 338.00 | 4004 | 105.0 | 149.0 | 210.0 | 331.0 |

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

| | |
|-------------------------------|---|
| Dielectric Strength | 23-31 awg, 1200 VRMS ; 32-33 awg, 1500 VRMS |
| 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 12 ³ / ₈ " square by 1/8" thick |
| Coil Resistance | 23-33 awg, ±5% |
| Weight | 1 lb 2 oz (510.3 gms) |
| Holding Force | 88.0 lb (391.4 N) @ 105°C |
| Dimensions | Ø2.250" x 1.145" L (See page F18) |

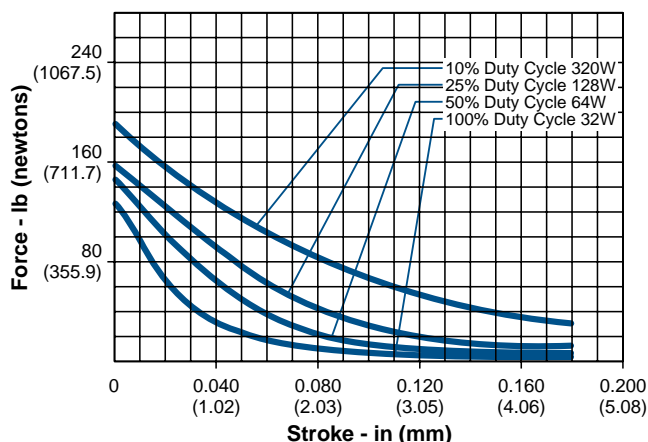
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 53 VDC, specify 187789-027).

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

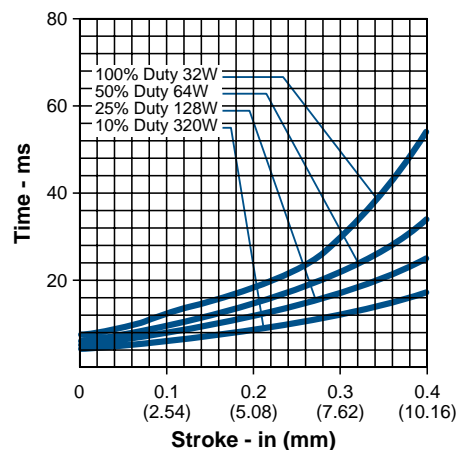
All specifications subject to change without notice.

Size 6SF— Typical Force @ 20°C



Force values for reference only.

Size 6SF— Typical Speed @ No Load, 20°C



Ledex® Low Profile Size 6EC — Push or Pull

Medium Stroke, Conical Face

Part Number: 173921-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

Performance

| Maximum Duty Cycle | 100% | 50% | 25% | 10% | | |
|--|-----------------------|-------------------------|--------------|--------------|--------------|--------------|
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 87 | 36 | 13 | | |
| Maximum ON Time (sec) for single pulse ² | ∞ | 140 | 44 | 16 | | |
| Watts (@ 20°C) | 32 | 64 | 128 | 320 | | |
| Ampere Turns (@ 20°C) | 1480 | 2080 | 2940 | 4620 | | |
| Coil Data | | | | | | |
| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
| 23 | 4.69 | 567 | 12.3 | 17.2 | 24.0 | 38.0 |
| 24 | 7.43 | 710 | 15.5 | 22.0 | 31.0 | 48.0 |
| 25 | 12.90 | 960 | 19.9 | 28.0 | 39.0 | 62.0 |
| 26 | 19.70 | 1170 | 25.0 | 35.0 | 49.0 | 78.0 |
| 27 | 32.00 | 1500 | 32.0 | 44.0 | 63.0 | 99.0 |
| 28 | 51.60 | 1904 | 40.0 | 56.0 | 79.0 | 125.0 |
| 29 | 74.40 | 2232 | 49.0 | 69.0 | 98.0 | 154.0 |
| 30 | 126.00 | 2940 | 63.0 | 89.0 | 126.0 | 198.0 |
| 31 | 195.00 | 3611 | 80.0 | 112.0 | 159.0 | 250.0 |
| 32 | 288.00 | 4350 | 98.0 | 138.0 | 195.0 | 306.0 |
| 33 | 427.00 | 5010 | 126.0 | 177.0 | 251.0 | 394.0 |

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

| | |
|-------------------------------|---|
| Dielectric Strength | 23-31 awg, 1200 VRMS ; 32-33 awg, 1500 VRMS |
| 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 12 ³ / ₈ " square by 1/8" thick |
| Coil Resistance | 23-33 awg, ±5% |
| Weight | 1 lb 5.50 oz (609.5 gms) |
| Holding Force | 49.0 lb (218.0 N) @ 105°C |
| Dimensions | Ø2.250" x 1.330" L (See page F18) |

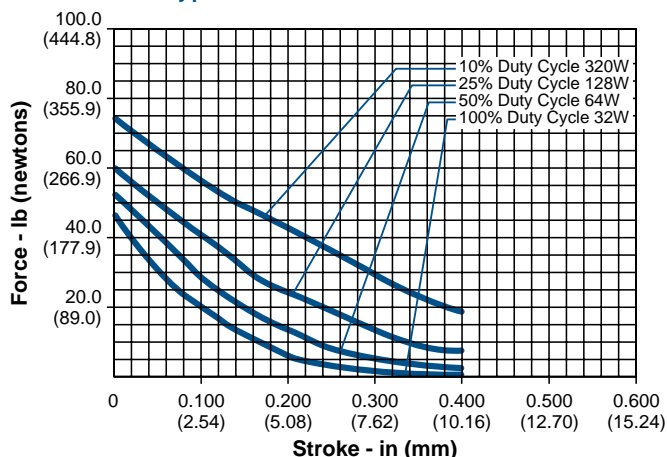
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 63 VDC, specify 173921-027).

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

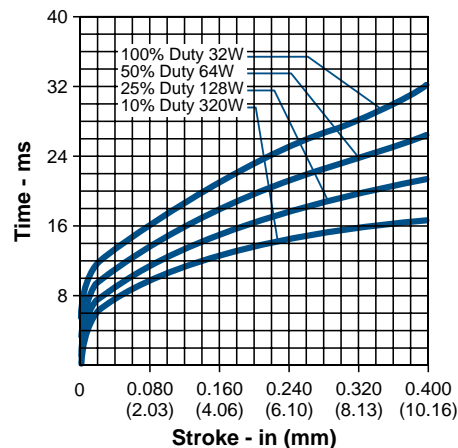
All specifications subject to change without notice.

Size 6EC— Typical Force at 20°C



Force values for reference only.

Size 6EC— Typical Speed @ No Load, 20°C



Ledex® Low Profile Size 7EC — Push or Pull

Medium Stroke, Conical Face

Part Number: 191357-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

Performance

| | | | | |
|--|------|------|------|------|
| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 80 | 38 | 16 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 138 | 50 | 18 |
| Watts (@ 20°C) | 35 | 70 | 140 | 350 |
| Ampere Turns (@ 20°C) | 1805 | 2555 | 3610 | 5710 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|---------------------------|-----------------------|-------------------------|--------------|--------------|--------------|--------------|
| 23 | 10.80 | 1044 | 19.0 | 27.0 | 39.0 | 61.0 |
| 24 | 16.50 | 1274 | 24.0 | 34.0 | 48.0 | 76.0 |
| 25 | 27.00 | 1635 | 31.0 | 43.0 | 61.0 | 97.0 |
| 26 | 43.80 | 2091 | 39.0 | 55.0 | 78.0 | 124.0 |
| 27 | 68.40 | 2603 | 49.0 | 69.0 | 98.0 | 155.0 |
| 28 | 108.00 | 3255 | 61.0 | 87.0 | 123.0 | 194.0 |
| 29 | 162.00 | 3933 | 75.0 | 106.0 | 151.0 | 238.0 |
| 30 | 265.00 | 5044 | 96.0 | 136.0 | 193.0 | 305.0 |
| 31 | 385.00 | 5800 | 116.0 | 164.0 | 232.0 | 367.0 |
| 32 | 583.00 | 7230 | 143.0 | 202.0 | 286.0 | 452.0 |
| 33 | 882.00 | 8400 | 176.0 | 248.0 | 351.0 | 600.0 |

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

| | |
|-------------------------------|---|
| Dielectric Strength | 23-29 awg, 1200 VRMS ; 30-33 awg, 1500 VRMS |
| 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 15½" square by ⅛" thick |
| Coil Resistance | 23-30 awg, ±5%; 31-33 awg, ±10% |
| Weight | 2.5 lb (1.134 kg) |
| Holding Force | 50.0 lb (222.4 N) @ 105°C |
| Dimensions | Ø2.750" x 1.780" L (See page F18) |

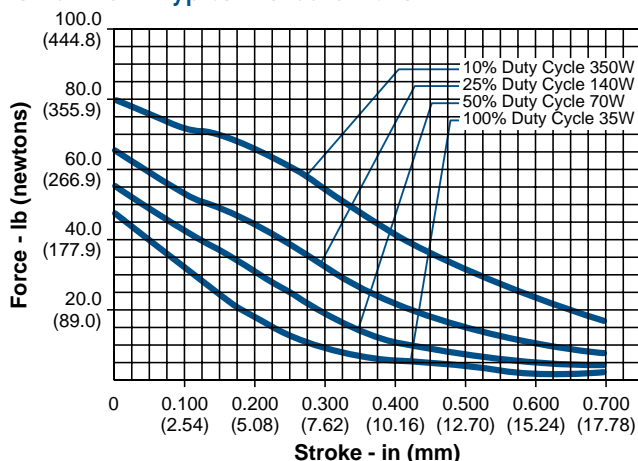
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 48 VDC, specify 191357-024).

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

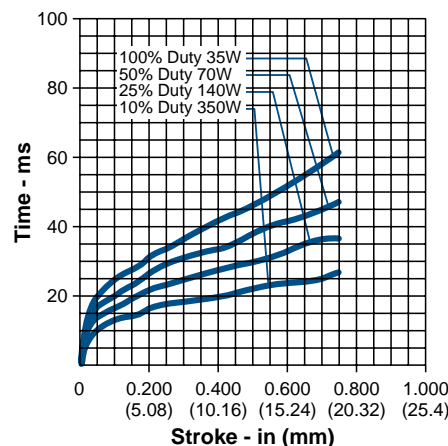
All specifications subject to change without notice.

Size 7EC— Typical Force @ 20°C



Force values for reference only.

Size 7EC— Typical Speed @ No Load, 20°C



Ledex® Low Profile Size 8EC — Push or Pull

Medium Stroke, Conical Face

Part Number: 191016-0XX

All catalog products manufactured after
April 1, 2006 are RoHS Compliant

Performance

| Maximum Duty Cycle | 100% | 50% | 25% | 10% |
|--|------|------|------|------|
| Maximum ON Time (sec) when pulsed continuously ¹ | ∞ | 72 | 43 | 20 |
| Maximum ON Time (sec) for single pulse ² | ∞ | 132 | 56 | 22 |
| Watts (@ 20°C) | 41 | 82 | 164 | 410 |
| Ampere Turns (@ 20°C) | 2195 | 3105 | 4155 | 6945 |

Coil Data

| awg (0XX) ³ | Resistance (@20°C) | # Turns ⁴ | VDC (Nom) | VDC (Nom) | VDC (Nom) | VDC (Nom) |
|---------------------------|-----------------------|-------------------------|--------------|--------------|--------------|--------------|
| 23 | 19.00 | 1512 | 28.0 | 40.0 | 56.0 | 88.0 |
| 24 | 31.20 | 1952 | 36.0 | 51.0 | 72.0 | 113.0 |
| 25 | 49.40 | 2448 | 45.0 | 64.0 | 90.0 | 142.0 |
| 26 | 78.00 | 3060 | 57.0 | 80.0 | 113.0 | 179.0 |
| 27 | 119.00 | 3740 | 70.0 | 99.0 | 140.0 | 221.0 |
| 28 | 184.00 | 4584 | 87.0 | 123.0 | 174.0 | 275.0 |
| 29 | 301.00 | 5936 | 111.0 | 157.0 | 222.0 | 351.0 |
| 30 | 425.00 | 6750 | 132.0 | 187.0 | 264.0 | 417.0 |
| 31 | 683.00 | 8750 | 167.0 | 237.0 | 335.0 | 529.0 |
| 32 | 1110.00 | 11000 | 213.0 | 302.0 | 427.0 | — |
| 33 | 1509.00 | 12050 | 249.0 | 352.0 | 498.0 | — |

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

| | |
|-------------------------------|---|
| Dielectric Strength | 23-27 awg, 1200 VRMS ; 28-33 awg, 1500 VRMS |
| 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 20¼" square by ⅛" thick |
| Coil Resistance | 23-30 awg, ±5%; 31-33 awg, ±10% |
| Weight | 4.9 lb (2.2 kg) |
| Holding Force | 120.0 lb (533.7 N) @ 105°C |
| Dimensions | Ø3.375" x 2.165" L (See page F18) |

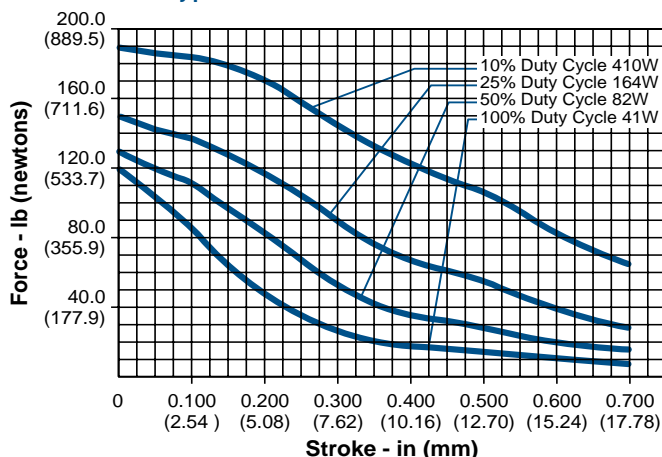
How to Order

Add the coil awg number (0XX) to the part number (for example: to order a 25% duty cycle unit rated at 90 VDC, specify 191016-025).

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

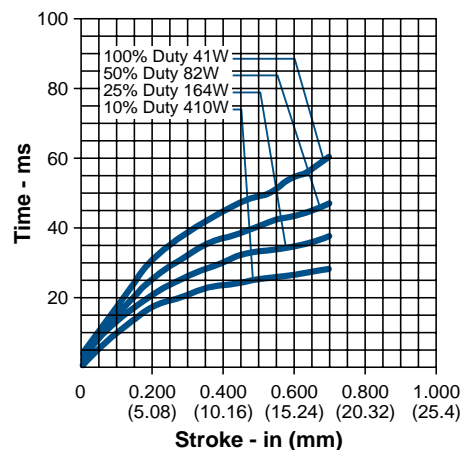
All specifications subject to change without notice.

Size 8EC— Typical Force at 20°C



Force values for reference only.

Size 8EC— Typical Speed @ No Load, 20°C

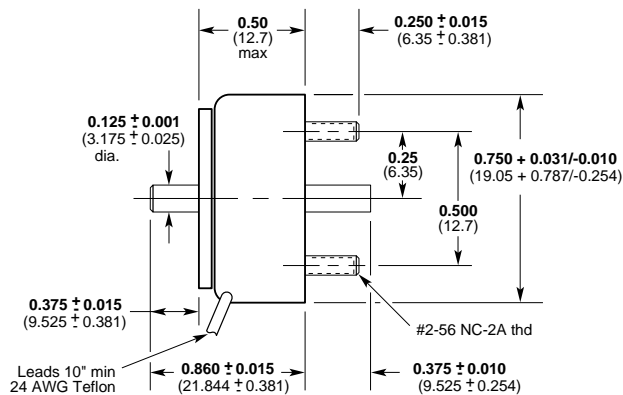


Ledex® Low Profile Dimensions

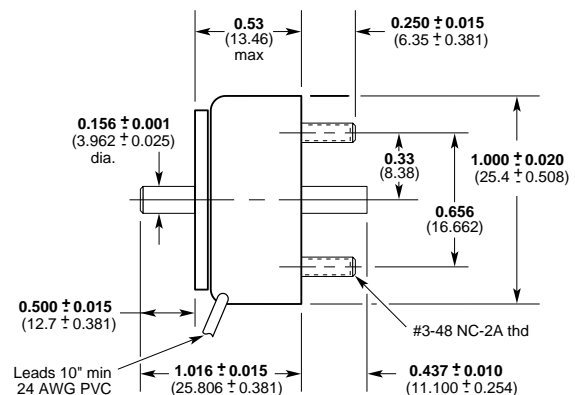
Inches (mm)

All solenoids are illustrated in energized state

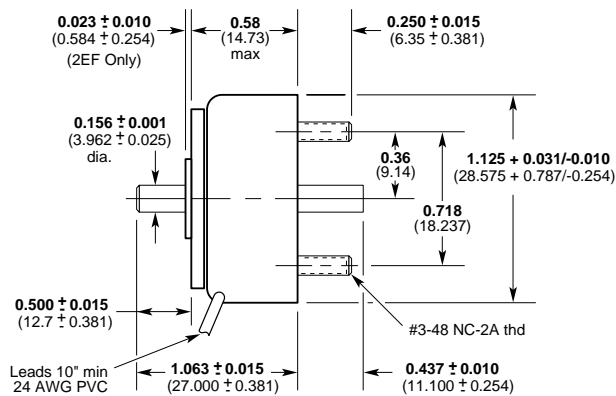
Size 0EC



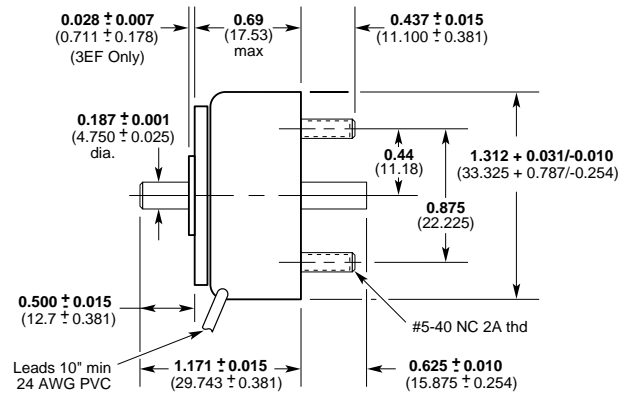
Size 1EC



Size 2EF/2EC



Size 3EF/3EC



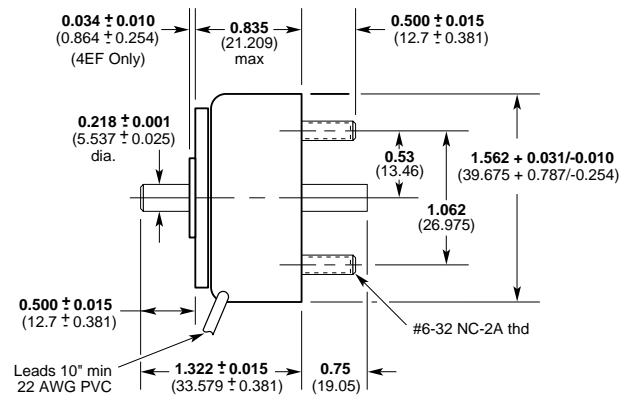
All specifications subject to change without notice.

Ledex® Low Profile Dimensions

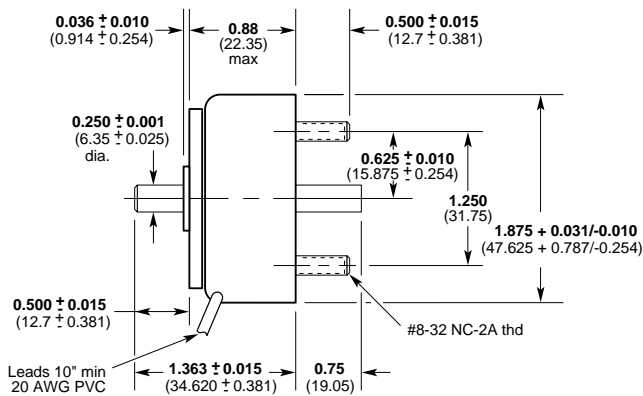
Inches (mm)

All solenoids are illustrated in energized state

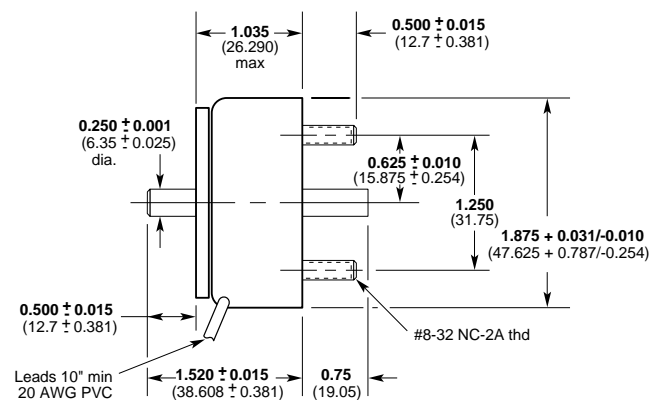
Size 4EF/4EC



Size 5SF



Size 5EC



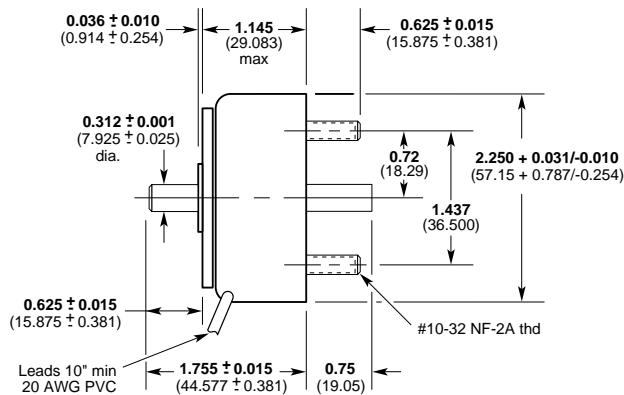
All specifications subject to change without notice.

Ledex® Low Profile Dimensions

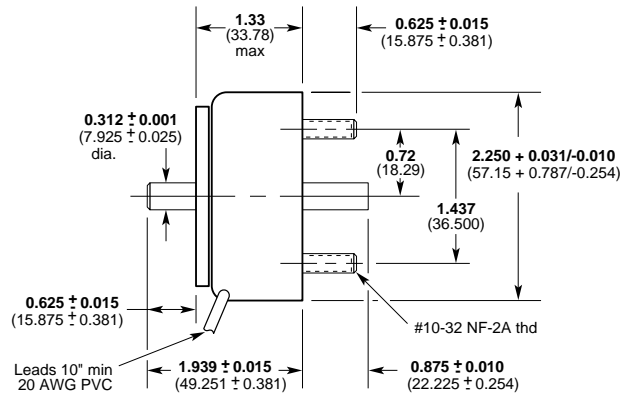
Inches (mm)

All solenoids are illustrated in energized state

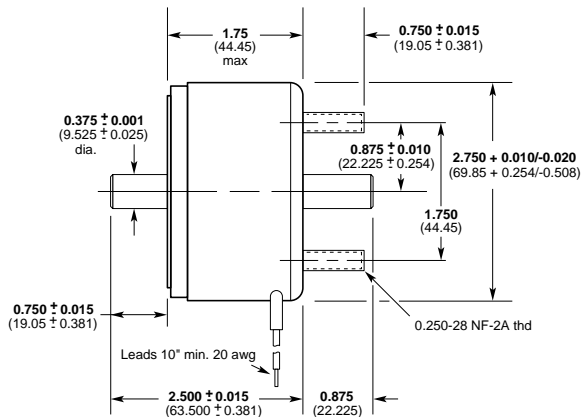
Size 6SF



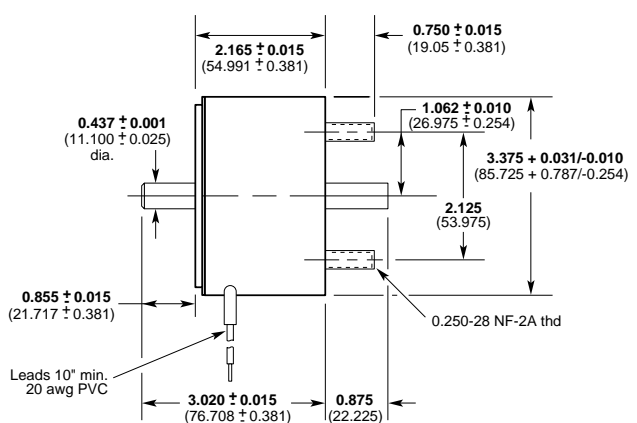
Size 6EC



Size 7EC



Size 8EC



All specifications subject to change without notice.