The leader in reliable position sensing for the most demanding plant conditions.
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In the most demanding conditions of processing and manufacturing plants, customers require solutions that are

**reliable and durable.**

To be reliable means ‘capable of being trusted - dependable.’ To be durable means ‘capable of withstanding wear and tear - long-lasting.’

When it comes to position sensing, reliability and durability are the perfect words to describe GO Switch leverless limit switches.

You see, GO Switches have a unique, hybrid design that combines the advantages of mechanical limit switches with the advantages of inductive proximity sensors - and leaves their drawbacks behind.

By combining the best of the two technologies, GO Switch enjoys a "double advantage," surpassing the capabilities that either technology could achieve by itself.

As a result, GO Switches deliver reliable, durable performance in demanding conditions that are too extreme for mechanical limit switches or inductive proximity sensors.

So if your plant processes include conditions that are extremely hot, cold, wet, dirty, corrosive, abusive, or explosive, be sure to demand technology with an advantage.

**Specify GO Switch leverless limit switches.**
### GO Switch Product Overview

#### Series or Model

<table>
<thead>
<tr>
<th>Series</th>
<th>Model</th>
<th>10 Series</th>
<th>20 Series</th>
<th>31, 32, 33, 35</th>
<th>80 Series</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>10 Series</td>
<td>20 Series</td>
<td>31, 32, 33, 35</td>
<td>80 Series</td>
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<td></td>
<td>30 Series</td>
<td>35 Series</td>
<td>30 Series</td>
<td>35 Series</td>
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</table>

#### Sensing Area

<table>
<thead>
<tr>
<th>Side</th>
<th>End</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/16&quot;</td>
<td>1/4&quot;</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>(14mm)</td>
<td>(6mm)</td>
<td>(6mm)</td>
</tr>
<tr>
<td>3/32&quot;</td>
<td>2/5&quot;</td>
<td>3/78&quot;</td>
</tr>
<tr>
<td>(86mm)</td>
<td>(66mm)</td>
<td>(88mm)</td>
</tr>
</tbody>
</table>

#### Maximum Sensing Range

- 450 feet
- Zone 1 [Class I, Div 1]
- Yes

#### Contact Forms Available

- SPDT / DMDB
- Latching

#### Enclosures Available

- Stainless Steel
- Copper
- Brass

#### Approvals Available

- SAA
- UL
- CSA

#### Options Available

- High Temperature
- Underwater
- Explosion Proof
- Intrinsically Safe

#### Electrical Ratings

<table>
<thead>
<tr>
<th>Series</th>
<th>Model</th>
<th>AC</th>
<th>DC</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Volts</td>
<td>Amps</td>
</tr>
<tr>
<td>10 Series</td>
<td>71, 72</td>
<td>3/8&quot; or M12x1</td>
<td>.040&quot; (1mm)</td>
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<tr>
<td></td>
<td></td>
<td>5/8&quot; or M18x1.5</td>
<td>.100&quot; (2.5mm)</td>
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<tr>
<td></td>
<td></td>
<td>5/8&quot;</td>
<td>.090&quot; (2mm)</td>
</tr>
<tr>
<td>20 Series</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
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<tr>
<td>31, 32, 33, 35</td>
<td>77</td>
<td>5/8&quot;</td>
<td>.35&quot; (9mm)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>80 Series</td>
<td>7G, 7H, 7I</td>
<td>5/8&quot;</td>
<td>.35&quot; (9mm)</td>
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</table>

#### High Temperature Underwater Explosion Proof Intrinsically Safe

<table>
<thead>
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<th>Series</th>
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<th>AC</th>
<th>DC</th>
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<tr>
<td></td>
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<td>Volts</td>
<td>Amps</td>
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<tr>
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<td>71, 72</td>
<td>3/8&quot; or M12x1</td>
<td>.040&quot; (1mm)</td>
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<td>.090&quot; (2mm)</td>
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<tr>
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<td>73, 74, 75, 76</td>
<td>3/4&quot;</td>
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<td>5/8&quot;</td>
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<td>7L</td>
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<td>.35&quot; (9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### Latching SPST N/O & N/C

- SPDT Stainless Steel
- Brass

#### Contact Forms Available

- SPDT
- SPDT / DMDB
- SAA

#### Sensing Area

- 221°F
- 350°F

- 221°F
- No
- Zone 1 [Class I, Div 1]
- Yes

- 350°F
- 450 feet
- Zone 1 [Class I, Div 1]
- Yes

- 400°F
- 23,000 feet
- Zone 1 [Class I, Div 1]
- Yes

- 400°F
- 450 feet
- Zone 1 [Class I, Div 1]
- Yes

#### Approvals Available

- SAA
- UL
- CSA

#### Options Available

- SPDT
- SPDT / DMDB
- SAA

####With LED’s

- 25A@120VAC
- 25A@24VDC

#### Without LED’s

- 120V 25A - 24VDC 125 0.5

Note: Please consult factory for application specific ratings.

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**Industrial Environment**

<table>
<thead>
<tr>
<th>General Purpose</th>
<th>Zone 0 (Class I, Div 1)</th>
<th>Zone 1 (Class I, Div 1)</th>
<th>Zone 2 (Class I, Div 2)</th>
<th>Underwater</th>
<th>High Temperature</th>
<th>Cylinder Position Sensors</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Model 11" /></td>
<td><img src="image" alt="Model 31" /></td>
<td><img src="image" alt="Model 81" /></td>
<td><img src="image" alt="Model 72" /></td>
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<tr>
<td><img src="image" alt="Model 71" /></td>
<td><img src="image" alt="Model 77" /></td>
<td><img src="image" alt="Model 76" /></td>
<td><img src="image" alt="Model 7C-7F" /></td>
<td><img src="image" alt="Model 7L &amp; LPS" /></td>
<td><img src="image" alt="Model 7L" /></td>
<td><img src="image" alt="Model 7H" /></td>
</tr>
</tbody>
</table>

---

**Square Position Sensors**

1. **Model 21**: Side Sensing
2. **Model 35**: Valve Position Sensor
3. **Model 71**: 3/8" diameter
4. **Model 73**: 5/8" diameter
5. **Model 74**: 5/8" diameter
6. **Model 75**: Long Threads
7. **Model 76**: Long Threads
8. **Model 77**: Long Body
9. **Model 7C-7F**: Cylinder Position Sensor
10. **Model 7L & LPS**: BriteLite LEDs

---

**Round Position Sensors**

1. **Model 11**: Long Range
2. **Model 31**: End Sensing
3. **Model 81**: DPDT
4. **Model 72**: 3/8" diameter
5. **Model 74**: 5/8" diameter
6. **Model 76**: Long Threads
7. **Model 7G**: DPDT
8. **Model 7H**: DPDT

---

**Zone 0 (Class I, Div 1) - Intrinsically Safe**

- **Model 7L & LPS**
- **BriteLite LEDs**

---

**Zone 2 (Class I, Div 2) - Non-Incendive**

- **Model 7L & LPS**
- **BriteLite LEDs**

---

**Underwater**

- **Model 7L & LPS**
- **BriteLite LEDs**

---

**High Temperature**

- **Model 7L & LPS**
- **BriteLite LEDs**

---

**Cylinder Position Sensors**

- **Model 7L & LPS**
- **BriteLite LEDs**

---

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Square Housing

General Purpose
- 11-12518-A2 SPDT, 9/16", Brass, Bottom Leads
- 81-20518-A2 DPDT, 1/4", Brass, Bottom Leads

Explosion Proof - Class I, Division 1
- 21-11524-A2 SPDT, 3/8", Stainless, Bottom Leads
- 81-20524-A2 DPDT, 1/4", Stainless, Bottom Leads

Non-Incendive - Class I, Division 1
- 11-11110-00 SPDT, 3/8", Brass, Side Terminal
- 11-12110-00 SPDT, 9/16", Brass, Side Terminal
- 11-12510-00 SPDT, 3/8", Brass, Bottom Terminal
- 21-11110-00 SPDT, 3/8", Brass, Side Terminal
- 21-11510-00 SPDT, 3/8", Brass, Bottom Terminal
- 21-11516-A2 SPDT, 3/8", Brass, Bottom Leads
- 81-20516-A2 DPDT, 1/4", Brass, Bottom Leads

Round Housing

General Purpose
- 73-13528-A2 SPDT, 0.100", Stainless, Leads
- 73-13528-DCA SPDT, 0.100", Stainless, Mini Connector
- 74-13528-B2 SPDT, 0.100", Stainless, Cable
- 74-13528-DBA SPDT, 0.100", Stainless, Micro
- 7G-23528-A2 DPDT, 0.090", Stainless, Leads
- 7LR-13568-A2 SPDT, 0.100", 316SS, Leads, Red LED
- 7LG-13568-A2 SPDT, 0.100", 316SS, Leads, Green LED

Explosion Proof - Class I, Division 1
- 73-13523-A2 SPDT, 0.100", Stainless, Leads
- 73-13524-A2 SPDT, 0.100", Stainless, Leads
- 7G-23523-A2 DPDT, 0.090", Stainless, Leads

Non-Incendive - Class I, Division 1
- 73-13526-A2 SPDT, 0.100", Stainless, Leads
- 7G-23526-A2 DPDT, 0.090", Stainless, Leads
- 7LR-13562-A2 SPDT, 0.100", 316SS, Leads, Red LED
- 7LG-13562-A2 SPDT, 0.100", 316SS, Leads, Green LED

Cylinder Position Sensors - Stroke to GO
- 7C-23658-DCA SPDT, 1.025" probe, Mini Connector
- 7C-43658-DCA SPDT, 1.025" probe, Mini Connector
- 7D-23658-DCA SPST, 1.250" probe, Mini Connector
- 7D-43658-DCA SPDT, 1.250" probe, Mini Connector
- 7E-23658-DCA SPST, 2.062" probe, Mini Connector
- 7E-43658-DCA SPDT, 2.062" probe, Mini Connector

Custom build your product using our easy ordering guide! Choose your options, write the codes in the spaces provided, and simply give us a call to order!
Position Sensors 101

The purpose of position sensors

In automated manufacturing and processing plants, position sensors help monitor and control plant processes by confirming that critical activities are completed as intended. More specifically, their primary function is to detect the presence, or absence, of a moving object, or "target".

For the purpose of this tutorial, only "mainstream" technologies that sense the presence of metal targets – limit switches, inductive proximity sensors, reed switches, and leverless limit switches – will be discussed.

Limit Switches

Limit switches are electro-mechanical devices that detect the position of a target by making direct physical contact with the target.

**ADVANTAGES**
- The advantages of mechanical limit switches:
  - Do not require power
  - Can handle high current loads
  - Wide operating temperature range
  - Immune to electrical noise
  - Immune to radio frequency interference
  - No leakage current
  - No voltage drops
  - Simple "Normally Open" or "Normally Closed"
  - Not polarity or voltage sensitive

**DISADVANTAGES**
- The disadvantages of mechanical limit switches:
  - Multiple moving parts to maintain
  - Lever arm, push button, body, base, head, contacts, terminals
  - Moving parts eventually wear and fail
  - Physical contact encourages premature failure due to damage
  - Lever arm connection to internal contacts invites moisture and dust into contact chamber, causing failure or maintenance issues
  - Poor repeatability due to wear and tear of moving parts
  - Physical contact causes damage to the target
  - Poor defense against moisture, dust, and corrosion
  - Extra cost for sealed contacts and hazardous area approvals

Reed Switches

Reed Switches are electro-mechanical devices that detect the position of a magnetic target by the attraction of the target’s magnetic field.

**ADVANTAGES**
- The advantages of reed switches:
  - No physical contact is required
  - Do not require power
  - Immune to electrical noise
  - Immune to radio frequency interference
  - No leakage current
  - No voltage drops
  - Simple "Normally Open" or "Normally Closed"

**DISADVANTAGES**
- The disadvantages of reed switches:
  - Require a magnetic target to operate
  - Reed element is fragile and can break with physical contact
  - High vibration can cause contact chatter and false signals
  - Bending metal reeds causes fatigue and premature failures
  - Contacts can be "touched" causing uncertainty of target position
  - Limited selection of shapes, sizes, and capabilities

Inductive Proximity Sensors

Inductive proximity sensors are solid-state electronic devices that detect the position of metal targets via the disturbance of their energy field.

**ADVANTAGES**
- The advantages of inductive proximity sensors:
  - Do not require power
  - Do not require moving parts to jam, wear, or break results in less maintenance
  - Wide selection of shapes and sizes for a variety of applications
  - Not affected by dust or dirt

**DISADVANTAGES**
- The disadvantages of inductive proximity sensors:
  - Require external power to operate
  - Cannot handle high current loads
  - Limited operating temperature range – cannot be used in extreme heat or cold
  - Affected by temperature fluctuations
  - Affected by humidity
  - Affected by radio frequency interference
  - Suffer from leakage current and voltage drops
  - Only special models are intrinsically safe
  - Only rare, expensive models are explosion proof
  - Polarity sensitive – typically must stock both "npn" and "pnp" models
  - Voltage sensitive – typically must stock both AC and DC models
  - "Contact" sensitive – typically must stock both "Normally Open" and "Normally Closed" models
  - Susceptible to moisture ingestion

Leverless Limit Switches

Leverless limit switches use a unique, hybrid technology to detect the position of a ferrous target via an electro-magnetic field.

**ADVANTAGES**
- The advantages of leverless limit switches:
  - No physical contact is required
  - Do not require power
  - Only one moving part, with no metal-to-metal contact making it move – with nothing to jam, bend, break or wear out
  - Can handle high current loads
  - By far the widest operating temperature range
  - Immune to electrical noise
  - Immune to radio frequency interference
  - No leakage current
  - No voltage drops
  - Simple "Normally Open" or "Normally Closed"
  - Can be wired in series or parallel
  - Inherently intrinsically safe
  - Large selection of shapes and sizes for a variety of applications
  - Not affected by dust and dirt
  - Not affected by moisture
  - Not affected by physical contact
  - Not affected by most caustics or chemicals
  - Many explosion-proof options
  - Water-proof and sub sea options
  - Extended sensing ranges up to 4’

Key Terminology

When considering position sensors, it helps to understand the common terminology used by most sensor manufacturers.

<table>
<thead>
<tr>
<th>Sensing range</th>
<th>Hysteresis</th>
<th>Repeatability</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>the distance from the sensing face to the target that activates the switch</td>
<td>the distance between the activated and release points of the switch</td>
<td>the switch's ability to detect the same target at the same range repeatedly during the life of the switch</td>
<td>the amount of time between the detection of a target and the generation of the output signal</td>
</tr>
</tbody>
</table>
GO Switch Leverless Limit Switches

Unique Design Combines Three Technologies to Surpass Them All

The design behind GO Switch combines the best of all worlds, bringing together the advantages of mechanical limit switches, reed switches, and inductive proximity sensors to create a unique, hybrid technology that reaches new heights of performance.

By combining the best of three technologies, GO Switch enjoys a significant advantage, surpassing the capabilities that any of the three could achieve by itself.

As a result, the unique leverless limit switch design enables GO Switches to operate effectively under conditions that are too extreme for other technologies.

So if your plant processes include conditions that are extremely hot, cold, wet, dirty, corrosive, abusive, or explosive, be sure to specify GO Switch leverless limit switches.
GO Switch Leverless Limit Switches

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So if your plant processes include conditions that are extremely hot, cold, wet, dirty, corrosive, abusive, or explosive, be sure to demand technology with an advantage. Specify GO Switch leverless limit switches.

Abusive Applications
Because GO Switches have only one moving part and no metal-to-metal contact making it move, there is virtually nothing to wear out! They are built to last for high cycle, dirty, and physically abusive applications.

Corrosive Conditions
Because most GO Switches have stainless steel housings, they are the logical choice for applications around salt water, bleaches, or other caustic chemicals.

Washdown & Underwater
Because GO Switches are completely potted and sealed, no moisture can affect their operation. Some models are even rated for use 20,000 feet underwater!

Explosive Environments
Because GO Switches use dry contacts, they are “simple devices” suitable for use in Intrinsically Safe applications. And many models are available for Zone 1 Class I, Div 1 hazardous areas.

High & Low Temperature
Because of their unique design, GO Switches can operate effectively in extremely hot (up to 400°F) or extremely cold (down to -40°F) plant conditions.

Shock & Vibration
Because GO Switches use permanent magnets that deliver outstanding snap action and contact pressure, they eliminate ‘contact teasing’ and ‘contact chatter’ in high vibration areas.
GO Switch 10 and 20 Series side sensing switches use two permanent magnets and a ferrous armature to control a set of dry contacts.

**Technology in Action**

**10 - 20 Series**

**Leverless Limit Switch**

Seesaw armature provides **snap action** and solid contact pressure, eliminating ‘contact teasing’ and ‘contact chatter’ in high vibration applications.

Side sensing range can be extended to nearly 4” using external target magnets.

Permanent magnets never lose their strength, even when mounted on ferrous metal.

Rugged brass or stainless steel housing withstands physical abuse, moisture, and corrosives.

Multiple wiring options:
- Terminal Block
- Lead Wires
- Cable
- Quick Disconnects

Potting fills the entire switch cavity, forming a barrier against moisture.

Conduit hub can be located in any of 5 positions for versatile installation.

Consumes no power to operate and has no current leakage or voltage drop.

**Options Available**
- Explosion Proof
- Extended Sensing
- HiTemp™ to 350°F
- SubSea™ Submersible
- Latching

**Key Benefits**

- Explosion Proof
- Extended Sensing
- HiTemp™ to 350°F
- SubSea™ Submersible
- Latching

**GO Switches are simple and built to last.**

With only one moving part and no metal-to-metal contact forcing it to move, there is nothing to wear out!

---

**Unoperated**

On the sensing side of the switch, one magnet is positioned closer to the armature, creating a dominant magnetic flux field which draws the armature down to its unoperated position, closing a contact circuit.

Shown: Model 11

**Operated**

When a ferrous target enters the sensing area of the switch, it diverts flux lines from the armature to create a magnetic dominance on the opposite side. As a result, the armature snaps to its operated position, closing the other contact circuit.

When the target is removed the armature snaps back to its original, unoperated position.
GO Switch Models 11 and 21 are the world’s original leverless limit switches. Their simple design, rugged enclosures, long sensing ranges, and global approvals make these switches the ideal choice wherever reliable position sensing is needed.

Features:
- SPOT 10A contacts
- Side Sensing
- -40° to 221°F (-40° to 105°C) operating temperature

Options:
- Suitable for Zone 0, 1, or 2 explosion proof
- -40° to 350°F (-40° to 176°C) high temperature
- Quick disconnect connector
- Underwater capabilities

Ordering Guide
Fill in the boxes to create your ordering number.

<table>
<thead>
<tr>
<th>Model</th>
<th>Contact Form</th>
<th>Sensing Range</th>
<th>Outlet Position</th>
<th>Enclosure Material</th>
<th>Approvals</th>
<th>Wiring Options</th>
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<tbody>
<tr>
<td>11</td>
<td>1-2</td>
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<td>Brass or Stainless</td>
<td>UL</td>
<td>Mini-change®</td>
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<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>Brass or Stainless</td>
<td>UL</td>
<td>Micro-change®</td>
</tr>
</tbody>
</table>

Dimensions

- Model 11
- Model 21

> **Ordering Guide**
> Fill in the boxes to create your ordering number.
## Extended Sensing with External Target Magnets

### AMF3 Target Magnet

**Extension Flange**

<table>
<thead>
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<th>20 Series</th>
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<tr>
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<tr>
<td>Width</td>
<td>7/16&quot; (11mm)</td>
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<tr>
<td>Depth</td>
<td>1-3/4&quot; (44mm)</td>
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</tbody>
</table>

**NEMA Specifications**

- Non-Hazardous: 4 4X 6 6P 7 9
- Hazardous: 00 - Terminal Block

### AMF4 Target Magnet

**Extension Flange**

<table>
<thead>
<tr>
<th>18 Series</th>
<th>20 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
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<tr>
<td>Height</td>
<td>1-15/16&quot; (46mm)</td>
</tr>
<tr>
<td>Width</td>
<td>7/16&quot; (11mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>1-3/4&quot; (44mm)</td>
</tr>
</tbody>
</table>

**NEMA Specifications**

- Non-Hazardous: 4 4X 6 6P 7 9
- Hazardous: 00 - Terminal Block

### AMF5 Target Magnet

**Extension Flange**

<table>
<thead>
<tr>
<th>18 Series</th>
<th>20 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Height</td>
<td>1-15/16&quot; (46mm)</td>
</tr>
<tr>
<td>Width</td>
<td>7/16&quot; (11mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>1-3/4&quot; (44mm)</td>
</tr>
</tbody>
</table>

**NEMA Specifications**

- Non-Hazardous: 4 4X 6 6P 7 9
- Hazardous: 00 - Terminal Block

## Agency Approvals

### Termination Options

- 00 - Terminal Block
- A - Potted PVC Leads
- B - Potted 50 Cable
- D - Quick Disconnect
- D - SubSea® Connector
- F - Potted HiTemp® Leads

### NEMA Ratings

<table>
<thead>
<tr>
<th>NEMA Classes</th>
<th>Non-Hazardous</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4X</td>
<td>6</td>
</tr>
</tbody>
</table>
- 00 - Terminal Block
- A - Potted PVC Leads
- B - Potted 50 Cable
- D - Quick Disconnect
- D - SubSea® Connector
- F - Potted HiTemp® Leads

SS = Stainless steel

X = Designed to meet respective NEMA specifications

## Leverless Limit Switches

### Wiring Diagrams (male view)

- **50 Cable**
  - N/C
  - N/O
  - Blue & Red/White Stripe
  - Green

- **DMDB Pumps Z PVC Leads**
  - N/C 1 & 2
  - Red & Red/White Stripe

### Termination Options

- **DMDB Corner Z PVC Leads**
  - N/C 1 & 2
  - Blue & Red/White Stripe

## Additional Specifications

- **AMF3 Target Magnet**
  - Designed to meet respective NEMA specifications

- **AMF4 Target Magnet**
  - Designed to meet respective NEMA specifications

- **AMF5 Target Magnet**
  - Designed to meet respective NEMA specifications

### Leverless Limit Switches

- **Micro-Change QDC - 4 Pin**
  - Pin 1
  - Pin 2
  - Pin 3
  - Pin 4

- **Micro-Change QDC - 3 Pin**
  - Pin 1
  - Pin 2
  - Pin 3

- **Micro-Change QDC - 2 Pin**
  - Pin 1
  - Pin 2

- **Micro-Change QDC - 5 Pin**
  - Pin 1
  - Pin 2
  - Pin 3
  - Pin 4

- **Mini-Change QDC - 6 Pin**
  - Pin 1
  - Pin 2
  - Pin 3
  - Pin 4

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3

- **Termination ODG**
  - Pin 1
  - Pin 2
  - Pin 3
GO Switch 30 and 80 Series end sensing switches use one permanent magnet and a ferrous armature to control a set of dry contacts.

**TECHNOLOGY IN ACTION**

**30 - 80 Series**

**LEVERLESS LIMIT SWITCH**

**Unoperated**

The armature is positioned off-center of the magnet, creating a dominant magnetic flux field on the sensing end of the switch which draws the armature down to its unoperated position, closing a contact circuit.

Shown: Model 81

**Operated**

When a ferrous target enters the sensing area of the switch, it diverts flux lines from the armature to create a magnetic dominance on the opposite side. As a result, the armature snaps to its operated position, closing the other contact circuit.

When the target is removed the armature snaps back to its original, unoperated position.

GO Switches are simple and built to last. With only one moving part and no metal-to-metal contact forcing it to move, there is nothing to wear out!
Models 31, 32 & 33

GO Switch Models 31, 32, and 33 offer end sensing in compact stainless steel enclosures.

Features:
- SPDT 6A contacts
- End Sensing
- -40° to 221°F (0°C to 105°C) operating temperature

Options:
- Suitable for Zone 0, 1, or 2 explosion proof
- Quick disconnect connector

Ordering Guide
Fill in the boxes to create your "ordering number."

Enclosure Material
- Stainless steel

Approvals
- UL listed General Purpose
- CSA certified General Purpose
- CSA / FM certified explosion proof

Wiring Options
- Lead Wires: 18 Gauge (1/18") dia. potted-in PVC insulated AWG / TEW stranded lead wires rated at 221°F (105°C) 600V UL / CSA listed
- Cable: 18 Gauge (1/18") dia. potted-in PVC rubber covered cable rated at 194°F (90°C) 600V UL / CSA listed
- Quick Disconnect: Male Quick Disconnect only, potted-in-connector. (CSA requires a case ground) (Approval must be 7 or 8) (Model 31 only and 33) Refer to pp. 92-103 for mating cable assemblies andAura Light Adapters.

Mini-change®
- 3 - pin Mini-change® type
- 4 - pin Micro-change® type

Micro-change®
- 3 - pin Micro-change® type
- 4 - pin Micro-change® type
- 5 - pin Micro-change® type

HiTemp Wire: 18 gauge (1/18") dia. potted-in Teflon® insulated leads rated at 462°F (243°C) 600V UL / CSA listed
Model 35

The GO Switch Model 35 leverless limit switch has set the standard for reliable performance in valve position monitors.

With its hermetically sealed contacts, low hysteresis, and superior resistance to vibration, moisture, contaminants, abuse, and temperature extremes, the GO Switch 35 clearly out performs any other sensor on the planet.

When ordering valve position monitors and switchboxes, be sure to specify “GO Switch inside.”

Model 35

Contact Material: Nickel cadmium oxide, gold flashed
Form: SPDT, Form C
Ratings: Resistive
Sensing Range:

<table>
<thead>
<tr>
<th>Sensing Range</th>
<th>Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10&quot; (2.5 mm)</td>
<td>5/32&quot; (4 mm)</td>
</tr>
</tbody>
</table>

Model 35

1 Single Pole Double Throw (Form C)

Target Material: Ferrous steel
Sensing Range: Approx. 1/10" (2.5 mm)
Sensing Range with Target Magnet: up to 3 5/8" (92 mm) (max)

Model 35

No conduit hub

Ordering Guide
Fill in the boxes to create your ordering number.

Model

Contact Form

Sensing Range

Outlet Position

Enclosure Material

Approvals

Wiring Options

Load Wire: 18 Gauge (.110" dia.) stranded lead wires rated at 221°F (105°C) 600V / UL / CSA listed

1 Copper coated with flat black lacquer

7 CSA certified General Purpose (Wiring must be A or B)

8 UL Listed General Purpose

9 Hermetic Seal, UL Listed General Purpose

Cable: 18 Gauge (.250" dia.) stranded rubber covered cable rated at 194°F (90°C) 600V/UL / CSA listed

A2 36" (914 mm)
A3 72" (1829 mm)
A4 144" (3658 mm)
A... Lengths greater than 144" (Specify length in feet e.g. A150 = 150 ft. of leads)

B2 36" (914 mm)
B3 72" (1829 mm)
B4 144" (3658 mm)
B... Lengths greater than 144" (Specify length in feet e.g. B150 = 150 ft. of cable)

Need Accessories?
See pp. 92-103 for:

- Range Extending Target Magnets
- Mounting Brackets
- Connectors and more!
## Agency Approvals

<table>
<thead>
<tr>
<th>Termination Options</th>
<th>Approvals</th>
<th>CSA/FM Class 1 Div 1</th>
<th>CSA/FM Class 2 Div 2</th>
<th>CSA General Purpose</th>
<th>UL General Purpose</th>
<th>Hermetic Seal Model 35</th>
<th>SAA Exx Ic T6 IP65</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Potted PVC Leads</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B - Potted PVC Cable</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D - Quick Disconnect</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F - Potted HiTemp* Leads</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

X = Approvals Available

## NEMA Ratings

<table>
<thead>
<tr>
<th>NEMA CLASSES</th>
<th>Non-Hazardous</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4X</td>
<td>6</td>
</tr>
</tbody>
</table>

| A - Potted PVC Leads | X | X |
| B - Potted PVC Cable | X | X |
| D - Quick Disconnect | X | X | X | X |
| F - Potted HiTemp* Leads | X | X | X | X | X | X |

35 Series Hermetic seal w/ potting:
X = Designed to meet respective NEMA specifications

## Leverless Limit Switches

### Wiring Diagrams (male view)

#### PVC & Teflon Leads - UL
- N/C Red
- N/O Blue
- COM Black

| Pin 1 | COM |
| Pin 2 | N/C |
| Pin 3 | N/O |
| Termination DCA |

#### PVC Cable - UL
- N/C Red
- N/O White
- COM Black
- GND Green

| Pin 1 | COM |
| Pin 2 | N/D |
| Pin 3 | N/C |
| Pin 4 | GND |
| Termination DCD |

#### PVC & Teflon Leads - CSA
- N/C Red
- N/O White
- COM Black
- GND Green

| Pin 1 | COM |
| Pin 2 | N/D |
| Pin 3 | N/C |
| Pin 4 | GND |
| Termination DCA |

#### PVC Cable - CSA
- N/C Red
- N/O White
- COM Black
- GND Green

| Pin 1 | COM |
| Pin 2 | N/D |
| Pin 3 | N/C |
| Pin 4 | GND |
| Termination DCD |

#### Micro-Change QDC - 3 Pin
- Pin 1 | COM |
- Pin 2 | N/C |
- Pin 3 | N/O |
- Termination DCA

#### Micro-Change QDC - 4 Pin
- Pin 1 | COM |
- Pin 2 | N/D |
- Pin 3 | N/C |
- Pin 4 | GND |
- Termination DCD
Model 81

The GO Switch Model 81 offers end sensing and an optional Double Pole Double Throw contact arrangement. With its brass or stainless steel housings and global certifications, it is a popular choice around the world.

Features:
- SPDT or DPDT 10A contacts
- End Sensing
- Operating temperature -40°F to 221°F (-40°C to 105°C)
- Quick disconnect connector
- Underwater capabilities

<table>
<thead>
<tr>
<th>Model 81</th>
<th>81-20516-A2</th>
<th>CSA Class I Div 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>81-20518-A2</td>
<td>UL General Purpose</td>
</tr>
<tr>
<td></td>
<td>81-20524-A2</td>
<td>DPDT Brass, 3 ft. leads</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DPDT Stainless, 3 ft. leads</td>
</tr>
</tbody>
</table>

### Ordering Guide

Fill in the boxes to create your ‘ordering number.’

**Contact Form:**
- Fill in the number of contacts you need.
- Fill in the number of poles you need.

**Sensing Range:**
- Fill in the range of sensing you require.
- Fill in any optional features you need.

**Enclosure Material:**
- Fill in the material type you prefer.

**Approvals:**
- Fill in the necessary approvals for your application.

**Wiring Options:**
- Fill in the wire type and size you need.

---

**Dimensions**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>81-20516-A2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
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**Approvals**

<table>
<thead>
<tr>
<th>Approvals</th>
<th>81-20516-A2</th>
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</thead>
<tbody>
<tr>
<td></td>
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**Wiring Options**

<table>
<thead>
<tr>
<th>Wiring Options</th>
<th>81-20516-A2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
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</tbody>
</table>

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**Ordering Guide**

<table>
<thead>
<tr>
<th>Model 81</th>
<th>Contact Form</th>
<th>Sensing Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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**GOSWITCH**

1165 South 44th West, P.O. Box 33270, Salt Lake City, Utah 84133-0270 Copyright 1994, 2002, 2007, 2009 by GOSWITCH, Inc. All Rights Reserved. Specifications subject to change without notice. WWW.GOSWITCH.COM 1-800-225-4359 1-801-487-1260 GO SWITCH

---

**Model 81**

- Size: 1 1/2" (38 mm) square x 350°F (176°C)
- (-40°C to 105°C). HiTemp™ option to -400°F high temperature
- Approx. 1/4" (6 mm) end sensing up to 3 7/8" (98 mm) (max)
- Operating Temperature: -400°F to 350°F high temperature
- Repeatability: 0.002" (.05 mm)
- Fill in the boxes to create your ‘ordering number.’
- Underwater capabilities
- Fill in the number of contacts you need.
- Fill in the number of poles you need.
- Fill in the range of sensing you require.
- Fill in any optional features you need.
- Fill in the material type you prefer.
- Fill in the necessary approvals for your application.
- Fill in the wire type and size you need.
**Agency Approvals**

<table>
<thead>
<tr>
<th>Termination Options</th>
<th>(1) No Approvals</th>
<th>(2) UL Class 1</th>
<th>(3) CSA/FM Class 1</th>
<th>(4) CSA General Purpose</th>
<th>(5) UL General Purpose</th>
<th>(6) CSA Ex nR T6 IP65</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 - Terminal Block X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>A - Potted PVC Leads X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B - Potted SO Cable X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D - Quick Disconnect X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D - SubSea® Connector X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>F - Potted HiTemp™ Leads X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**NEMA Ratings**

<table>
<thead>
<tr>
<th>NEMA CLASSES</th>
<th>Non-Hazardous</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>X</td>
<td>6</td>
</tr>
<tr>
<td>4X</td>
<td>6P</td>
<td>7</td>
</tr>
<tr>
<td>6P</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

| 00 - Terminal Block X | X                | X              | X                 | X                      | X                     | X                    |
| A - Potted PVC Leads X | X                | X              | X                 | X                      | X                     | X                    |
| B - Potted SO Cable X | X                | X              | X                 | X                      | X                     | X                    |
| D - Quick Disconnect X | X                | X              | X                 | X                      | X                     | X                    |
| D - SubSea® Connector X | X                | X              | X                 | X                      | X                     | X                    |
| F - Potted HiTemp™ Leads X | X                | X              | X                 | X                      | X                     | X                    |

**Termination Options**

**Non-Hazardous**

- X = Approvals Available
- SS = Stainless steel
- X = Designed to meet respective NEMA specifications

**Wiring Diagrams (male view)**

<table>
<thead>
<tr>
<th>4 Wire PVC &amp; HiTemp Leads</th>
<th>N/C Red</th>
<th>N/O Blue</th>
<th>COM Black</th>
<th>GND Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminations A &amp; F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SO Cable**

<table>
<thead>
<tr>
<th>N/C Red</th>
<th>N/O White</th>
<th>COM Black</th>
<th>GND Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminations B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PVC Leads, Cable & HiTemp Leads**

| N/C1 - Red | N/C2 - Red/White Stripe |
| N/O1 - Blue | N/O2 - Blue/White Stripe |
| COM1 - Black | COM2 - Black/White Stripe |
| GND - Green | GND - Green |
| Terminations A & F        |         |          |           |           |

**Termination Options**

- X = Approvals Available
- SS = Stainless steel
- X = Designed to meet respective NEMA specifications

**Termination Options**

- X = Approvals Available
- SS = Stainless steel
- X = Designed to meet respective NEMA specifications

**Termination Options**

- X = Approvals Available
- SS = Stainless steel
- X = Designed to meet respective NEMA specifications

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- SS = Stainless steel
- X = Designed to meet respective NEMA specifications

**Termination Options**

- X = Approvals Available
- SS = Stainless steel
- X = Designed to meet respective NEMA specifications

**Termination Options**

- X = Approvals Available
- SS = Stainless steel
- X = Designed to meet respective NEMA specifications
## Models 71 and 72

GO Switch Models 71 and 72 have the smallest diameters of any round leverless limit switch, and are used extensively in factory automation applications.

### Features:
- **SPDT 4A contacts**
- Intrinsically Safe
- -40°F to 221°F operating temperature

### Options:
- Suitable for Zone 0, 1, or 2 explosion proof
- -40°F to 400°F high temperature
- Quick disconnect connector
- English or Metric threads

### Sensing Range

<table>
<thead>
<tr>
<th>Model</th>
<th>Target Material</th>
<th>Ferrous steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>Target Magnets</td>
<td>(up to .15&quot;) end sensing</td>
</tr>
<tr>
<td>72</td>
<td>Target Magnets</td>
<td>(up to .15&quot;) end sensing</td>
</tr>
</tbody>
</table>

### Outlet Position

<table>
<thead>
<tr>
<th>Model</th>
<th>Conduit Outlet</th>
<th>1/2&quot; NPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>2</td>
<td>Side entry (Model 72)</td>
</tr>
<tr>
<td>72</td>
<td>5</td>
<td>Bottom of enclosure</td>
</tr>
</tbody>
</table>

### Approvals

<table>
<thead>
<tr>
<th>Model</th>
<th>Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>UL listed General Purpose</td>
</tr>
<tr>
<td>72</td>
<td>UL listed General Purpose</td>
</tr>
</tbody>
</table>

### Wiring Options

#### Lead Wires

- 18 Gauge (0.41 mm) stranded or solid PVC / Teflon® insulated leads, rated at 221°F (105°C) / 600V UL / CSA listed

#### Cable

- 18 Gauge (0.41 mm) stranded or solid PVC / Teflon® insulated leads, rated at 176°F (80°C) / 300V UL / CSA listed

#### Water Resistant

- 18 Gauge (0.41 mm) stranded or solid PVC / Teflon® insulated leads, rated at 176°F (80°C) / 300V UL / CSA listed

### Ordering Guide

**Fill in the boxes to create your ordering number.**

<table>
<thead>
<tr>
<th>Model</th>
<th>Contact Form</th>
<th>Sensing Range</th>
<th>Outlet Position</th>
<th>Enclosure Material</th>
<th>Approvals</th>
<th>Wiring Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>1</td>
<td>6</td>
<td>2</td>
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<td>72</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**See pp. 105-104 for mating cable assemblies and Ann Light Adapters.**

**Mini-change®**

- MDOA 4 pin Mini-change® type
- MDDS 4 pin Mini-change® type

**Micro-change®**

- DDA 3 pin Micro-change® type
- DDSG 3 pin Micro-change® type

**HTTemp Leads**

- 18 gauge (0.41 mm) stranded or solid PVC / Teflon® insulated leads, rated at 400°F (204°C) / 600V UL / CSA listed (Approval must be 2, 3, 4, 8, F, or B)

---

** Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370 Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
Models 73 and 74

The GO Switch Model 73 is our most popular leverless limit switch. Its solid stainless steel construction and global certifications make it the ideal choice for a variety of applications. Model 74 is the same, less the conduit hub.

Features:
- spgtr 4A contacts
- Intrinsically Safe
- -40°F to 221°F operating temperature
- Options: Suitable for Zone 0, 1, or 2 explosion proof
- -40°F to 400°F high temperature
- Quick disconnect connector
- Underwater capabilities
- English or Metric threads

Sensing Range

Target Material: Ferrous steel
Sensing Range: Approx. .100" (3 mm) end sensing (2,000 PSI)
.022" (.5 mm) end sensing (3,300 PSI)
.006" (1.5 mm) end sensing (10,000 PSI)
Sensing Range with Target Magnet:
Standard sensing - approx. .100" (3 mm) end sensing (Enclosure must be 2 or 6)
4 HIPressure sensing - approx. .022" (.5 mm) end sensing (Enclosure must be 3 and Approvals must be 2, 7, 8, or 6)
5 HIPressure sensing - approx. .060" (1.5 mm) end sensing (Enclosure must be 4 and Approvals must be 2, 7, 8, or 9)

Extended Sensing Range with External Target Magnets
(See Accessories for External Target Magnets)

Conduit Outlet: 1/2" NPT
Side entry with TeflonTM insulated leads (Wiring must be F)
Lengths greater than 144" (Specify length in feet (e.g. B150 = 150 ft. of cable))

Ordering Guide
Fill in the boxes to create your order number.

Models 73 and 74

<table>
<thead>
<tr>
<th>Model</th>
<th>Contact Form</th>
<th>Sensing Range</th>
<th>Outlet Position</th>
<th>Enclosure Material</th>
<th>Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>73-15323-A2</td>
<td>Class 1 Div 1, 3 ft. leads</td>
<td>303 stainless steel (rated 2,000 PSI) (Sensing must be 3)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15324-A2</td>
<td>Class 1 Div 1, 6 ft. leads</td>
<td>303 stainless steel (rated 2,000 PSI) (Sensing must be 3)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15326-A2</td>
<td>Class 1 Div 2, 3 ft. leads</td>
<td>303 stainless steel (rated 2,000 PSI) (Sensing must be 3)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15328-A2</td>
<td>General Purpose 3 ft. leads</td>
<td>303 stainless steel (rated 2,000 PSI) (Sensing must be 3)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15328-DCA</td>
<td>General Purpose, Mini Connector</td>
<td>316 stainless steel (rated 2,000 PSI)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15328-B2</td>
<td>General Purpose, 3 ft. cable</td>
<td>316 stainless steel (rated 2,000 PSI)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15328-DBA</td>
<td>General Purpose, Micro Connector</td>
<td>316 stainless steel (rated 2,000 PSI)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
</tbody>
</table>

Need Accessories?
See pp. 101-104 for:
- Range Extending Target Magnets
- Mounting Baskets
- Connectors and more

Wiring Options

1. Lead Wires: 18 Gauge (.04") Awg, polyvinyl chloride insulated, stranded wire, rated at 227°C (440°F), CSA listed (Approval must be 2 or 8) and Approvals must be 2, 7, or 8, or 9) Path length less than 144” (Specify length in feet (e.g. A110 = 110 ft. of cable))

Water Resistant: 18 Gauge (.04") insulated, lead wire, rated at 179°C (352°F), CSA listed (Approval must be 2, 7, or 9) with water resistant cable connector (Model 74).
2. Cable: 15 Gauge (.03") potted-in PVC cable, rated at 179°C (352°F), UL / CSA listed

Quick Disconnect: Male Quick Disconnect only, potted-in connector. (CSA requires a case ground)
(Approvals must be 7 or 8) Refer to pp. 93-104 for mating cable assemblies and Access-Light Adapters.

Mini-change®

73-13528-A2 303 stainless steel (rated 2,000 PSI) (Sensing must be 3) | Bottom of enclosure | CSA certified General Purpose | 2 |

Micro-change®

73-13528-DCA 316 stainless steel (rated 2,000 PSI) | Bottom of enclosure | CSA certified General Purpose | 2 |

Side Entry Underwater Connector (Model 73)

3DE Male, 5/8" (16 mm) dia. x 35/8" (92 mm) with 1/2" NPT conduit hub.

4DE Male, 5/8" (16 mm) dia. x 5/8" (16 mm) dia. x 23/4" (70 mm) with 1/2" NPT conduit hub.

5DE Male, 5/8" (16 mm) dia. x 5/8" (16 mm) dia. x 35/8" (92 mm) with 1/2" NPT conduit hub.

General Purpose 3 ft. leads

Class I Div 1, 3 ft. leads

Class I Div 1, 6 ft. leads

Class I Div 2, 3 ft. leads

General Purpose 3 ft. leads

General Purpose, Mini Connector

General Purpose, 3 ft. cable

General Purpose, Micro Connector

Cl I Zone 0; DIP Cl II (Intrinsically safe with entity approved barrier.

HiTemp Leads: 18 gauge (.04") insulated, polyvinyl chloride insulated, stranded wire, rated at 482°F (250°C), UL / CSA listed (Approval must be 2, 3, 4, 6, 7, 8, or 9) Path length less than 144” (Specify length in feet (e.g. P110 = 110 ft. of leads))

Model 73

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<td>Class 1 Div 1, 6 ft. leads</td>
<td>303 stainless steel (rated 2,000 PSI) (Sensing must be 3)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15326-A2</td>
<td>Class 1 Div 2, 3 ft. leads</td>
<td>303 stainless steel (rated 2,000 PSI) (Sensing must be 3)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15328-A2</td>
<td>General Purpose 3 ft. leads</td>
<td>303 stainless steel (rated 2,000 PSI) (Sensing must be 3)</td>
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<td>2</td>
</tr>
<tr>
<td>73-15328-DCA</td>
<td>General Purpose, Mini Connector</td>
<td>316 stainless steel (rated 2,000 PSI)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15328-B2</td>
<td>General Purpose, 3 ft. cable</td>
<td>316 stainless steel (rated 2,000 PSI)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
<td>2</td>
</tr>
<tr>
<td>73-15328-DBA</td>
<td>General Purpose, Micro Connector</td>
<td>316 stainless steel (rated 2,000 PSI)</td>
<td>Bottom of enclosure</td>
<td>CSA certified General Purpose</td>
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</tbody>
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Need Accessories?
See pp. 101-104 for:
- Range Extending Target Magnets
- Mounting Baskets
- Connectors and more

Wiring Options

1. Lead Wires: 18 Gauge (.04") polyvinyl chloride insulated, stranded wire, rated at 227°C (440°F), CSA listed (Approval must be 2, 7, or 9) Path length less than 144” (Specify length in feet (e.g. A110 = 110 ft. of cable))

Water Resistant: 18 Gauge (.04") insulated, lead wire, rated at 179°C (352°F), UL / CSA listed (Approval must be 2, 7, or 9) with water resistant cable connector (Model 74).
2. Cable: 15 Gauge (.03") insulated, lead wire, rated at 179°C (352°F), UL / CSA listed

Quick Disconnect: Male Quick Disconnect only, potted-in connector. (CSA requires a case ground)
(Approvals must be 7 or 8) Refer to pp. 93-104 for mating cable assemblies and Access-Light Adapters.

Mini-change®

73-13528-A2 303 stainless steel (rated 2,000 PSI) (Sensing must be 3) | Bottom of enclosure | CSA certified General Purpose | 2 |

Micro-change®

73-13528-DCA 316 stainless steel (rated 2,000 PSI) | Bottom of enclosure | CSA certified General Purpose | 2 |

Side Entry Underwater Connector (Model 73)

3DE Male, 5/8" (16 mm) dia. x 35/8" (92 mm) with 1/2" NPT conduit hub.

4DE Male, 5/8" (16 mm) dia. x 5/8" (16 mm) dia. x 23/4" (70 mm) with 1/2" NPT conduit hub.

5DE Male, 5/8" (16 mm) dia. x 5/8" (16 mm) dia. x 35/8" (92 mm) with 1/2" NPT conduit hub.

General Purpose 3 ft. leads

Class I Div 1, 3 ft. leads

Class I Div 1, 6 ft. leads

Class I Div 2, 3 ft. leads

General Purpose 3 ft. leads

General Purpose, Mini Connector

General Purpose, 3 ft. cable

General Purpose, Micro Connector

Cl I Zone 0; DIP Cl II (Intrinsically safe with entity approved barrier.

HiTemp Leads: 18 gauge (.04") insulated, polyvinyl chloride insulated, stranded wire, rated at 482°F (250°C), UL / CSA listed (Approval must be 2, 3, 4, 6, 7, 8, or 9) Path length less than 144” (Specify length in feet (e.g. P110 = 110 ft. of leads))
Models 75, 76 & 77

GO Switch Models 75 and 76 are the same as models 73 and 74, only slightly longer with more thread surface and therefore more adjustability. Model 77 is the longest and largest option in the 70 series family.

Features:
- SPDT 4A contacts
- Intrinsically Safe
- -40°F to 221°F operating temperature
- Options: Suitable for Zone 0, 1, or 2 explosion proof
- -40°F to 400°F high temperature Quick disconnect connector
- Underwater capabilities

Ordering Guide
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<table>
<thead>
<tr>
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<th>Approvals</th>
<th>Wiring Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>SPDT</td>
<td>1/2&quot; NPT</td>
<td>1&quot; bar</td>
<td>PC resized</td>
<td>UL Listed</td>
<td>Load Wire: 10 Gauge (-110°F) plenum-rated AWM / TEF insulated lead wire, rated at 221°F (105°C) 800V UL / CSA listed</td>
</tr>
<tr>
<td>76</td>
<td>A F. On Hex</td>
<td>1/2&quot; NPT</td>
<td>1&quot; bar</td>
<td>PC resized</td>
<td>UL Listed</td>
<td>Load Wire: 10 Gauge (-110°F) plenum-rated AWM / TEF insulated lead wire, rated at 221°F (105°C) 800V UL / CSA listed</td>
</tr>
<tr>
<td>77</td>
<td>A F. On Hex</td>
<td>1/2&quot; NPT</td>
<td>1&quot; bar</td>
<td>PC resized</td>
<td>UL Listed</td>
<td>Load Wire: 10 Gauge (-110°F) plenum-rated AWM / TEF insulated lead wire, rated at 221°F (105°C) 800V UL / CSA listed</td>
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</tr>
</tbody>
</table>

Need Accessories?
See pp. 103-104 for:
- Lug connections (Sensing must be 4)
- Wiring must be A, B, or F) (Lead seal req’d within 18")
- Quick Disconnect: Not Quick Disconnect only, pulled-in connector (CSA requires a ground) (Approvals are 7 or 8)
- Intrinsically Safe-40
- High Pressure sensing - approx. .020" (.51 mm)
- Standard sensing - approx. .100" (2.54 mm)
- Extended Sensing Range with Target Magnets:
  - Ferrous steel
  - .075" (1.905 mm)
  - .060" (1.524 mm)
  - .030" (0.762 mm)

(model 75)

(model 76)

(model 77)

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Models 7G, 7H & 7I
GO Switch Models 7G, 7H & 7I offer unique options such as hermetically sealed and Double Pole Double Throw contact arrangements in a variety of enclosures.

Features:
- SPOT or DPDT 4A contacts
- Intrinsically Safe
- -40 to 221°F operating temperature

Options:
- Suitable for Zone 0, 1, or 2 explosion proof
- DPDT 4A contacts
- -40 to 400°F high temperature
- Hermetically sealed contacts

Sensing Range
- Target Material: Ferrous steel
- Sensing Range: .0093” (2.3 mm) end sensing (2,000 PSI)
- Sensing Range with Target Magnet: up to .20” (5 mm)
- Standard sensing - approx. .050” (2.3 mm) end sensing

Contact Form
- Form: SPDT Form C; DPDT Form CC
- Contact Material: Palladium silver with sawtooth surface configuration

Sensing Range with External Target Magnets
- Go Switch Models 7G, 7H & 7I offer unique options such as hermetically sealed and Double Pole Double Throw contact arrangements in a variety of enclosures.
- Features:
  - SPOT or DPDT 4A contacts
  - Intrinsically Safe
  - -40 to 221°F operating temperature

Options:
- Suitable for Zone 0, 1, or 2 explosion proof
- DPDT 4A contacts
- -40 to 400°F high temperature
- Hermetically sealed contacts
Model 7L GO Switch with LEDs

The new GO Switch Model 7L offers the same proven internals as our other 70 Series leverless limit switches, with the addition of Red or Green BriteLite LEDs. The new 7L brings increased plant safety and awareness to the reliability of the 70 Series.

Features:
- 316 stainless steel enclosure
- Red or Green BriteLite LEDs
- Leverless Limit Switch design

Model 7L

**Contact Form**

<table>
<thead>
<tr>
<th>Contact Material</th>
<th>Form</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palladium silver</td>
<td>SPOT, Form C</td>
<td>25A @ 24VDC/120VAC</td>
</tr>
</tbody>
</table>

**Sensing Range**

- Target Material: Ferrus
- Sensing Range: 0.100" nominal

**Outlet Position**

- Standard sensing - approx. 0.100" (2.5 mm) end sensing
- Bottom of enclosure

**Enclosure Material**

- Stainless Steel type 316

**Approvals**

- C-UL listed General Purpose

**Wiring Options**

- Lead Wires: 16 Gauge - 11/16" dia, potted-in PVC insulated AWG / TEW stranded lead wires, rated at 220°F (105°C) 600V UL / CSA listed
- Cable: 18 Gauge - 3 cond .250" dia; 4 cond .250" dia. potted-in PVC insulated stranded lead wires, rated at 176°F (80°C) 300V, UL / CSA listed

**Need Accessories?**

See pp. 93-104 for:
- Range Extending
- Mounting Brackets
- Connectors and more!

**Ordering Guide**

Fill in the boxes to create your 'ordering number.'

---

Model 7LG GO Switch with LEDs

**Contact Form**

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<td>SPOT, Form C</td>
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**Sensing Range**

- Target Material: Ferrus
- Sensing Range: 0.100" nominal

**Outlet Position**

- Standard sensing - approx. 0.100" (2.5 mm) end sensing
- Bottom of enclosure

**Enclosure Material**

- Stainless Steel type 316

**Approvals**

- C-UL listed General Purpose

**Wiring Options**

- Lead Wires: 16 Gauge - 11/16" dia, potted-in PVC insulated AWG / TEW stranded lead wires, rated at 220°F (105°C) 600V UL / CSA listed
- Cable: 18 Gauge - 3 cond .250" dia; 4 cond .250" dia. potted-in PVC insulated stranded lead wires, rated at 176°F (80°C) 300V, UL / CSA listed

**Need Accessories?**

See pp. 93-104 for:
- Range Extending
- Mounting Brackets
- Connectors and more!

**Ordering Guide**

Fill in the boxes to create your 'ordering number.'

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Model 7LR GO Switch with LEDs

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<td>SPOT, Form C</td>
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</tr>
</tbody>
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**Sensing Range**

- Target Material: Ferrus
- Sensing Range: 0.100" nominal

**Outlet Position**

- Standard sensing - approx. 0.100" (2.5 mm) end sensing
- Bottom of enclosure

**Enclosure Material**

- Stainless Steel type 316

**Approvals**

- C-UL listed General Purpose

**Wiring Options**

- Lead Wires: 16 Gauge - 11/16" dia, potted-in PVC insulated AWG / TEW stranded lead wires, rated at 220°F (105°C) 600V UL / CSA listed
- Cable: 18 Gauge - 3 cond .250" dia; 4 cond .250" dia. potted-in PVC insulated stranded lead wires, rated at 176°F (80°C) 300V, UL / CSA listed

**Need Accessories?**

See pp. 93-104 for:
- Range Extending
- Mounting Brackets
- Connectors and more!

**Ordering Guide**

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Model 7LG GO Switch with LEDs

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**Sensing Range**

- Target Material: Ferrus
- Sensing Range: 0.100" nominal

**Outlet Position**

- Standard sensing - approx. 0.100" (2.5 mm) end sensing
- Bottom of enclosure

**Enclosure Material**

- Stainless Steel type 316

**Approvals**

- C-UL listed General Purpose

**Wiring Options**

- Lead Wires: 16 Gauge - 11/16" dia, potted-in PVC insulated AWG / TEW stranded lead wires, rated at 220°F (105°C) 600V UL / CSA listed
- Cable: 18 Gauge - 3 cond .250" dia; 4 cond .250" dia. potted-in PVC insulated stranded lead wires, rated at 176°F (80°C) 300V, UL / CSA listed

**Need Accessories?**

See pp. 93-104 for:
- Range Extending
- Mounting Brackets
- Connectors and more!

**Ordering Guide**

Fill in the boxes to create your 'ordering number.'
Model LPS

LPS: Linear Position Sensor

The Luminator LPS is specifically designed to provide position feedback on linear control valves and knife gate valves. Onboard Green or Red LEDs increase safety and awareness for plant operators.

Features:
- 316 stainless steel enclosure
- Hermetically sealed sensors
- Snap-action contacts

Visual Display Wiring

Ordering Guide
Fill in the boxes to create your 'ordering number.'

Model

Sensor

Area Classification

Visual Display

Wiring

LPS-DZ2RA2
Class I, Div 2 with
Red BriteLite™

LPS-DZ2GA2
Class I, Div 2 with
Green BriteLite™

Dimensions

Enclosure: 3.86” x 1”, 316 series stainless steel

Magnetic Target: 1.00” x 0.65”, 316 series stainless steel

Conduit Outlet: 1/2” NPT

Operating Temperature: -40° to 160°F (-40° to 71°C)

Environment
- Zone 1 (Class I, Div 1): NEMA Type 4, 4X, 7 and 9
- Zone 2 (Class I, Div 2): NEMA Type 4, 4X

Visual Display
- BriteLite: Triaxial LEDs
- BriteLite Colors: Green or Red
- G Green BriteLite 360° triaxial LED visual position indicator (Z0 & Z2 only)
- R Red BriteLite 360° triaxial LED visual position indicator (Z0 & Z2 only)
- N No visual indication

BriteLite: Triaxial LEDs

Need Accessories?
See pp. 93-104 for:
- Range Extending
- Target Magnets
- Mounting Brackets
- Connectors and more!

A2 3 ft. 18 gauge potted-in lead wires
A3 6 ft. gauge potted-in lead wires
A4 12 ft. 18 gauge potted-in lead wires
DCA 3-pin mini change quick disconnect
(D2 only unless installed I.S. per NEC Article 504)
DCD 4-pin mini change quick disconnect
(D2 only unless installed I.S. per NEC Article 504)

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Model 7A Pneumatic Proximity Switch

The GO Switch model 7A is a unique pneumatic proximity switch. The 7A uses reliable leverless limit switch technology to operate a 3 way air valve at up to 100 PSI.

The GO Switch 7A is ideal for use as a cylinder position sensor in pneumatic cylinders, on many types of automated equipment, and in any hazardous areas where electrical signals should be avoided.

Features:
- Pneumatic proximity switch
- 3 way air valve
- 1.5 SCFM nominal flow rate
- Up to 100 PSI operation

Ordering Guide
Fill in the boxes to create your ‘ordering number.’

<table>
<thead>
<tr>
<th>Model</th>
<th>Port Arrangement</th>
<th>Sensing Range</th>
<th>Port Position</th>
<th>Enclosure Material</th>
<th>Approvals</th>
<th>Wiring Options</th>
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<tr>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>00</td>
<td>00</td>
</tr>
</tbody>
</table>

Repeatability: ±0.002” (±0.05 mm) typical
Operating Temperature: 0°F to 300°F (-20 to 180°C)
Operating Pressure: 60-100 PSI

Target Material: Ferrus steel
Sensing Range: ±0.02” (±0.5 mm) end sensing (2,000 PSI)
Standard sensing - approx. ±0.02” (±0.5 mm) end sensing

Three push to release fittings (for 5/32” O.D. tubing)

Supply, Cylinder, and Exhaust

Three push in fittings

Target Material: Ferrous steel
Sensing Range: ±0.062” (±1.6 mm) end sensing (2,000 PSI)
Standard sensing - approx. ±0.062” (±1.6 mm) end sensing

1.88” (48 mm)
2.50” (64 mm)

Dimensions

Model 7A Pneumatic Proximity Switch

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Standard sensing - approx. ±0.062” (±1.6 mm) end sensing

1.88” (48 mm)
2.50” (64 mm)

Dimensions
Cylinder Position Sensors
GO Switch Stroke-to-GO® cylinder position sensors use three permanent magnets and push-pull plunger assembly to control a set of dry contacts.

**Technology in Action**

**Stroke-to-GO**

**Leverless Limit Switch**

The center magnet simultaneously attracts the primary magnet and repels the bias magnet, pushing the connecting rod backward. As a result, the common contact rests in its unoperated position, closing a contact circuit.

When the ferrous cushion of a cylinder enters the sensing area of the switch, it attracts the primary magnet, which pulls the connecting rod forward. As a result, the common contact snaps to its operated position, closing the other contact circuit.

When the target is removed the common contact automatically returns to its original unoperated position.

**Options Available**

- SPST or SPDT
- HiTemp™ to 400°F
- SubSea™ Submersible

**Key Benefits**

Stoke-to-GO cylinder position sensors are simple and built to last.

With only one moving part and no metal-to-metal contact forcing it to move, there is nothing to wear out!
Models 7C, 7D, 7E & 7F

With their solid stainless steel housings and leverless limit switch design, Stroke to Go switches have set the standard for reliability and durability in cylinder position sensing.

Features:
- SPD7 4A contacts
- Inherently Intrinsically Safe
- 40°F to 221°F operating temperature
- Options: -40°F to 400°F high temperature

Quick disconnect connector
Underwater capabilities

Target Material: Ferrous steel
Sensing Range: -0.090” (2.3 mm) and sensitivity 0.003” (0.076 mm) (Recommended air gap .015” – .040”)

Standard sensing - approx. .090” (2.3 mm) and sensing

Outlet Position
- 2 Side entry 360° adjustable (Wiring must be A, B, C, or E)
- No conduct hub
- 6 Side outlet 360° adjustable with Quick Disconnect (Wiring must be B) (Approval must be 7)
- 7 Side outlet 360° adjustable with 1/16” NPT conduit hub (Wiring must be A, B, or F)
- Top outlet (Wiring must be SubSea)

Contact Form
- SPDT
- SPST

Contact Material: Peltierium silver with silver emissive surface configuration
Form: SPDT, Form C (with or without LED indication)
Single Pole, Single Throw (or without LED indication) Form A or Form B

Models 7C, 7D, 7E & 7F

Model
Repeatability: .002” (.05 mm) typical
Response Time: 8 milliseconds
Differential: Approx. .020” (.5 mm)
Operating Temperature: 40°F to 160°F (-40°C to 71°C) without LEDs; HiTemp™ option to 400°F (204°C)

Models 7C-23658-DCA
1.025” probe
Mini Connector
7C-43658-DCA
2.062” probe
Mini Connector

Models 7E-23658-DCA
1.025” probe
Mini Connector
7E-43658-DCA
2.062” probe
Mini Connector

Sensing Range
- .090” (2.3 mm) and sensitivity

Outlet Position
- 2 Side entry 360° adjustable (Wiring must be A, B, C, or F)
- No conduct hub
- 6 Side outlet 360° adjustable with Quick Disconnect (Wiring must be B) (Approval must be 7)
- 7 Side outlet 360° adjustable with 1/16” NPT conduit hub (Wiring must be A, B, or F)
- Top outlet (Wiring must be SubSea)

Enclosure Material
- 2 Stainless steel (rated 3,000 psi operating at 1 to 5 safety factor applies to standard probe lengths)
- 3 High temperature to 400°F (204°C) with Teflon™ insulated leads (Leakage current is 1.0mA)
- 4 High temperature to 400°F (204°C) with bi-color LED indication (Leakage current is 1.0mA)
- 5 CSA certified General Purpose
- 6 UL listed General Purpose

Approvals
- Load Wire: 18 Gauge (.110” dia) potted-in PVC insulated AWM / TEW stranded lead wire, rated at 221°F (105°C) 200V / UL listed
- A2: 26” (660 mm)
- A3: 72” (1829 mm)
- A4: 144” (3658 mm)
- A5: Length greater than 144” (Specification length in feet (e.g. A150 = 150 ft. of cable))
- Cable: 10 Gauge (.250” dia.) potted-in PVC cable, rated at 176°F (80°C) 300V, UL / CSA listed
- B2: 36” (914 mm)
- B3: 72” (1829 mm)
- B4: 144” (3658 mm)
- B5: Length greater than 144” (Specification length in feet (e.g. B150 = 150 ft. of cable))
- Water Resistant: 18 Gauge (.250” dia.) PVC cable rated at 176°F (80°C) 300V with water-resistant connectors
- C2: 36” (914 mm)
- C3: 72” (1829 mm)
- C4: 144” (3658 mm)
- C5: Length greater than 144” (Specification length in feet (e.g. C150 = 150 ft. of cable))
- Quick Disconnect: Male Quick Disconnect only, potted-in connector. (CSA requires a case ground)
- D2: 3 pin Micro-change® type
- D3: 3 pin Micro-change® type
- D4: 3 pin Micro-change® type
- D6: 5 pin Micro-change® type
- SDB: 5 pin Micro-change® type
- SDE: 5 pin Micro-change® type
- SDB: 4 pin Micro-change® type
- SDE: 4 pin Micro-change® type
- HiTemp Leads: 18 gauge (.110” dia) potted-in Teflon™ insulated leads rated at 221°F (105°C) 200V / UL listed
- F2: 50” (1270 mm)
- F3: 72” (1829 mm)
- F4: 144” (3658 mm)
- F5: Length greater than 144” (Specification length in feet (e.g. F150 = 150 ft. of cable))

Wiring Options

Need Accessories?
See pp. 104-106 for:
- Range Extending
- Target Magnets
- Mounting Brackets
- Connectors and more

For more information, visit www.stevenengineering.com

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Contact Form

Model

Contact Form

Sensing Range

Outlet Position

Enclosure Material

Approvals

Wiring Options

Sensing Range

Outlet Position

Enclosure Material

Approvals

Wiring Options
Cylinder Position Sensors

Stroke-To-GO® Switches provide precise end-of-stroke position indication on pneumatic and hydraulic cylinders. Designed to exceed automotive industry standards, the housing is machined from stainless steel bar stock to handle pressures to 3,000 PSI operating (tested to UL’s 3X burst requirement) while withstanding the extreme external conditions such as weld slag, coolants, cutting fluids, physical abuse and even high temperatures. Stroke-To-GO® Switches incorporate the same 70 Series GO® Switch mechanism that has been tested to over 200 million mechanical cycles and field proven in the most rigorous applications. This unique design offers the greatest benefits in cylinder indication.

**Models 7C, 7D, 7E & 7F**

<table>
<thead>
<tr>
<th>PROBE CODE</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>7C</td>
<td>2.290</td>
<td>2.315</td>
</tr>
<tr>
<td>7D</td>
<td>2.315</td>
<td>2.340</td>
</tr>
<tr>
<td>7E</td>
<td>2.340</td>
<td>2.365</td>
</tr>
<tr>
<td>7F</td>
<td>2.365</td>
<td>2.390</td>
</tr>
</tbody>
</table>

A two digit code is required for ordering the correct custom probe length. All Application Considerations below must be met. For any discrepancies please consult factory. Please follow these steps:

1. Measure dimension A from both ends of your cylinder or retrieve from specification drawings.
2. Locate the Min/Max range that dimension A falls within on the Custom Probe Length Chart.
3. Locate probe length requirement and Probe Code in the next two Columns to the right.
4. Enter the probe code into the corresponding spaces of the Stroke-To-GO® Part Number.

**Application Considerations**

- Cylinder cushion must be ferrous.
- Air gap between switch sensing face and cushion should be .015” to .040” (outside this range please consult factory).
- Largest diameter of target (cushion) should cover at least 75% of probe sensing face.
- Sensing face of Stroke-To-GO® Switch must be at least 1.25” from piston rod for proper switch meet. This may at times require an air gap distance greater than .040”.
- For cushion diameters less than .50”, air gap should be .105” to .255”.

**Unique Features**

- **Mechanical life:** >200,000,000 cycles
- **Leakage current:** >200,000,000 cycles
- **Voltage Drop:** With LEDs - <1mA (SPST)
- **Leakage current:** >200,000,000 cycles
- **Stroke-to-GO® Switches** incorporate the 70 Series GO® Switch mechanism that has been tested to over 200 million mechanical cycles and field proven in the most rigorous applications. This unique design offers the greatest benefits in cylinder indication.

**Temperature drift:**

- With LEDs - 2.8 volts (SPST)
- Without LEDs - 2.8 volts (SPST)

**Mechanical life:**

- >200,000,000 cycles

**Leakage current:**

- >200,000,000 cycles

**Voltage Drop:**

- With LEDs - <1mA (SPST)
- Without LEDs - 2.8 volts (SPST)

**Leakage current:**

- >200,000,000 cycles

**Stroke-to-GO® Switches** incorporate the 70 Series GO® Switch mechanism that has been tested to over 200 million mechanical cycles and field proven in the most rigorous applications. This unique design offers the greatest benefits in cylinder indication.
### Leverless Limit Switches

**CONTACT FORMS**

<table>
<thead>
<tr>
<th>CONTACT FORMS</th>
<th>Leads</th>
<th>Cable</th>
<th>Water-Resistant</th>
<th>HiTemp</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - SPST Form A</td>
<td>COM</td>
<td>N/O</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>N/O w/ LED</td>
<td>GND</td>
<td>Blue</td>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>3 - SPST Form B</td>
<td>COM</td>
<td>N/C</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>N/C w/ LED</td>
<td>GND</td>
<td>Red</td>
<td>Red</td>
<td>White</td>
</tr>
<tr>
<td>4 - SPOT Form C</td>
<td>N/O</td>
<td>BLUE</td>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>No LED</td>
<td>GND</td>
<td>Red</td>
<td>Red</td>
<td>White</td>
</tr>
<tr>
<td>5 - SPOT Form C</td>
<td>N/O</td>
<td>BLUE</td>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>Dual LEDs</td>
<td>GND</td>
<td>Red</td>
<td>Red</td>
<td>White</td>
</tr>
<tr>
<td>7 - SPST Form A</td>
<td>COM</td>
<td>N/O</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>N/O w/ LED</td>
<td>GND</td>
<td>Blue</td>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>8 - SPST Form B</td>
<td>N/O</td>
<td>RED</td>
<td>Red</td>
<td>White</td>
</tr>
<tr>
<td>N/O w/ LED</td>
<td>GND</td>
<td>Green</td>
<td>Green</td>
<td>White</td>
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</table>

### Agency Approvals

<table>
<thead>
<tr>
<th>Approvals</th>
<th>(2) HiTemp</th>
<th>(7) CSA General Purpose</th>
<th>(8) UL General Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Potted PVC Leads</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>B - Potted PVC Cable</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C - Water squeeze connector</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D - Quick Disconnect</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D - SubSea™ Connector</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>F - HiTemp™ Leads</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>X = Approvals Available</td>
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### NEMA Ratings

<table>
<thead>
<tr>
<th>Models 7C, 7D, 7E, 7F</th>
<th>Non-Hazardous</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEMA CLASSES 4 4X 6 6P 7 9</td>
<td></td>
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</tr>
<tr>
<td>A - Potted PVC leads</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B - Potted PVC cable</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>C - PVC Cable w/ squeeze</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D - Quick Disconnect</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D - SubSea™ Connector</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>F - HiTemp™ Teflon leads</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X = Designed to meet respective NEMA specifications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Models 7C, 7D, 7E, 7F

- Non-Hazardous
- Hazardous

- **SPST, Form A, N/O**
  - PIN 1: GND
  - PIN 2: COM
  - PIN 3: N/O

- **SPST, Form B, N/C**
  - PIN 1: GND
  - PIN 2: COM
  - PIN 3: N/C

- **SPOT, Form C**
  - PIN 1: COM
  - PIN 2: N/C
  - PIN 3: N/O

- **SPOT, Form D**
  - PIN 1: COM
  - PIN 2: N/D
  - PIN 3: N/C
  - PIN 4: GND

### Spoke Position Sensors

**Courtesy of Steven Engineering**

230 Ryan Way, South San Francisco, CA 94080-6370

Main Office: (650) 588-9200

Outside Local Area: (800) 258-9200

www.stevenengineering.com
Leverless Limit Switches

502.969.8000

SPST, Form A, N/O
PIN 1 COM
PIN 2 N/O
PIN 3 GND
PIN 4 Inactive
PIN 5 COM

SPST, Form B, N/C
PIN 1 COM
PIN 2 N/C
PIN 3 GND
PIN 4 Inactive
PIN 5 COM

SPDT, Form C
PIN 1 N/O
PIN 2 N/C
PIN 3 GND
PIN 4 Inactive
PIN 5 COM

3 Pin Mini Change
with or without LED

4 Pin Mini Change
with or without LED

5 Pin Mini Change
with or without LED

3 Pin SubSea without LED

4 Pin SubSea without LED

3 Pin SubSea - Right Angle without LED

Stroke to GO Wiring

Cylinder Position Sensors

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Main View

Main View

Main View

Main View

Main View

Main View

Main View

Main View

Main View
Specialty Sensors
11 HiTemp™ Switch

The GO Switch Model 11 HiTemp™ leverless limit switches are rated for continuous operation at 350°F. With its classic design, the 11 is useful when long sensing ranges are needed, in applications such as automotive paint booths, conveyors, automated driers, and valve position monitoring on steam valves and other high heat applications.

Features:
- SPDT 10A contacts
- Side sensing to 3/8”
- Continuous operation at 350°F

Options:
- Sensing range to 3-3/8” with target magnet
- Mica glass lead wires rated over 842°F

Dimensions

<table>
<thead>
<tr>
<th>Model 11</th>
<th>Contact Form</th>
<th>Sensing Range</th>
<th>Outlet Position</th>
<th>Enclosure Material</th>
<th>Approvals</th>
<th>Wiring Options</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Need Accessories?
See pp. 93-104 for:
Range Extending
Target Magnets
Mounting Brackets
Connectors and more!

Ordering Guide
Fill in the boxes to create your ordering number.
81 HiTemp™ Switch

The GO Switch Model 81 HiTemp™ leverless limit switch is rated for continuous operation at 350°F. The 81 offers end sensing and an optional Double Pole Double Throw contact arrangement. The 81 is useful when redundant signals are required in applications such as automotive paint booths, conveyors, automated driers, and valve position monitoring on steam valves and other high heat applications.

Features:
- SPDT or DPDT 10A contacts
- End sensing to 5/16”
- Continuous operation at 350°F

Options:
- Sensing range to 3-7/8” with target magnet
- Mica glass lead wires rated over 842°F

Contact Form:
- Form C - SPDT
- Form CC - DPDT

Target Material: Ferrous steel
Sensing Range: Approx. 1/8” (8 mm)
Sensing Range with Target Magnet: up to 3 3/4” (98 mm) (max)

Model 81

Dimensions

Ordering Guide
Fill in the boxes to create your 'ordering number.'

Contact Form

Sensing Range

Outlet Position

Enclosure Material

Approvals

Wiring Options

Need Accessories?
See pp. 83-84 for:
- Range Extending Target Magnets
- Mounting Brackets
- Connectors and more!
### Models 71 and 72

GO Switch Models 71 and 72 have the smallest diameters of any round leverless limit switch, and are used extensively in factory automation applications.

**Features:**
- SPDT 4A contacts
- Intrinsically Safe
- -40°F to 400°F operating temperature
- Options:
  - English or Metric threads
  - Mica glass lead wires rated over 842°F

### High Temperature - Models 71 - 72

70.969.8000

### Leverless Limit Switches

#### Wiring Options

- **Wiring Options**
  - English or Metric threads
  - Mica glass lead wires rated over 842°F

#### Model 71

- **Model 71**
  - M12 x 1 external metric thread

#### Model 72

- **Model 72**
  - M12 x 1 external metric thread

### Ordering Guide

**Ordering Guide**

Fill in the boxes to create your ‘ordering number.’

### Contact Form

<table>
<thead>
<tr>
<th>Model</th>
<th>Contact Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>1 Pole Double Throw (Form C)</td>
</tr>
<tr>
<td>71M</td>
<td>M12 x 1 external metric thread</td>
</tr>
<tr>
<td>72</td>
<td>1 Pole Double Throw (Form C)</td>
</tr>
<tr>
<td>72M</td>
<td>M12 x 1 external metric thread</td>
</tr>
</tbody>
</table>

### Sensing Range

- **Target Material:** Ferrous steel
- **Sensing Range:**
  - Range: Approx. .040" (1 mm)
  - End Sensing: .020" (.51 mm)
  - Standard Sensing: approx. .040" (1 mm) end sensing

### Outlet Position

- **Outlet Position:**
  - 1/2" NPT
  - Bottom of enclosure

### Enclosure Material

- **Enclosure Material:**
  - 303 stainless steel (rated 2,000 PSI)
  - 316 stainless steel (rated 2,000 PSI)

### Approvals

- **Approvals:**
  - SAA
    - High temperature to 400°F (204°C)
    - Intrinsically safe with entity approved barrier. (Refer to NEC Article 501)

### Wiring Options

- **Wiring Options:**
  - High Temp Leads 18 gauge (.070" dia.) potted-in Teflon® insulated leads rated at 482°F (250°C)
- **Wiring Lengths:**
  - F2: 36" (914 mm)
  - F3: 72" (1829 mm)
  - F4: 144" (3658 mm)
  - Lengths greater than 144" (Specify length in feet (e.g. F150 = 150 ft. of leads))

### Contact Material

- **Contact Material:** Palladium silver with sawtooth surface configuration

### Form

- **Form:** SPDT

### Repeatability

- **Repeatability:** 0.002" (.05 mm) typical

### Response Time

- **Response Time:** 8 milliseconds

### Differential

- **Differential:** .002" (.05 mm) typical

### Operating Temperature

- **Operating Temperature:** -40°F to 400°F (-40°C to 204°C)

### AC DC Volts Amps Volts Amps

- **AC:**
  - 120: 4
  - 240: 2
  - 480: 0.5
- **DC:**
  - 250: 0.5

### Target Material

- **Ferrous steel**

### Sensing Range with Target Magnet

- **Sensing Range with Target Magnet:** up to .15" (4 mm)

### Conduit Outlet

- **Conduit Outlet:**
  - 1/2" NPT
  - 2: Side entry (Model 72)
  - 5: Bottom of enclosure

### Dimensions

- **Height:** .565" (.1438 cm)
- **Diameter:** .315" (.8000 cm)

### Need Accessories?

See page 13-14 for:
- Range Extending
- Target Magnets
- Mounting brackets
- Connectors and more!

### Courtesy of Steven Engineering, Inc.

230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com
73-74-75-76-77 HiTemp™ Switches

GO Switch Models 73, 75, and 77 HiTemp™ leverless limit switches are rated for continuous operation at 400°F, the highest rating of any position sensors on the market. These models are useful when precision sensing is required, in applications such as cylinder position sensing in automated paint booths, dryers, and conveyors, and valve position monitoring on steam valves and other high heat applications.

Features:
- SPOT 4 amp contacts
- End sensing to 0.100”
- Continuous operation at 400°F

Options:
- Sensing range to .30” with target magnet
- Mica glass lead wires rated over 842°F

<table>
<thead>
<tr>
<th>Model</th>
<th>Contact Form</th>
<th>Sensing Range</th>
<th>Outlet Position</th>
<th>Enclosure Material</th>
<th>Approvals</th>
<th>Wiring Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 73</td>
<td>M10 x 1.5 external metric thread</td>
<td>Model 73</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/4” (6 mm) dia. x 0.25” (6.4 mm) long with 1/4-20 UNF x 0.25” (1.6 mm) threads and 1/4-18 NPT conduit hub</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 74</td>
<td>M10 x 1.5 external metric thread</td>
<td>Model 74</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1/4” (6 mm) dia. x 0.25” (6.4 mm) long with 1/4-20 UNF x 0.25” (1.6 mm) threads and 1/4-18 NPT conduit hub</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 75</td>
<td>M10 x 1.5 external metric thread</td>
<td>Model 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1/4” (6 mm) dia. x 0.25” (6.4 mm) long with 1/4-20 UNF x 0.25” (1.6 mm) threads and 1/4-18 NPT conduit hub</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 76</td>
<td>M10 x 1.5 external metric thread</td>
<td>Model 76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/4” (6 mm) dia. x 0.25” (6.4 mm) long with 1/4-20 UNF x 0.25” (1.6 mm) threads and 1/4-18 NPT conduit hub</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**High Temperature - Models 7G, 7H & 7I**

## 7G-7H-7I HiTemp™ Switches

GO Switch Models 7G, 7H, and 7I HiTemp™ leverless limit switches are rated for continuous operation at 400°F, the highest rating of any position sensors on the market. These models offer end sensing and an optional Double pole Double Throw contact arrangement. They are useful when precision sensing and redundant signals are needed, in applications such as cylinder position sensing in automated paint booths, driers, and conveyors, and valve position monitoring on steam valves and other high heat applications.

### Features:
- SPDT or DPDT 4A contacts
- End sensing to .090”
- Continuous operation at 400°F
- Options:
  - Sensing range to .20” with target magnet
  - Mica glass lead wires rated over 642°F

### Ordering Guide

Fill in the boxes to create your "ordering number."

- **Model**
- **Contact Form**
- **Sensing Range**
- **Outlet Position**
- **Enclosure Material**
- **Approvals**
- **Wiring Options**

#### Sensing Range with Target Magnet:
- Target material: Ferrous steel
- Sensing Range: 204°F (90°C) end sensing (2000 PSI)

#### Extended Sensing Range with External Target Magnets:
- Sensing Range: 204°F (90°C) end sensing (2000 PSI)

### Enclosure Material
- Stainless Steel type 303

### Approvals
- 2 High temperature to 400°F (204°C) with Teflon™ insulated leads
- 2 303 stainless steel (yew 2, 000/95)
- 6 316 stainless steel (yew 2, 000/95)

### Wiring Options
- HiTemp Leads: 20 gauge 150' at 144°F , 200' at 250°F (600V UL / CSA listed)
- HiTemp Leads: 2: 30' (914 mm)
- HiTemp Leads: 2: 72' (2133 mm)
- HiTemp Leads: 2: 144' (4378 mm)

### Mounting Brackets
- See pp. 93-104 for:

#### Need Accessories?

See pp. 93-104 for:
- Mounting Brackets
- Connectors and more!
High Temperature - Models 7C, 7D, 7E, & 7F

502.969.8000

Stroke-to-GO HiTemp™ Switches

Stroke-to-GO Models 7C, 7D, 7E, and 7F HiTemp™ cylinder position sensors are rated for continuous operation at 400°F, the highest rating of any cylinder position sensors on the market. These models are useful in applications such as cylinder position sensing in automated paint booths, dryers, and conveyors, and other high-heat applications.

Features:
- SPDT or SPDT 4A contacts
- Continuous operation at 400°F
- Options:
  - Custom probe lengths up to 5" long
  - Mica glass lead wires rated over 842°F

Contact Form

- Contact Material: Palladium silver with sawtooth surface configuration
- Form: SPDT, Form C with or without LED indicator, Single Pole, Single Throw
- Form A or Form B
- Ratings: Resistive

Sensing Range

- Target Material: Ferrous steel
- Sensing Range: .090" (.23 mm) end sensing (3,000 PSI) (Recommended air gap: .005" - 0.040"
- Standard sensing - approx. .090" (.23 mm) end sensing

Outlet Position

- Conduit Outlet: 1/2" NPT
- Side entry 360° adjustable
- No conduit hub
- Side outlet 360° adjustable with 1/2" NPT conduit hub

Enclosure Material

- Stainless Steel type 303

Approvals

- High temperature to 400°F (350°C) with Teflon™ insulated leads rated at 40°F (25°C) 600V UL / CSA listed

Wiring Options

- Mica glass lead wires rated over 842°F (3,000 PSI) (Recommended air gap: .005" - 0.040")
- Standard sensing - approx. .090" (.23 mm) end sensing

Dimensions

High Temperature Switches

Need Accessories?

See pp. 93-104 for:
- Range Extending
- Target Magnets
- Mounting Brackets
- Connectors and more!

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### Underwater Switches - 10 & 20 Series

**502.969.8000**

#### 11/21 SubSea™ Switches

GO Switch Models 11 and 21 SubSea™ leverless limit switches are submersible to 434 feet. With their classic design, the 11 and 21 are useful when long sensing ranges are needed, in applications such as lock and dam gates, military hatch doors, ships and vessels, and offshore oil platforms.

**Features:**
- SPDT 10A contacts
- Side sensing to 9/16”
- Permanent submergence to 434 feet

**Options:**
- Sensing range to 3-3/8” (86mm) with target magnet
- Straight or right angle SubSea connector

**Specifications:**
- **Sensing Range:**
  - Approx. 3/8” (10mm) standard; 9/16” extended sensing (Model 11)
  - Standard sensing - approx. 3/8”
  - Extended sensing - approx. 9/16”
- **Contact Material:**
  - Ferrous steel
  - Silver cadmium oxide, gold flashed
- **Contact Form:**
  - Single Pole Double Throw (Form C)
  - Double Make Double Break, two-circuit, Form 2
  - Double Make Double Break, two-circuit, Form 2 Latching (extended sensing)

**Ordering Guide:**
- Fill in the boxes to create your ‘ordering number.’

### Underwater Connectors

#### SubSea Connector with Delrin Lock Sleeve

- **Material:** Stainless Steel
- **Pressure Rating:** 200 PSI

#### Delrin Lock Sleeves

- **Material:** Stainless Steel

#### SubSea Right Angle Connector

- **Material:** Stainless Steel

### Wiring Options

- **SubSea™ Underwater Connector** (Refer to pp. 93-104 for mating cable assemblies.)
  - **3DE**
    - 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
  - **4DE**
    - 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
  - **3DE**
    - 3 pin, certified not to leak underwater
  - **4DE**
    - 4 pin, certified not to leak underwater

#### Enclosure Material

- **Material:** Stainless Steel
- **Pressure Rating:** 200 PSI

#### Approvals

- **UL listed General Purpose**
- **CSA certified General Purpose**

### Sensing Range

- **Target Material:** Ferrous steel
- **Sensing Range:**
  - Approx. 3/8” (10mm) standard; 9/16” (extended sensing (Model 11))

### Outlet Position

- **Contact Outlet:** 1/2” NPT
- **Contact Form:**
  - Single Pole Double Throw (Form C)
  - Double Make Double Break, two-circuit, Form 2

### Contact Form

- **Contact Material:** Silver cadmium oxide, gold flashed
- **Contact Form:**
  - Single Pole Double Throw (Form C)
  - Double Make Double Break, two-circuit, Form 2

### Sensing Range

- **Target Material:**
  - Ferrous steel
- **Sensing Range:**
  - Approx. 3/8” (10mm) standard; 9/16” extended sensing (Model 11)
  - Standard sensing - approx. 3/8”
  - Extended sensing - approx. 9/16”
- **Contact Outlet:** 1/2” NPT
- **Contact Form:**
  - Single Pole Double Throw (Form C)
  - Double Make Double Break, two-circuit, Form 2

### Ordering Guide

- Fill in the boxes to create your ‘ordering number.’

### Wiring Options

- **SubSea™ Underwater Connector** (Refer to pp. 93-104 for mating cable assemblies.)
  - **3DE**
    - 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
  - **4DE**
    - 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
  - **3DE**
    - 3 pin right-angle, certified not to leak underwater
  - **4DE**
    - 4 pin right-angle, certified not to leak underwater

### Enclosure Material

- **Material:** Stainless Steel
- **Pressure Rating:** 200 PSI

### Approvals

- **UL listed General Purpose**
- **CSA certified General Purpose**

### Wiring Options

- **SubSea™ Underwater Connector** (Refer to pp. 93-104 for mating cable assemblies.)
  - **3DE**
    - 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
  - **4DE**
    - 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
  - **3DE**
    - 3 pin right-angle, certified not to leak underwater
  - **4DE**
    - 4 pin right-angle, certified not to leak underwater

### Sensing Range

- **Target Material:** Ferrous steel
- **Sensing Range:**
  - Approx. 3/8” (10mm) standard; 9/16” extended sensing (Model 11)
  - Standard sensing - approx. 3/8”
  - Extended sensing - approx. 9/16”

### Outlet Position

- **Contact Outlet:** 1/2” NPT
- **Contact Form:**
  - Single Pole Double Throw (Form C)
  - Double Make Double Break, two-circuit, Form 2
Underwater Switches - 80 Series

81 SubSea™ Switch

The GO Switch Model 81 SubSea™ leverless limit switch is submersible to 434 feet. The 81 offers end sensing and an optional Double Pole Double Throw contact arrangement. The 81 is useful when redundant signals are required in applications such as lock and dam gates, military hatch doors, ships and vessels, and offshore oil platforms.

Features:
- SPDT or DPDT 10 amp contacts
- End sensing to 1/4”
- Permanent submersion to 434 feet
- Options: Sensing range to 3-7/8” with target magnet
  - Straight or right angle SubSea™ connector

Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Contact Form</th>
<th>Sensing Range</th>
<th>Outlet Position</th>
<th>Enclosure Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td>Form CC - DPDT</td>
<td>0</td>
<td>1 Side outlet</td>
<td>Material: Stainless Steel</td>
</tr>
</tbody>
</table>

Ordering Guide

Fill in the boxes to create your ‘ordering number.’

Contact Form

1 Single Pole Double Throw (Form C) (Wiring must be 3DD, 3DE or 4DD)
2 Double Pole Double Throw (Form CC) (Wiring must be 4DD)

Sensing Range

Target Material: Ferrous steel
Sensing Range: Approx. 1/8” (8 mm)
Sensing Range with Target Magnet: up to 3 1/4” (82 mm) max

Ordering Guide

Model 81

Contact Form

Form CC - DPDT

Sensing Range

0

Outlet Position

Condout Outlet: 1/2” NPT.

SubSea Connector with Delrin Lock Sleeve

SubSea Right Angle Connector

Electrical Specifications

Material: Stainless Steel

Approvals

- 7 CSA certified General Purpose
- 8 UL listed General Purpose

Wiring Options

SubSea™ Underwater Connector (See pp. 93-104 for mating cable assemblies.)
3DE 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
4DD 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
3DE 3 pin right-angle, certified not to leak underwater
4DE 4 pin right-angle, certified not to leak underwater

Connecting Options

Refer to pp. 93-104 for mating cable assemblies.

Enclosure Material

Material: Stainless Steel

Contact Form

Form CC - DPDT

Sensing Range

0

Outlet Position

Condout Outlet: 1/2” NPT.

SubSea Connector with Delrin Lock Sleeve

SubSea Right Angle Connector

Electrical Specifications

Material: Stainless Steel

Approvals

- 7 CSA certified General Purpose
- 8 UL listed General Purpose

Wiring Options

SubSea™ Underwater Connector (See pp. 93-104 for mating cable assemblies.)
3DE 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
4DD 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
3DE 3 pin right-angle, certified not to leak underwater
4DE 4 pin right-angle, certified not to leak underwater

Connecting Options

Refer to pp. 93-104 for mating cable assemblies.

Enclosure Material

Material: Stainless Steel

Contact Form

Form CC - DPDT

Sensing Range

0

Outlet Position

Condout Outlet: 1/2” NPT.

SubSea Connector with Delrin Lock Sleeve

SubSea Right Angle Connector

Electrical Specifications

Material: Stainless Steel

Approvals

- 7 CSA certified General Purpose
- 8 UL listed General Purpose

Wiring Options

SubSea™ Underwater Connector (See pp. 93-104 for mating cable assemblies.)
3DE 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
4DD 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
3DE 3 pin right-angle, certified not to leak underwater
4DE 4 pin right-angle, certified not to leak underwater

Connecting Options

Refer to pp. 93-104 for mating cable assemblies.

Enclosure Material

Material: Stainless Steel

Contact Form

Form CC - DPDT

Sensing Range

0

Outlet Position

Condout Outlet: 1/2” NPT.

SubSea Connector with Delrin Lock Sleeve

SubSea Right Angle Connector

Electrical Specifications

Material: Stainless Steel

Approvals

- 7 CSA certified General Purpose
- 8 UL listed General Purpose

Wiring Options

SubSea™ Underwater Connector (See pp. 93-104 for mating cable assemblies.)
3DE 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
4DD 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeve)
3DE 3 pin right-angle, certified not to leak underwater
4DE 4 pin right-angle, certified not to leak underwater

Connecting Options

Refer to pp. 93-104 for mating cable assemblies.
73-75-77 SubSea™ Switches

GO Switch Models 73, 75, and 77 SubSea™ leverless limit switches are submersible to as deep as 23,000 feet. With their solid, one-piece stainless steel housings, there is no means for water to penetrate the contact chamber. These models are useful when precision sensing is required, in applications such as valve position monitoring, pig detection, pin placement detection, and cylinder position sensing on lock and dam gates, military hatch doors, ships and vessels, and offshore oil platforms.

Features:
- SPOT 4 amp contacts
- End sensing to 0.100”
- Optional submersion depth to 11,500 feet
- Optional submersion depth to 23,000 feet
- Sensing range to .35” with target magnet
- Straight or right angle SubSea connector

Options:
- Optional submersion depth to 23,000 feet
- End sensing to 0.100”

Model 73
- 1/4" (.63 mm) dia. x 3 1/4" (.82 mm) long with 1/4-18 UNF x 1/4".041 wall thickness and 1/4” NPT conduit hub

Model 75
- 1/4" (.63 mm) dia. x 4 1/4" (.78 mm) long with 1/4-18 UNF x 1/4".041 wall thickness and 1/4” NPT conduit hub

Model 77
- 1/4" (.63 mm) dia. x 5 1/2” (.144 mm) long with 1/4-18 UNF x 1/2".081 wall thickness and 1/2” NPT conduit hub

**Ordering Guide**
Fill in the boxes to create your ‘ordering number.’

**Model**
<table>
<thead>
<tr>
<th>Repeatability</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>±0.002” (.05 mm)</td>
<td>6 milliseconds</td>
</tr>
</tbody>
</table>

**Contact Form**
- Form: SPOT, Form C
- Contact Material: Palladium silver with sawtooth surface configuration
- Ratings: Resistive

**Sensing Range**
- Target Material: Ferrous steel
- Sensing Range:
  - .060” (.15 mm) end sensing (Enclosure must be 4)
  - .072” (.18 mm) end sensing (Enclosure must be 3)
  - .100” (.25 mm) end sensing (Enclosure must be 2)

**Outlet Position**
- 6 Bottom of enclosure

**Enclosure Material**
- Material: 303 Stainless Steel
- 303 stainless steel (rated 2,000 PSI) (Sensing must be 4)
- 3 HiPressure - 303 stainless steel (rated 3,000 PSI) (Sensing must be 4)
- 4 HiPressure - 303 stainless steel (rated 10,000 PSI) (Sensing must be 5)
- 6 316 Stainless steel (rated 2,000 PSI)

**Approvals**
- 7 CSA certified General Purpose
- 8 UL listed General Purpose

**Wiring Options**
- SubSea Underwater Connector: Refer to pp. 93-104 for mating cable assemblies.
- 300 3 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
- 400 4 pin, certified not to leak underwater (includes male/female Delrin™ lock sleeves)
- 358 3 pin right-angle, certified not to leak underwater
- 406 4 pin right-angle, certified not to leak underwater

**Need Accessory?**
See pp. 53-104 for:
- Range Extending
- Target Magnets
- Mounting Brackets
- Connectors and more!
In the power generation industry, reliability is a must. This is especially true when it comes to turbine control valves. But one of the more common difficulties in power plants is the typical limit switch arrangement on throttle, governor, intercept, and reheat stop valves. Conventional limit switches in this application are notorious for failing due to heat and physical abuse, and for falling out of tolerance and requiring readjustment.

TopWorx has solved this problem with the Defender turbine trip switch system. Made especially for turbine valves, the Defender is packed with up to 10 reliable GO Switch leverless limit switches, and is designed as a direct, drop-in replacement for existing OEM limit switches on Westinghouse or General Electric turbines.

Wiring Options

Ordering Guide
Fill in the boxes to create your ‘ordering number.’

Model
Defender Turbine Valve Monitoring System

GO Switches
Defender Turbine Trip Switch

Model 74-LLS: SPDT, environmentally sealed, rated 4A @ 120VAC, 3A @ 240VDC, maximum 240 VAC or 240VDC, with prewired HiTemp™ Teflon lead wire

Choose number of switches
(maximum 1, maximum 10)

- 01000 One Leverless Limit Switch
- 02000 Two Leverless Limit Switches
- 03000 Three Leverless Limit Switches
- 04000 Four Leverless Limit Switches
- 05000 Five Leverless Limit Switches
- 06000 Six Leverless Limit Switches
- 07000 Seven Leverless Limit Switches
- 08000 Eight Leverless Limit Switches
- 09000 Nine Leverless Limit Switches
- 10000 Ten Leverless Limit Switches

Wiring Options

00 Male/Female M8 Spec Quick Disconnect with back shell connection to 1-1/4” flex conduit
01 Male/Female M8 Spec Quick Disconnect with 25 ft. of cable
02 Male/Female M8 Spec Quick Disconnect with 50 ft. of cable
03 Male/MF Female M8 Spec Quick Disconnect with back shell connection to 1-1/4” flex conduit
04 Male/MF Female M8 Spec Quick Disconnect with 25 ft. of cable
05 Male/MF Female M8 Spec Quick Disconnect with 50 ft. of cable
06 Male/MF Female M8 Spec Quick Disconnect with back shell connection to 1-1/4” flex conduit
07 Male/MF Female M8 Spec Quick Disconnect with 25 ft. of cable
08 Male/MF Female M8 Spec Quick Disconnect with 50 ft. of cable
09 Male/MF Female M8 Spec Quick Disconnect with 100 ft. of cable
10 Male/MF Female M8 Spec Quick Disconnect with 25 ft. of HiTemp™ cable
11 Male/MF Female M8 Spec Quick Disconnect with 50 ft. of HiTemp™ cable
12 Male/MF Female M8 Spec Quick Disconnect with 100 ft. of HiTemp™ cable

Accessories
ACP48 DEFENDER Calibration Unit
Only one unit is required to calibrate any quantity of Defender Systems
74-LLS Replacement GO Switch and Target Cam Package
**Quick Disconnects & Cordsets**

Quality-engineered connectors and cordsets make installation and maintenance a snap.

Standard designs are shown, with custom connectors available on special order.

Refer to the Wiring Options portion of each GO Switch Ordering Guide for detailed information.

### Micro Change® Quick Disconnect

- 22 gauge (3 pin .23" dia.; 4 pin .25" dia.; 5 pin .26 dia.) molded PVC anodized aluminum shell rated 221°F (105°C) 300V

### Water Resistant Squeeze Connector

- Stainless steel, water resistant strain relief.

### SubSea Quick Disconnect

- Stainless steel, water resistant, strain relief.

### High Pressure SubSea Quick Disconnect

- Molded Neoprene® Quick Disconnect with Delrin® lock sleeves. Provides water-tight seal, safety and quick change-out. Overall length of connector is 2.9" (74 mm) X 1.23" (31 mm) dia.

### High Pressure Right Angle SubSea Quick Disconnect

- Overall length of connector is 2.85" (72 mm) X 0.65" (17 mm) dia.

### SubSea™ Underwater Cordsets

<table>
<thead>
<tr>
<th>Number</th>
<th>Mini-Change® Cordsets</th>
<th>Micro-Change® Cordsets</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-ECB-9</td>
<td>3 pin, 3 ft. (914 mm)</td>
<td>A-EBB-9 3 pin, 2 ft. (610 mm)</td>
</tr>
<tr>
<td>A-ECB</td>
<td>3 pin, 3 ft. (914 mm)</td>
<td>A-EBB 3 pin, 2 ft. (610 mm)</td>
</tr>
<tr>
<td>A-ECB-90</td>
<td>3 pin, 6 ft. (1829 mm)</td>
<td>A-EBB 3 pin, 3 ft. (914 mm)</td>
</tr>
<tr>
<td>A-ECB</td>
<td>3 pin, 6 ft. (1829 mm)</td>
<td>A-EBB 3 pin, 3 ft. (914 mm)</td>
</tr>
<tr>
<td>A-ECB-90</td>
<td>3 pin, 12 ft. (3658 mm)</td>
<td>A-EBB 3 pin, 6 ft. (1829 mm)</td>
</tr>
<tr>
<td>A-ECB</td>
<td>3 pin, 12 ft. (3658 mm)</td>
<td>A-EBB 3 pin, 6 ft. (1829 mm)</td>
</tr>
<tr>
<td>A-ECU</td>
<td>3 pin, 20 ft. (6096 mm)</td>
<td>A-EBW 4 pin, 12 ft. (3658 mm)</td>
</tr>
<tr>
<td>A-ECV</td>
<td>3 pin, 30 ft. (9144 mm)</td>
<td>A-EBW 4 pin, 20 ft. (6096 mm)</td>
</tr>
<tr>
<td>A-ECZ</td>
<td>4 pin, 3 ft. (914 mm)</td>
<td>A-EBX 4 pin, 30 ft. (9144 mm)</td>
</tr>
<tr>
<td>A-ECC</td>
<td>4 pin, 6 ft. (1829 mm)</td>
<td>A-EBX 4 pin, 30 ft. (9144 mm)</td>
</tr>
<tr>
<td>A-ECF</td>
<td>4 pin, 6 ft. (1829 mm)</td>
<td>A-EBX 4 pin, 30 ft. (9144 mm)</td>
</tr>
<tr>
<td>A-ECG</td>
<td>4 pin, 12 ft. (3658 mm)</td>
<td>A-EBY 5 pin, 20 ft. (6096 mm)</td>
</tr>
<tr>
<td>A-ECX</td>
<td>4 pin, 12 ft. (3658 mm)</td>
<td>A-EBZ 5 pin, 30 ft. (9144 mm)</td>
</tr>
</tbody>
</table>
| A-ECJ | 5 pin, 3 ft. (914 mm) | Class I Div 2 Quick Connect Guard

**Leverless Limit Switches**

Leverless Limit Switches are available on GO Switches, with any GO Switch. There are three base models available. A 4, 4X rated for use in Cl I Div 2 applications.

### Watertight Cable Gland

Plastic cable gland is easy to install on any stainless steel GO Switch with a 1/2" conduit hub using the "P" cable termination option. It provides a watertight seal rated to IP 68 - 5 bar (comparable to NEMA 6) and is an excellent way of protecting all GO Switches in wet environments. Not suitable for use with conduit.

- A-GLD3 3 or 4 conductor PVC cable
- A-GLD2 3 or 4 conductor PVC cable

### SubSea™ Underwater Cordsets

<table>
<thead>
<tr>
<th>Number</th>
<th>Specified length of cable (ft.) required</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-3EA _</td>
<td>(3 pin) 3 pin and 20 ft. of cable</td>
</tr>
<tr>
<td>A-4EA _</td>
<td>3 pin female connector with Delrin® lock sleeve and minimum 12 ft. (3658 mm) of 16 gauge (3 pin .395&quot;) SD cable rated 194°F (90°C) 600V (certified not to leak underwater)</td>
</tr>
<tr>
<td>A-4ED _</td>
<td>4 pin female connector with Delrin® lock sleeve and minimum 12 ft. (3658 mm) of 16 gauge (4 pin .425&quot;) SD cable rated 194°F (90°C) 600V (certified not to leak underwater)</td>
</tr>
</tbody>
</table>

Consult factory for details.
AURA Light Adapter

Aura™ Light Adapter

The Aura Light Adapter provides LED position confirmation on any N/O GO Switch using a 3, 4, or 5 pin Mini-Change connector.

Ordering Guide
Fill in the boxes to create your ‘ordering number.’

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Arrangement</th>
<th>Connector</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Adapter Module</td>
<td>R (2) Red LEDs for normally open (N/O) output</td>
<td>3</td>
<td>0 None</td>
</tr>
<tr>
<td></td>
<td>G (2) Green LEDs for normally open (N/O) output</td>
<td>4</td>
<td>1 Contact Wash Circuit</td>
</tr>
<tr>
<td>ALA1 Aura Light Adapter for one contact (requires a load)</td>
<td></td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

Red LED
1.01”

Red LED
2.75”

Side 1

Side 2

Accessories

LED Adapter Module
ALA1 Aura Light Adapter for one contact (requires a load)

R (2) Red LEDs for normally open (N/O) output

G (2) Green LEDs for normally open (N/O) output

Connector

3-pin Mini-Change type connector

4-pin Mini-Change type connector

5-pin Mini-Change type connector

Options

0 None

1 Contact Wash Circuit

Red LED
2.75”

Dimensions

Red LED
1.01”

Side 1

Side 2

R (2) Red LEDs for normally open (N/O) output

G (2) Green LEDs for normally open (N/O) output

3-Pin

PIN 1 - COM

PIN 2 - NOT USED

PIN 3 - N/O

4-Pin

PIN 1 - COM

PIN 2 - N/O

PIN 3 - NOT USED

PIN 4 - GND

5-Pin

PIN 1 - N/O

PIN 2 - NOT USED

PIN 3 - GND

PIN 4 - NOT USED

PIN 5 - COM

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Target Magnets

Increase the Sensing Range of GO Switches

**AMP3 Magnet/Resin Cover**

AM3 magnet in plastic molded bracket with mounting holes: 3/8” (10 mm) x 1 1/2” (35 mm) x 2” (50 mm) thick with 7/32” (6 mm) holes.

For all GO Switches

**AMS4 Magnet/Stainless Cover**

AM4 magnet molded into stainless steel cover, with mounting holes: 11/4” (32 mm) x 1 1/2” (37 mm) x 1” (25 mm) thick with 7/32” (6 mm) holes.

For all GO Switches

**AMC5 Magnet/Stainless Cover**

AMC magnet molded into stainless cover with mounting holes: 3/8” (10 mm) x 1 1/2” (38 mm) x 2” (50 mm) thick with 3/16” (5 mm) holes.

For all GO Switches

---

**Leverless Limit Switches**

**AMS7 Magnet/Stainless**

Magnet assembly: 2” (50 mm) x 1/2” (13 mm) x 7/16”-20 UNC threads.

For 70 Series GO Switches

**AMF6 Magnet (Machinable)**

Flexible sensing amplifier/external magnet: 3” (76 mm) x 12” (305 mm) x 1/4” (10 mm) thick.

For all square GO Switches

---

Refer to individual GO Switch models for extended sensing ranges with external target magnets.
## Mounting Brackets

Standard mounting brackets are available to cover most GO Switch installations. They are designed to provide secure installation without interfering with the operation of the switch.

### Item | Part Number & Description
--- | ---
**Heavy Duty Mounting Bracket**<br>Side mount bracket for 10 Series GO Switches | ABS2 3" (76mm) x 3 1/4" (82mm) x 1/8" (3mm) thick stainless steel
| **Universal Mounting Bracket for 10/20 Series**<br>Universal mounting bracket for 10 Series and 20 Series GO Switches | ABS3 6" (152mm) x 1 1/2" (38mm) x 3/16" (5mm) stainless steel
| **Combination Cover Plate and Mounting Bracket**<br>Bottom mount for 10 or 20 Series GO Switches | ABS4 3" (76mm) x 1 1/2" (38mm) x 1/8" (3mm) thick brass
| **Universal Mounting Bracket for 80 Series**<br>Side mount bracket adapts 80 Series GO Switches for rotary-valve position indication | ABS5 3" (76mm) x 1 1/2" (38mm) x 1/8" (3mm) thick stainless steel
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | ABS6 10 gauge (.134") type 304 stainless steel
| **Heavy Duty “L” Mounting Bracket**<br>“L” bracket for 70 Series Model 73, 74, 75, 76 & 7G GO Switches | ABS7 1" (25mm) wide x .050" thick stainless steel for Model 31, 32, & 33 GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | ABS11 1/2" (19mm) wide x .030" thick stainless steel for Model 35 GO Switches
| **Heavy Duty “L” Mounting Bracket**<br>“L” bracket for 70 Series Model 73, 74, 75, 76 & 7G GO Switches | ABS9 1-1/4" (32mm) wide; 11 gauge (.120") thick non-magnetic stainless steel

## Leverless Limit Switches

### Item | Part Number & Description
--- | ---
**Cover Plates**<br>Cover plate for 10 and 20 Series GO Switches. Bottom mount cover plate/conduit for 10 and 20 Series GO Switches. Furnished with gasket and screws | AHS1 Brass; 1-1/2" (38mm) x 1-1/2" (38mm) x 1/8" (3mm)
| **Jam Nuts**<br>Nickel plated brass jam nuts for 70 Series GO Switches | AHS7 (2) 3/8" nickel plated brass for Model 71 and 72 GO Switches
| **Parker Seal Nut and Washer**<br>ThreadSeal Kits for 70 Series GO Switches. Zinc plated steel with nitrile rubber (standard) or Viton (hi-temp or hydraulic fluids detergent) washer | AHS13 3/8" zinc plated steel for Model 71 and 72 GO Switches
| **Sealant Tape**<br>Grafoil sealant tape for 70 Series GO Switches. Forms a leak-tight temperature-stable joint. Recommended for high pressure and/or high temperature | AHS15 3/4" zinc plated steel for Model 77 GO Switches
| **Heavy Duty Mounting Bracket**<br>Side mount bracket adapts 80 Series GO Switches for rotary-valve position indication | ABS8 Stainless steel; 1-1/2" (38mm) x 1-1/2" (38mm) x 1/8" (3mm)
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS16 (2) 5/8" stainless steel for Model 73-76, 7G & 7H GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS17 1" nickel plated brass for Model 7I GO Switches
| **Heavy Duty “L” Mounting Bracket**<br>“L” bracket for 70 Series Model 73, 74, 75, 76 & 7G GO Switches | AHS3 Brass; 1-1/2" (38mm) x 1-1/2" (38mm) x 1/8" (3mm)
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS18 5/8" stainless steel for Model 73-76, 7G & 7H GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS19 5/8" Viton for Model 73-76, 7G & 7H GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS20 3/4" Viton for Model 77 GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS16 (2) 5/8" nickel plated brass for Model 71 GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS21 (2) 3/4" stainless steel for Model 77 GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS17 1" zinc plated steel for Model 7I GO Switches
| **Heavy Duty “L” Mounting Bracket**<br>“L” bracket for 70 Series Model 73, 74, 75, 76 & 7G GO Switches | AHS15 3/4" zinc plated steel for Model 77 GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS15 3/4" zinc plated steel for Model 77 GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS17 3/4" nickel plated brass for Model 7I GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS17 3/4" stainless steel for Model 77 GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS17 1" zinc plated steel for Model 7I GO Switches
| **Strap Bracket**<br>Strap brackets for 30 Series GO Switches | AHS17 .005" x 24"
Over the years, customers have asked us to mount our GO Switch leverless limit switches to just about every type and brand of valve and actuator on the planet.

As a result, TopWorx has amassed over 1,200 different mounting kit designs.

So whether your valve application is rotary or linear, NAMUR or non-NAMUR, in production or obsolete, TopWorx is sure to have a mounting kit that fits your need.

### Valve and Actuator Manufacturers

- Aro
- Apollo
- Autocline
- Automax
- Avonax
- Badger Meter
- Bettis
- Bray
- Brook
- BIMB Valves
- Cameron
- Centraline
- Century
- Cloreco
- CompacTorque
- Conbraco
- Contromatics
- Cooper Valve
- CPV Mfg.
- Dahl, O. W.
- Dimco
- DeZurik
- Dorr
- Dynamic
- Elliott, Kenneth
- El-O-Matic
- Exeeco Gear Operators
- Fabri Valve
- Fisher Controls
- Flexible Valve Company
- Foxboro
- General Valve Company
- GilbarCo
- Hills McCanna
- Honeywell
- Hycon Actuators
- Hypro
- ITT
- ITT Grinnell
- Jarnesbury
- Kamyr
- Kusps
- Kinetic
- Kinley & Maier
- Kinnetik
- KTM-General Valve
- Leeson Actuators
- Lindoract
- Linkat
- Matic
- McCann
- McCann
- McCarroll
- Metronode
- Metrodyne
- Multi Actuators
- Neles Automation
- Orifice Valves
- Pacific Valves
- Parker Hydropower
- Pfaudler
- Prin Seals
- Pratt, Henry
- Ranco
- Raymond Control Systems
- ROSS
- Rockwell
- Rockwell
- Salco
- Rotork
- Saunders Valve
- Schott Valves
- Sink Actuas
- Shaler Actuators
- Sharker
- Tiffs
- Uthry
- Vals
t
- Walworth
- Watts Regulator
- WKM Dynavalve Actuators
- Worcester Controls
- Xerox

### NAMUR Mounting Kits

The vast majority of rack and pinion valve actuators come with an ISO/NAMUR mounting pattern. This worldwide standard provides a consistent bolt pattern and shaft height regardless of the actuator brand. As a result, there is less need for expensive, custom made mounting kits, making it easier and less expensive to mount topworx accessories.

TopWorx offers several cast aluminum and stainless steel mounting kits that make it easy to attach GO Switch 70 Series switches to rack and pinion actuators.

### Custom (Non-NAMUR) Mounting Kits

Rotary valve actuators that do not use the ISO/NAMUR standard, such as scotch-yoke or vane actuators, require custom designed mounting kits to attach GO Switches.

This can be a complex procedure that should not be overlooked by the end user. Since there are no standards, it is more difficult to ensure the proper fit and function of brackets, and consequently the automated valve system itself.

TopWorx has a team of designers experienced at solving this problem, making it easy to mount GO Switch products to scotch-yoke and vane actuators. With an existing library of over 1,200 different designs, there is probably already a design ready for your application.

**Note:** TopWorx custom mounting kits are always made of heavy-gauge stainless steel, ensuring the proper amount of support in the field.

### Linear Valve Mounting Kits

Linear valves, such as control valves, globe valves, knife gate valves, or diaphragm valves, do not conform to any standard mounting patterns. Therefore, custom designed mounting kits are necessary to attach GO Switches.

Since TopWorx has been mounting GO Switch leverless limit switches onto linear valves and actuators for several decades, there is probably already a design ready for your application - if not, we will create one.
Installation
Installation Principles

Installation Principle - Square Switches

- Non-ferrous brackets/plates are recommended (stainless steel or aluminum).
- GO Switches may be mounted on ferrous materials but it is not recommended. Loss of sensing range will result.
- It is recommended to mount switches 1” to 1-1/2” away from surrounding ferrous materials when possible.
- If mounting on ferrous material, ensure uniform coverage of the switch, biasing the internal magnet(s) equally. (Fig. 2) If magnets are biased unequal, latching may occur. (Fig. 1)
- GO Switches sense ferrous materials such as mild steel, 400 series and 17/4 stainless steel.
- Avoid contact between target and switch. Configure mounting of switch and/or target so that target passes within proximity range of sensing area. Sensing range will vary according to model number and size (mass) of target used.
- Target magnets, available through TopWorx, will increase the sensing range of the switch. Reference sensing ranges in corresponding sections throughout the catalog.
- For optimum performance, provide sufficient mass of target, and choose the appropriate GO Switch model to match the application requirements for operating frequency, type of load, etc.

- The greater mass of target the better for maximum contact pressure, especially in low current applications.
- For heavy or inductive loads, arc suppression devices, or interposing relays are recommended for contact longevity. Contact factory for specifics.
- GO Switches may be mounted in any plane.
- When mounting GO Switches side by side, place 2-1/4” apart edge to edge, not center to center.
- Contact factory for side by side mounting.

Attachment of Conduit or Cable

- Attach conduit or cable correctly
  - When using long runs of conduit or cable, place supports close to the switch to avoid pulling switch out of position.
  - If switch is mounted on a moving part, be sure flexible conduit is long enough to allow for movement, and positioned to eliminate binding or pulling.
  - For installation in hazardous locations, check local electrical codes. Switches must be installed according to local electrical codes.
  - In damp environments, use 1/4” thick non-conductive RTV or a similar moisture barrier to prevent water/condensation from entering conduit hub.
Satisfy these 3 criteria to reduce possible premature failures

Sealing switches
In figure 1 something common has occurred; the conduit system has filled with water. Over a period of time this may cause the switch to fail prematurely.

In figure 2, the termination of the switch has been filled with 1/4" thick non-conductive RTV to prevent water intrusion and to prevent premature switch failure. A drip loop with provision for water to escape has also been installed.

Target size
In figure 3, the ferrous target is too small to be detected reliably.

In figure 4, the target has sufficient size and mass for long term, reliable operation.

Target location
In figure 5, the target has been positioned to stop on the outside edge of the sensing range. This is a marginal condition for long term reliable operation.

In figure 6, the target has been positioned to stop well within the sensing range which will assure long term reliable operation.

Contact arrangements vary according to type of switch. Refer to sections on each switch series for detailed information. Be sure that electrical load will not exceed rated capacity of the switch.

For two-circuit switches (CM8B), contacts must be connected same polarity only in order to minimize possibility of a line-to-line short.

All GO® Switches are “pure” contact switches, meaning that they have no voltage drop when closed, nor do they have any leakage current when open. For multi-unit installation, switches may be wired in series or parallel, as shown below.

Series and Parallel Wiring

Series Wiring
Any number of GO® Switches may be wired in series, without voltage drop. By contrast, conventional solid state switches have about two volts drop across the switch when operated. With a system of 12 volts and four switches in series, 8 volts is dropped across the switches and only 4V is left to operate the load. When using GO® Switches, 12V is still available to operate the load.

Parallel Wiring
Any number of GO® Switches may be wired in parallel, with no current leakage and without drawing operating current.

When conventional solid state switches are wired in parallel, there is about 100 microamps leakage through each switch. If ten switches were wired in parallel, the total leakage current would be 1000 microamps or one milliamp - sufficient current to indicate an “ON” condition to a programmable logic controller (PLC).
GO Switch 70 Series end sensing switches use three permanent magnets and a push-pull plunger to control a set of mechanical contacts. The center magnet simultaneously attracts the primary magnet and repels the bias magnet, pushing the connecting rod and common contact into the normally closed position, closing a contact circuit. When a ferrous or magnetic target enters the sensing area of the switch, it attracts the primary magnet, which pulls the connecting rod and common contact into the normally open position, closing the other contact circuit. The sensing distance is the maximum distance between the switch and target when the switch first operates; the trip point. The differential, also known as deadband or hysteresis, is the distance that the target must move from the sensing area in order to allow the switch to reset. The internal mechanism is shown here:

To apply the 70 Series GO Switch to obtain the least differential, the direction the target approaches the switch must be considered. Below are two possible orientations that illustrate the differences in target movement and the affects on switch differential.

The measurements shown are nominal and can vary as much as .030-.050" depending on the material and size of target used in the application. As you can see, the best scenario for least differential is to orient the switch and target as shown in Orientation B. However, in this application, the possibility of getting debris between the switch and target must also be considered.

When trying to determine differential of an application, it is directly proportional to the distance the target will travel in the application. For example: a linear valve stroke is 1”. A switch is applied to indicate the closed position of the valve. Using Orientation A, the differential is 0.030”. The ‘deadband’ is therefore 9% of travel. If the switch were re-oriented, as shown in the Orientation B, the deadband would be only 2% of the total valve travel.

The greater mass of target the better for maximum contact pressure, especially in low current applications.

For heavy or inductive loads, arc suppression devices, or interposing relays are recommended for contact longevity. Contact factory for specifics.

Do not use excessive force on external threads when installing. (56 in lbs. max)

Configure mounting so bracket dissects switch as close to the middle of the length of body as possible (Fig. 1). This eliminates undue stress caused by heavy cables, connectors, etc.

Two appropriately sized jam nuts are included with switch. Lock washers are recommended in high vibration applications.

For cylinder applications, see pg. 65 for set up recommendations.

**Installation Principles**

**Setting Up A 70 Series GO Switch For Optimum Performance**

GO Switch 70 Series end sensing switches use three permanent magnets and a push-pull plunger to control a set of mechanical contacts.

The center magnet simultaneously attracts the primary magnet and repels the bias magnet, pushing the connecting rod and common contact into the normally closed position, closing a contact circuit. When a ferrous or magnetic target enters the sensing area of the switch, it attracts the primary magnet, which pulls the connecting rod and common contact into the normally open position, closing the other contact circuit.

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The measurements shown are nominal and can vary as much as .030-.050” depending on the material and size of target used in the application. As you can see, the best scenario for least differential is to orient the switch and target as shown in Orientation B. However, in this application, the possibility of getting debris between the switch and target must also be considered.

When trying to determine differential of an application, it is directly proportional to the distance the target will travel in the application. For example: a linear valve stroke is 1”. A switch is applied to indicate the closed position of the valve. Using Orientation A, the differential is 0.030”. The ‘deadband’ is therefore 9% of travel. If the switch were re-oriented, as shown in the Orientation B, the deadband would be only 2% of the total valve travel.

Remember, there is no exact science to use when applying a GO Switch. However, once the switch is set, and the target travels to the same position every time (within .002”), the GO Switch will maintain calibration for life. **Set it and forget it!**
Pressure Sealing Methods

GO Switch recommends the use of our Parker ThredSeal® Washer Kits in lieu of other commercially available sealing hardware. Provided with the Parker ThredSeal® Washer Kit are torque values for specific pressure ratings as well as the maximum torque values.

**Models 73-76 - 5/8” Diameter**
Torque Jam Nuts to:
- 10 lbs-ft to achieve seal at 2,000 PSI
- 25 lbs-ft to achieve seal at 5,000 PSI
Do not exceed 30 lbs-ft

**Models 71 & 72 - 3/8” Diameter**
Torque Jam Nuts to:
- 10 lbs-in to achieve seal at 2,000 PSI
- 30 lbs-in to achieve seal at 5,000 PSI
Do not exceed 45 lbs-in

**Model 77 - 3/4” Diameter**
Torque Jam Nuts to:
- 20 lbs-ft to achieve seal at 2,000 PSI
- 60 lbs-ft to achieve seal at 5,000 PSI
Do not exceed 75 lbs-ft

Air and Hydraulic Cylinders

A ferrous cylinder cushion or piston will actuate the switch.

To determine the correct thread length, measure the distance from the head cap surface to the cushion and add 1/2” for seal nut. 70 Series are rated 2,000 PSI operating pressure, 5,000 PSI operating and 10,000 PSI non-shock optional on models 73 through 77.

Thread seal nut onto switch. Screw switch into cylinder by hand until switch touches cushion. Back out 1/4 to 1/2 turn. Tighten seal nut.

70 Series GO® Switches are unaffected by surrounding ferrous steel.

Factors Affecting Contact Life

GO Switches are designed to provide optimum performance over a long period. Their premium grade components and inherently durable design keeps them working, trouble-free, year after year. Some of the conditions that can decrease contact life are:

**Contact Erosion**
There are two types of contact erosion, mechanical and electrical. Electrical contact erosion is caused by heavy electrical loads. The contacts may overheat and become molten if there isn’t sufficient off time to allow cooling between cycles. Mechanical erosion occurs as a result of friction between contacts cycling at high speeds with little or no electrical load. Mechanical wear can also occur due to operating a switch at a frequency higher than its design capability. The high operating speed of GO Switches makes them ideal for almost any application. For those with unusually high-frequency switching demands, please consult factory.

Electrical wear caused by arcing, can be eliminated by utilizing high quality contact materials, such as the gold-flashed silver cadmium oxide used in GO Switches, and by operating the switches within the voltage parameters for which they are designed. The use of arc suppressors such as resistor-capacitor combinations or blowout coils can also serve to prevent arcing, a consideration which is particularly important in certain hazardous operating environments.

**Contact Transfer**
When switches are operated above rated voltage or at high speeds, contact material can transfer from one contact to the other. For this reason, it is important to observe the input voltage specifications supplied for each GO Switch.

**Welding or Sticking**
The GO Switch design virtually eliminates welding or sticking due to mechanical armature hang-ups. Excessive voltage and the resultant arcing, however, can cause overheating of the contacts and welding or sticking. By operating the GO Switch within its specified parameters, this problem can be eliminated.
NEC Codes

050-8 Protection Techniques for Hazardous Locations
- 500-4 Explosionproof Apparatus
- 500-4(b) Intrinsically Safe Systems
- 500-4(c) Nonincendive Equipment
- 500-4(d) Hermetically Sealed

NEC 501-5 Sealing and Drainage
- 501-5(a) Conduit Seals, Class I, Division 1
- 501-5(b) Conduit Seals, Class I, Division 2
- 501-5(c) Conduit Seals, Class I, Divisions 1 and 2
- 501-5(d) Solid state switch
- 501-5(e) Factory seal

NEC 502-2 Wiring Methods
- 502-4(a) Class I, Division 1
- 502-4(b) Class I, Division 2
- 502-4(c) Class II, Division 1
- 502-4(d) (1) Type required
- 502-4(e) Hermetic seal
- 502-4(f) Factory seal

NEC 505-20 Equipment
- 505-20-15a) Zone 0
- 505-20-15b) Zone 1
- 505-20-15c) Zone 2

NEC 502 Intrinsically Safe Systems
- 502-2 Definitions
  - Associated apparatus
  - Control drawing
  - Intrinsically safe apparatus

Definitions as referenced by NEC Article 100
- Amperage
  - The current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.
- Approved
  - Acceptable to the authority having jurisdiction.
- Bonding
  - The permanent joining of metallic parts to form an electrically conductive path that will ensure electrical continuity and the capacity to conduct safety any current likely to be imposed.
- Bonding jumper
  - A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

Device
- A unit of an electrical system that is intended to carry but not utilize electric energy.

Disconnecting
- A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

Dustproof
- Constructed or protected so that dust will not interfere with its successful operation.

Dusttight
- Constructed so that dust will not enter the enclosure case under specified test conditions.

Enclosure
- The case or housing of apparatus...to prevent personnel from accidentally contacting energized parts, or to protect the equipment from physical damage.

Explosionproof apparatus
- Apparatus enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur with in and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosions of gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

Ground
- A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

Grounded
- Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current carrying capacity to prevent the buildup of voltages that may result in undue hazards to connected equipment or to persons.

Labeled
- Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed
- Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or services meets identified standards or has been tested and found suitable for a specified purpose.

Live parts
- Electric conductors, buses, terminals, or components that are uninsulated or exposed and a shock hazard exists.

Nonincendive circuit
- A circuit, other than field wiring, in which any arc or thermal effect produced under intended operating conditions of the equipment, is not capable, under specified test conditions, or igniting the flammable gas, vapor, or dust-air mixture. See Section 500-4(f) for details regarding this protection method allowable in Classes I and II, Division 2 classified areas.

Qualified person
- One familiar with the construction and operation of the equipment and the hazards involved.

Rainproof
- Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions.

Raintight
- Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions.

Waterproof
- Constructed so that moisture will not enter the enclosure under specified test conditions.

Weatherproof
- Constructed or protected so that exposure to the weather will not interfere with successful operation.
Applications
### Applications

#### AUTOMOTIVE
- Chemical washdown areas
- Conveyors
- Cylinder end-of-stroke indication
- Eye wash stations
- Marmac position sensing
- Paint incineration damper indication
- Paint mixing valves
- Paint spray areas
- Part present indication
- Pneumatic and hydraulic clamping and welding fixtures
- Positioning and indexing
- Powerhouse (see Power Generation)
- Safety showers
- Speed control on conveyors

#### CEMENT PLANTS
- Bagging
- Chutes
- Conveyors
- Crushers
- Hopper doors
- Kilns
- Loaders
- Machinery
- Packaging
- Valve position indication

#### CHEMICAL PROCESSING
- Emergency showers
- Eye wash stations
- Filters
- Hose Couplings
- Transfer panels
- Valve position indication

#### CONSTRUCTION
- Concrete block mfg.
- Concrete ready mix trucks (counting revolutions of drum)
- Cranes

#### ELEVATORS/ESCALATORS
- Leveling switch in mining elevators

### EQUIPMENT
- **Compacting**
- **Engraving**
- **Frosting**
- **Gilding**
- Heavy Equipment (Komatsu, John Deere, Hyundai, etc.)
- Lubricators
- Mixing
- Printing
- Other machinery dealing with abrasive, explosive, corrosive or otherwise "hard to handle" environments
- Rock crushing

#### MATERIAL HANDLING
- Baggers/Balers
- Bulk loading/unloading equipment
- Conveyors
- Crating equipment
- Labelers
- Lifts
- Packaging machines

#### MILITARY/MARINE
- Ballast transfer pumps
- Davits
- Elevators
- Elevator speed control
- Hatch interlocks
- Safety interlocks
- Shipboard cranes
- Valve position indication

#### MINING
- Any limit application
- Any machinery handling corrosive or otherwise "hard to handle" environments

#### LUMBER AND WOOD PRODUCTS
- Conveyors
- Eyewash stations
- Sawdust bins
- Saws
- Ventilation equipment

#### MACHINERY
- Car wash
- Commercial laundry

#### NUCLEAR POWER PLANTS
- Fuel transfer systems
- Valve position indication

#### OFF ROAD EQUIPMENT
- Boom alignment
- Cranes
- Cylinders
- Dump truck bed indication
- Ore/pile reclaimers

#### OIL/GAS EXPLORATION
- Off-shore sites
- Sub-sea applications
- Valve position indication

#### PETROLEUM REFINING
- Refiners
- Ventilation equipment
- Shower and eyewash stations
- Valve position indication

#### POWER GENERATION
- Air preheaters
- Air preheater blowers
- Ash bins
- Ash handling valves
- Bag houses
- Barge unloading
- Blow down valves
- Boiler feed pump recirculation valve
- Boiler oil injectors
- Bottom ash valves
- Burner valves
- Coal car dumpers
- Coal feeders
- Coal handling apparatus
- Coal pulverizing swing valves
- Coal samplers
- Coal transport conveyors
- Conveyors
- Dampers
- Damper valves
- Economizers
- Feedwater heater level detection
- Fly ash valves
- Hopper gates

#### SOLID WASTE DISPOSAL/CO-GENERATION
- Conveyors
- Cranes
- Dampers
- Valve position indication
- Ventilation equipment

#### STEEL MILLS
- Bullwheels
- Cold rolling units
- Conveyors
- Cranes
- Dampers
- Draw benches
- Fans
- Hot mill applications
- Shower and eyewash stations
- Track monitors
- Valve position indication

#### WASTE WATER TREATMENT
- Sluice gates

### Leverless Limit Switches

#### STEEL MILLS
- Bullwheels
- Cold rolling units
- Conveyors
- Cranes
- Dampers
- Draw benches
- Fans
- Hot mill applications
- Shower and eyewash stations
- Track monitors
- Valve position indication

#### TIRE AND RUBBER
- Any machinery handling carbon black
- Conveyors
- Curing presses
- Cylinder end-of-stroke indication
- Shower and eyewash stations
- Tire mold closure interlocks
- Tire scrappers

#### TOOL & DIE
- Plastic injection molding
- Aluminum die-casting
- Rubber molding
- High temperature applications

#### TRANSPORTATION EQUIPMENT
- Airport fuel transfer equipment
- Davis Hangar doors
- Hatch interlocks
- K-Loaders
- Passenger jetways
- Scissor lifts
- Shipboard cranes
- Valve position indication
- Vehicle interlocks
AUTOMOTIVE SKID CONVEYOR INDICATION

Automotive manufacturers need reliable position indication of body skids along the skid conveyor system. The critical areas are at the entrance, exit, and even inside of the paint-drying ovens where temperatures can reach close to 400°F. Mechanical limit switches and inductive proximity switches cannot withstand the heat or the physical abuse of this application. Fortunately...

GO Switch has the answer.

We recommend our stainless steel high temperature 10 Series GO Switch with extended sensing, and a 400°F continuous temperature rating.

The GO Switch will provide reliable maintenance-free position indication in this tough application.

Contact the paint shop supervisor, electrical engineers, and/or maintenance people responsible for the paint booth. They will be glad you called!

SOOT BLOWER POSITION INDICATION

Wherever power is generated, whether it is at a power generation station or a pulp and paper facility, soot blowers are used to eliminate slag buildup from the inside wall of a boiler. The lance of the soot blower penetrates the side of the boiler wall and extends inside. As it enters the boiler, the lance rotates in a clockwise motion spraying high pressure steam from the end of the lance back toward the boiler wall. This high pressure spray removes the slag in a circular pattern that enlarges as the lance extends further into the boiler. After the lance is fully extended, it retracts and rotates counter-clockwise to its original inactive state until a predetermined time when the process starts again. Depending on the size of the boiler, there can be as many as 60 soot blowers to service one boiler!

As you might imagine, the area in which the soot blowers operate is a demanding environment. High temperature and physical abuse make mechanical limit switches a constant maintenance headache. If a soot blower is out of service, the boiler wall is not being cleaned and as a result, power is not being generated efficiently. Translation: downtime, maintenance costs and lost revenue.

Fortunately, GO Switch has the solution. Each soot blower can be retrofitted using two Double Pole, Double Throw 80 Series GO Switches and one (1) AMS4 target magnet. As the soot blower lance extends and retracts into the boiler, the target magnet travels to the sensing area of each GO Switch, providing maintenance-free, fit and forget position indication.

The GO Switch is wired like a mechanical switch so existing wiring can be used for easy installation. Since the GO Switch does not depend on lever arms or internal moving parts, maintenance is immediately eliminated. This has been field tested and proven in thousands of applications already.
Bar screen trash rakes for water treatment

Bar screens are typically used in the intake channels of water treatment plants to remove solid debris from the water to prevent damage of subsequent equipment. When debris has accumulated on the screen, cleaning is required. It is done with a trash rake that is usually mounted in front of the screen on a support frame. Some of these trash rakes are manually operated and most are motor propelled so an operator only has to push a button to activate the rake. Some are activated by a timer. The rake goes through a cycle descending in front of the screen to the bottom moving towards the screen and then moving upward transporting the accumulated debris to a discharge chute where a container or a conveyor takes it away.

The motor operated trash rakes usually have two limit switches on them mounted to the support frame well above the water level. The end-of-travel limit switch defines the exact position at which the assembly will stop at the end of the cycle. The overload protection switch is activated when the rake comes in contact with an obstruction in the screen too large for it to remove.

Stainless steel 10 series or 80 series are the best limit switches for these applications. The harsh and moist environments in water treatment plants are too much for mechanical or solid state switches. Often the switches must be explosion proof and magnets must be used as targets because of the variation in the traveling rake position.

Water treatment plants are in a number of facilities including:

- Electrical generating stations
- Industrial plants
- Chemical processing plants
- Pulp and paper mills
- Plastics manufacturing plants
- Irrigation projects
- Food processing plants
- Oil refineries
- Sewage treatment plants
- Fish conservation projects
- Flood control pumping stations
SAFETY SHOWERS AND EYEWASH STATIONS

In an emergency first-aid is crucial and according to the OSHA Plant Safety regulations; Subpart G - Occupational Health and Environmental Control; Section 1910.94, Paragraph (d) (9) (vii):

(vii) Near each tank containing a liquid which may burn, irritate, or otherwise be harmful to the skin if splashed upon the worker’s body, there shall be a supply of clean cold water. The water pipe (carrying a pressure not exceeding 25 pounds) shall be provided with a quick opening valve and at least 48 inches of hose not smaller than three-fourths inch, so that no time may be lost in washing off liquids from the skin or clothing. Alternatively, deluge showers and eye flushes shall be provided in cases where harmful chemicals may be splashed on the body.

Deluge showers and eye flushes are plentiful in chemical processing facilities. How are the proper personnel notified should an emergency occur? Flow switches are used, but have corrosion and freezing problems.

GO Switch has the answer. GO Switch has the answer. GO Switch has the answer. GO Switch has the answer. GO Switch has the answer.

The GO Switch VIP for deluge showers and eye flushes can be mounted on any new or existing unit. Using the GO DPDT 80 Series switch allows for flexibility in signalling the proper personnel. For example, when the shower or eye flush valve is opened, the GO Switch can signal the control room and first-aid personnel simultaneously, or signal the control room and sound an alarm. When personal injury occurs time is of the essence.

REFUSE TRUCKS

Refuse trucks have as few as three switches and as many as ten switches per truck. The most common competitive switches used are mechanical lever-arm and push-button limit switches. Some trucks incorporate electronic proximity sensors.

Limit switch/sensor failures are prevalent in the refuse collection business. These switch/sensor failures are attributed to mechanical wear and tear, moisture-ingression, corrosion and temperature extremes.

Vehicles out of service for any period of time cause lost revenue.

GO Leverless Limit Switches will prevent these failures and downtime while reducing maintenance costs.

Visit the refuse collection companies in your area. They will be glad you called!

LS1 = Normally open: held closed when side door is closed and latched.
LS2 = (7 & 8 normally closed) (1 & 2 normally open): switches at end of packer stroke.
LS3 = Normally closed: opens when tailgate is latched.
LS4 = Normally closed: opens when tailgate is latched.
LS5 = Normally closed: opens when packer is fully retracted.
LS6 = Normally open: (1 & 2 normally open) (5 & 6 normally open): closes when arms are above cab.
LS7 = Normally closed: opens when top door opens.
Reference Material
This group defines the options or approvals which may be required for a particular application. Safety requirements, the demands of the machinery on which the switch will be used, or the type of environment will all play a role in determining the type of approval needed.

### Approval Agencies

- **Underwriters Laboratories (UL)**
  - Our file number is E79070 for hazardous location switches and E81878 for general purpose switches.

- **DEMCO (Subsidiary of UL)**
  - For general purpose switches.

- **Mine Safety and Health Administration (MSHA)**
  - Our file number is X/P-1504-1 November 20, 1984.

- **Factory Mutual (FM)**
  - Factory Mutual approved switches are listed in the Factory Mutual Approved Guide.

- **Canadian Standard Association (CSA)**
  - Our file number is LR-24226, (CSA) which includes most GO® Switches except special models.

- **Standards Association of Australia (SAA)**
  - Our file number is Ex109.

- **British Approvals Service for Electrical Equipment in Flammable Atmospheres (BASEEFA) (Genelec)**
  - Our file number is Ex 89C1233X for use in Zone 1 Hazardous areas.

### NEMA Definitions

<table>
<thead>
<tr>
<th>Type</th>
<th>General Purpose</th>
<th>indoor</th>
<th>accidental contact (cage or skeleton) will not rust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2</td>
<td>Drip-proof</td>
<td>indoor</td>
<td>limited amounts of falling water and dirt (not dust-tight) will not rust</td>
</tr>
<tr>
<td>Type 3</td>
<td>Dust-tight, rain-tight</td>
<td>outdoor</td>
<td>windblown dust, rain, sleet, and undamaged by external ice formation</td>
</tr>
<tr>
<td>Type 3R</td>
<td>Dust-tight, rain-tight</td>
<td>outdoor</td>
<td>same as type 3 above, plus diverts water from live parts, provision for drainage, will not rust</td>
</tr>
<tr>
<td>Type 3S</td>
<td>Dust-tight, rain-tight</td>
<td>outdoor</td>
<td>same as type 3 above, operation of external mechanism when ice laden, will not rust</td>
</tr>
<tr>
<td>Type 4</td>
<td>Water-tight/dust-tight</td>
<td>indoor/outdoor</td>
<td>windblown dust and rain, splashing water, and hose directed water, undamaged by ice formation, will not rust</td>
</tr>
<tr>
<td>Type 5</td>
<td>Dust-tight</td>
<td>indoor</td>
<td>dust and falling direct, will not rust</td>
</tr>
<tr>
<td>Type 6</td>
<td>Water-tight, dust-tight</td>
<td>indoor/outdoor</td>
<td>temporary entry of water during limited submersion (6 ft. for 30 min), undamaged by formation of ice, will not rust</td>
</tr>
<tr>
<td>Type 6P</td>
<td>Water-tight/dust-tight</td>
<td>indoor/outdoor</td>
<td>same as type 6 above plus prolonged submersion at 6 psig, will not rust</td>
</tr>
<tr>
<td>Type 7</td>
<td>Explosion proof</td>
<td>Cl I, Gps A, B, C, D</td>
<td>indoor</td>
</tr>
<tr>
<td>Type 8</td>
<td>Explosion proof</td>
<td>Cl I, Gps A, B, C, D</td>
<td>indoor</td>
</tr>
<tr>
<td>Type 9</td>
<td>Explosion proof</td>
<td>Cl II, Gps E or G</td>
<td>indoor</td>
</tr>
<tr>
<td>Type 10</td>
<td>Hazardous Locations</td>
<td>indoor</td>
<td>(MSHA) Mine Safety and Health Adm. per 30 C.F.R., Part 18</td>
</tr>
<tr>
<td>Type 11</td>
<td>Oil-tight/Corrosion</td>
<td>indoor</td>
<td>protection from corrosive effects of gases and liquid dripping, seepage and external condensation of corrosives, oil immersion</td>
</tr>
<tr>
<td>Type 12</td>
<td>Oil-tight/Dust-tight</td>
<td>indoor</td>
<td>fibers, lint, dust and light splashing, seepage, and dripping condensation of non-corrosive liquids</td>
</tr>
<tr>
<td>Type 12K</td>
<td>Oil-tight/Dust-tight</td>
<td>indoor</td>
<td>same as type 12 above, enclosure has knockouts</td>
</tr>
<tr>
<td>Type 13</td>
<td>Oil-tight/Dust-tight</td>
<td>indoor</td>
<td>dust, spraying of water, oil and corrosive coolant, oil resistant gaskets</td>
</tr>
</tbody>
</table>

### Reference Material

Courtesy of Steven Engineering, Inc.  
230 Ryan Way, South San Francisco, CA 94080-6370  
Main Office: (650) 588-9200  
Outside Local Area: (800) 258-9200  
www.stevenengineering.com
UL Hazardous Locations

Class I Flammable Gases, Vapors or Liquids

Class I Area Classification

Division 1: Where ignitable concentrations of flammable gases, vapors, or liquids can exist all of the time or some of the time under normal operating conditions.

Zone 0: Where ignitable concentrations of flammable gases, vapors, or liquids can exist all of the time under normal operating conditions.

Zone 1: Where ignitable concentrations of flammable gases, vapors, or liquids can exist some of the time under normal operating conditions.

Division 2: Where ignitable concentrations of flammable gases, vapors, or liquids are not likely to exist under normal operating conditions.

Class I Groups

Division 1 & 2

A (pentaene & hydrogen)
B (ethylene)
C (ethylene)
D (propane)

Class I Temperature Codes

Division 1 & 2

T1 (≤180°C)
T2 (≤180°C)
T3 (≤180°C)
T4 (≤180°C)
T5 (≤180°C)
T6 (≤180°C)

Zone 0, 1 & 2

T1 (≤180°C)
T2 (≤180°C)
T3 (≤180°C)
T4 (≤180°C)
T5 (≤180°C)
T6 (≤180°C)

Class I, Zone 0, 1 & 2 Protection Methods

Any Class I, Zone 0 method
Any Class I, Zone 1 method
Purged/pressurized (Type Z) NFPA 496
Intrinsically safe (2 fault) method

Flameproof, 'd'

Intrinsically safe, 'ib' (1 fault)

Non-sparking device, 'nA'

Restricted breathing, 'nR'

Hermetically sealed, 'nC'

Class III Temperature Codes

Division 1 & 2

T1 (≤180°C)
T2 (≤180°C)
T3 (≤180°C)
T4 (≤180°C)
T5 (≤180°C)
T6 (≤180°C)

Note: Article 503 of the NEC limits the maximum temperature codes for Class III equipment to T3PC for equipment not subject to oversizing and to T5PC for equipment that may be overloaded.

UL Hazardous Locations

Class II Combustible Dusts

Class II Area Classification

Division 1: Where ignitable combustible dusts can exist all of the time or some of the time under normal operating conditions.

Zone 0: Where ignitable combustible dusts can exist all of the time under normal operating conditions.

Zone 1: Where ignitable combustible dusts can exist some of the time under normal operating conditions.

Division 2: Where ignitable combustible dusts are not likely to exist under normal operating conditions.

Class II Groups

Division 1 & 2

E (metal - Div. 1 only)
F (coal)
G (grain)

Class III Temperature Codes

Division 1 & 2

T1 (≤180°C)
T2 (≤180°C)
T3 (≤180°C)
T4 (≤180°C)
T5 (≤180°C)
T6 (≤180°C)

Class III Groups

Division 1 & 2

None.

UL Hazardous Locations

Class III Ignitible Fibers & Flyings

Class III Area Classification

Division 1: Where ignitable fibers or materials producing ignitable flyings are handled, manufactured or used.

UL Hazardous Locations

Class I, Division 1 & 2 Protection Methods

Area Protection

Division 1

Explosion proof

Intrinsically safe, 'ib' (2 fault)

Purged/pressurized (Type X or Y)

Division 2

Non-incendive

Non-sparking device

Purged/pressurized (Type Z)

Hermetically sealed

Any Class I, Div. 1 method

Any Class I, Zone 1 or 2 method

UL Hazardous Locations

Class I, Zone 0, 1 & 2 Protection Methods

Area Protection

Zone 0

Intrinsically safe, 'ib' (2 fault)

Any Class I, Div. 1 method

UL 913

Canada

CSA-157

Zone 1

Encapsulation, 'm'

Flameproof, 'd'

Increased safety, 'e'

Intrinsically safe, 'ib' (1 fault)

Oil immersion, 'o'

Powder filling, 'q'

Any Class I, Zone 0 method

Any Class I, Zone 1 method

UL 2279

Canada

CSA-157

Zone 2

Non-incendive, 'nC'

Non-sparking device, 'nA'

Restricted breathing, 'nR'

Hermetically sealed, 'nC'

Any Class I, Zone 0 or 1 method

Any Class I, Div. 1 or 2 method

UL 2279

Canada

CSA-157

Intrinsically safe (2 fault) method

UL 913

Canada

CSA-157

UL Hazardous Locations

Applicable Certification Documents

U.S.

Canada

Europe

Class I, Division 1 & 2 Protection Methods

Zone 0

UL 2279, Pt. 11

CSA-79-11

IEC 60079-11

Division 2

UL 913

Canada

CSA-157

UL 1604

Canada

CSA-213

UL 1904

Canada

CSA-213

Zone 1

UL 2279, Pt. 1

CSA-79-1

IEC 60079-1

Division 2

UL 1604

Canada

CSA-213

UL 1904

Canada

CSA-213

UL 2279, Pt. 6

CSA-79-6

IEC 60079-6

Division 1

Purged/pressurized, 'p'

Any Class I, Zone 0 method

Any Class I, Div. 1 method

UL 2279

Canada

CSA-157

Zone 2

Purged/pressurized (Type Z) NFPA 496

Intrinsically safe (2 fault) UL 913

Canada

CSA-157

Zone 1

Non-incendive, 'nC'

Non-sparking device, 'nA'

Restricted breathing, 'nR'

Hermetically sealed, 'nC'

Any Class I, Zone 0 or 1 method

Any Class I, Div. 1 or 2 method

UL 2279

Canada

CSA-157

Zone 2

Any Class I, Zone 0 method

Any Class I, Div. 1 method

UL 2279

Canada

CSA-157

UL 913

Canada

CSA-157

IEC 60079-11

Note: Article 503 of the NEC limits the maximum temperature codes for Class III equipment to T3PC for equipment not subject to oversizing and to T5PC for equipment that may be overloaded.
UL Hazardous Locations

Class II, Division 1 & 2 Protection Methods

<table>
<thead>
<tr>
<th>Area</th>
<th>Protection</th>
<th>Applicable Certification Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division 1</td>
<td>Dust-ignition proof</td>
<td>UL 1203 CSA-25 or CSA-E-1241-1-1</td>
</tr>
<tr>
<td></td>
<td>Intrinsically safe</td>
<td>UL 913 CSA-157</td>
</tr>
<tr>
<td></td>
<td>Pressurized</td>
<td>NFPA 496</td>
</tr>
<tr>
<td>Division 2</td>
<td>Dust-tight</td>
<td>UL 1604 CSA-157 or CSA-E-1241-1-1</td>
</tr>
<tr>
<td></td>
<td>Non-incendive</td>
<td>UL 1604</td>
</tr>
<tr>
<td></td>
<td>Non-sparking</td>
<td>UL 1604</td>
</tr>
<tr>
<td></td>
<td>Pressurized</td>
<td>NFPA 496</td>
</tr>
</tbody>
</table>

Hazardous Locations Markings

Class I, II & III, Division 1 & 2 (U.S. & Canada) -- This marking would include:
Class(es), Division(s), Gas/Dust Group(s), Temperature Code. Example: Class I, Division 1, Groups C & D, T4A.

Class I, Zone 0, 1 & 2 (U.S. & Canada) -- This marking would include:
Method A: For Zone Listings based on UL 2279 or the CSA-E79 Series Class, Zone(s), Ex, Protection Method(s), Gas Group, Temporary Code. Example: Class I, Zone 1, Ex de IIB T4.
Method B: For Zone Listings based on UL or CSA Division Certification Documents Class, Zone(s), Gas Group, Temperature Code. Example: Class I, Zone 1, Group IB T4.

Note: For U.S. Zone Listings based on UL 2279, Article 505 of the 1999 NEC requires that the "Ex" element of the marking string shall read "AEx."

Note: For Canadian Zone Listings based on the CSA-E79 Series, the "Class" and "Zone" elements of the marking string are optional.

Zone 0, 1 & 2 (IEC only) -- This marking would include:
Ex, Protection Method(s), Gas Group, Temperature Code. Example: Ex de IIB T4.

Zone 0, 1 & 2 (Europe only) -- This marking would include:
EEEx, Protection Method(s), Gas Group, Temperature Code. Example: EEx de IIB T4.

UL’s Hazardous Locations Standards

ANSUL 674 Electric motors and generators for use in Division 1 hazardous (classified) locations.
ANSUL 698 Industrial control equipment for use in hazardous (classified) locations.
ANSUL 781 Portable electric lighting units for use in hazardous (classified) locations.
ANSUL 783 Electric flashlights and lanterns for use in hazardous (classified) locations.
ANSUL 823 Electric heaters for use in hazardous (classified) locations.
ANSUL 844 Electric lighting fixtures for use in hazardous (classified) locations.
ANSUL 877 Circuit breakers and circuit-breaker enclosures for use in hazardous (classified) locations.
ANSUL 886 Outlet boxes and fittings for use in hazardous (classified) locations.
ANSUL 894 Switches for use in hazardous (classified) locations.
ANSUL 913 Intrinsically safe apparatus and associated apparatus for use in Class I, II and III, Division I, hazardous (classified) locations.
ANSUL 1002 Electrically operated valves for use in hazardous (classified) locations.
ANSUL 1010 Receptacle-plug combinations for use in hazardous (classified) locations.
ANSUL 1067 Electrically conductive equipment and materials for use in flammable anesthetizing locations.
ANSUL 1203 Explosion-proof and dust-ignition-proof electrical equipment for use in hazardous (classified) locations.
ANSUL 1207 Sewage pumps for use in hazardous (classified) locations.
UL 1604 Electrical equipment for use in Class I and I, Division 2, and Class II hazardous (classified) locations.
UL 2208 Solenoid distillation units.
UL 2225 Metal-clad cables and cable-sealing fittings for use in hazardous (classified) locations.
ANSUL 2279 Electrical equipment for use in Class I, Zone 0, 1 and 2 hazardous (classified) locations.
Ambient Temperature
The temperature for a medium, such as gas or liquid, surrounding an object.

Analog Signal
A signal in which the data is represented or transmitted in continuously varying quantities, as opposed to a digital signal.

ANSI
Abbreviation for American National Standards Institute.

AWG
Abbreviation for American Wire Gauge; based on circular mil system.

Axial Motion
A motion of the target along the reference axis.

BASEEFA
Abbrivation for British Approvals Service for Electrical Equipment in Flammable Atmospheres.

CE
Abbrivation for the International Commission on Rules for the approval of Electrical Equipment.

CE Mark
A trademark that allows a manufacturer trade privileges with the European Union. The CE Mark, by responsibility of the manufacturer, insures that certain directives have been met through testing and documentation.

CENELEC
European Committee for Electrotechnical Standardization.

C-UL
Products bearing this mark are a UL listed device, and tested to CSA standards.

Contact Bounce
A condition that can occur with switching circuits in which the movable contacts close against the stationary contacts with enough energy to "bounce" and reopen the contacts. This may occur several times, very rapidly, during a contact closure.

Contact Pressure
The amount of force holding the movable and stationary contacts together.

CSA
Abbreviation for Canadian Standards Association.

DEMC
A subsidiary of Underwater’s Laboratories.

Differential (Hysteresis) (Reset)
The distance which a target must move from the sensing point in order to allow the switch to reset.

Differential Travel
A distance between the operating and release points.

Digital Signal
A signal in which the data is transmitted or represented by a series of discrete pulses or steps of constant amplitude.

Dry Circuit
A circuit in which the open circuit voltage is 0.05V or less and the current is 200 mA or less. At such low levels, the current is not able to break through the film of oxides, sulfides or other films which may build up on the contact surfaces.

Environmental Seal
A seal created by gaskets, seals, potting or other means, designed to keep out contamination which might reduce performance. An environmental seal is sometimes referred to as a “factory seal.”

Explosion Proof
The property of being able to contain an explosion within the sensor or housing.

Frequency
The number of cycles completed by an alternating current in one second. The newest term Hertz, abbreviated “Hz,” is equivalent to “cycles per second.”

Hermetic seal
A permanent seal created by fusion, soldering, welding, brazing or other means, to prevent the transmission of gases. A hermetic seal is also referred to as “helium tight,” “leak tight,” or “vacuum tight.” For most applications, a hermetic seal is one where the leakage rate is less than 1 x 10^-8 cubic centimeters per second of helium, at a differential of one atmosphere.

Hi-Pot
A device used to place a high voltage across an insulator, to test its insulating properties. The typical Hi-Potential Breakdown Test specified by CSA and UL require that the voltage be twice the rated voltage, plus 1000 volts, plus 20% of that total. For example, a 600v switch would be tested at (600 x 2) + 1000 + 1.2 x 640 volts. This voltage is placed across the insulator for 1 second. If the insulator doesn’t break down, it is considered acceptable.

Hysteresis (Differential) (Reset)
The distance which a target must move from the sensing point in order to allow the switch to reset.

IEC
Abbreviation for the international Electrical and Electronics Engineers.

Intrinsically Safe (IS)
Intrinsic safety may be attained through integral circuitry or an appropriately sized barrier, both of which are current limiting devices. The on-board circuitry, or barrier, is designed for the area classification which the monitoring device is to be used. The basis of intrinsic safety is to limit the amount of current through a device, so that if there is exposure to the surrounding atmosphere there is not sufficient heat generated to ignite that atmosphere.

ISO
Abbreviation for the International Standards Organization.

Latching Condition
A condition where the switch will not reset to its unoperated mode. It must be operated, then reset, in two separate operations.

Lateral Motion
A motion of the target perpendicular to the reference axis.

Leakage Current
Minute amounts of current which flow through a switch even in the unoperated state. Leakage current occurs with electronic switches since they require an external power supply. GO Switches do not require a power supply and, therefore have no leakage current.
Repeatability
Ability to perform the same task operating parameters, consistently, time after time.

Leverless Limit Switches

Reset (Differential) (Hysteresis)
The distance which a target must move from the sensing point in order to allow the switch to reset.

Response Time
The amount of time required for the switch to move from N/C position to N/O position, or vice versa.

RTV
Abbreviation for Room Temperature Vulcanizing.

SAA
Abbreviation for Standards Association of Australia.

SAE
Abbreviation for Society of Automotive Engineers.

Same Polarity Only
On DMDB switches the like terminals must be wired with the same voltage polarity.

Sensing Area
That location marked on a GO® Switch that is most sensitive to a ferrous or magnetic target.

Sensing Distance Range
Maximum gap between switch and target when the switch first operates; the trip point.

Sensing Face
A surface of the switch through which the magnetic field interact with a moving target and causes the switch operate.

SO Cable
A cable designed for industrial use that has the PVC insulated lead wires protected by a rubber (usually neoprene) jacket.

Standard Target
A specified object used for making comparative measurements of the operating and differential distances.

TEW
Thermoplastic Equipment Wire.

Temperature Rating
Maximum and minimum temperature at which an insulating material can be used in continuous operation without loss of basic properties.

UL
Abbreviation for Underwriter’s Laboratories.

Voltage Drop
The amount of voltage across a pair of closed contacts. In GO Switches, this voltage drop is extremely low, compared to solid state switches.

Voltage Rating
The amount of voltage across a pair of closed contacts. In GO Switches, this voltage drop is extremely low, compared to solid state switches.
Conversion Charts

Pressure

<table>
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<th>ATM.</th>
<th>Kg cm2</th>
<th>P.S.I.</th>
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<tr>
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Conversion Factors

- PSI x 27.71 = in. Hg
- PSI x 2.036 = in. Hg
- PSI x 703.1 = mm Hg
- PSI x 51.75 = mm Hg
- PSI x 0.0703 = kg/cm²
- PSI x 0.6895 = bar
- PSI x 6.895 = kPa

Temperature Conversion

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Temperature conversion formula:

\[ C = \frac{5}{9}(F - 32) \]

\[ F = \frac{9}{5}C + 32 \]