IOM

TopWorx engineers are happy to provide technical assistance on GO® Switch products. However, it is the customer's responsibility to determine the safety and suitability of the product in their application. It is also the customer's responsibility to install the switch using the current electrical codes in their region.

70 Series

Introduction

GO® Switches operate on the principle of magnetic attraction, reacting to ferrous metal or magnetic targets as they come within the switch's sensing range.

Although switches vary in design according to their intended applications, all GO® Switches use permanent magnets which, when actuated by the presence of a ferrous or magnetic target, change the state of electrical contacts.

Mounting

- 70 Series GO Switches are unaffected by weld fields and RF interference.
- 70 Series GO Switches may be mounted adjacent to or surrounded by ferrous metals however the proximity of ferrous metals will affect sensing distance. For the maximum rated sensing distance, avoid mounting near ferrous metals.
- GO Switches sense ferrous materials such as mild steel, 400 series and 17/4 stainless steel.
- Sensing and differential of switch may vary depending on target travel direction.
- Avoid contact between target and switch. Configure mounting of switch and/or target so that target passes within the 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.
- Greater target mass and target movement fully into and out of sensing range will increase contact pressure. This is helpful in low current controls 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. (36 in/lbs. max)
- Configure mounting so bracket dissects switch as close to the middle of the body as possible. This eliminates undue stress caused by heavy cables, connectors, etc.
- Two appropriately sized jam nuts are included with switch. Lock washers are recommended where vibration is present.

Specifications - SPDT

Sensing Distance:

71 & 72:	.040" (1.02mm) 2,000 PSI
73-77, 7L:	.100" (2.54mm) 2,000 PSI
73-77	.072" (1.83mm) 5,000 PSI
73-77	.060" (1.52mm)10,000 PSI

Range with Target Magnet: up to .35" (Model 71 & 72 up to .15")

Differential: Approx. .020" (.5mm)

Thread Options:
71, 72 - 3/8-24 UNF; M12 x 1
73-76, 7L - 5/8-18 UNF; M18 x 1

Response time: 8 milliseconds

Temperature Rating:
(71-77) -40ºF (-40ºC) to 221ºF (105ºC)
Std. (71-77; 7G & 7H) HiTemp option to 400ºF (204ºC)
(7L) -40ºF (-40ºC) to 160ºF (71ºC)

Contact Material: Palladium silver with sawtooth surface configuration

Contacts: Single Pole, Double Throw, Form C.

Electrical Ratings: Resistive
71-77 Ratings
4A @ 120VAC/3A @ 24VDC
2A @ 240 VAC/1.25A @ 48VDC
7L Ratings
.25A @ 120VAC/24VDC
(approx. 5V drop)

Target Material: Ferrous metal; optional target magnets

Conduit Outlet: 1/2" -14NPT. One location

Enclosure Material: Stainless steel type 303, 316 optional; 7L - 316 stainless steel

Repeatability: .002" (0.05mm)
Under identical operating conditions

Specifications - DPDT

Sensing Distance: .090" (2.3mm) end sensing (2000 PSI)

Range with Target Magnet: up to .20" (5mm)

Differential: Approx. .020"(.5 mm)

Thread Option: 7G & 7H = 5/8"-18 UNF; M18 x 1; 7I = 1"-14 UNF

Response time: 8 milliseconds

Temperature Rating: -40ºF (-40ºC) to 221º F (105º C); HiTemp option to 400ºF (204ºC)

Contact Material: Palladium silver with sawtooth surface configuration

Contacts: Double Pole Double Throw, 2 Form C.

Electrical Ratings: Resistive
3A @ 120VAC/1A @ 24VDC;

Target Material: Ferrous metal; optional target magnets

Enclosure Materials: Stainless Steel type 303, 316 optional

Conduit Outlet: 1/2"-14 NPT. One location

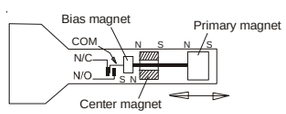
Repeatability: .002" (0.05mm) typical
Under identical operating conditions

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. The normally closed and normally open contacts change state.

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:

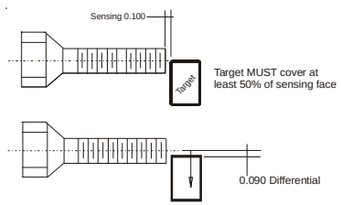


To apply the 70 Series GO Switch and obtain the least differential, the direction the target approaches the switch must be considered. Below are two possible orientations that illustrate the differences in target movement and the affects on switch differential.

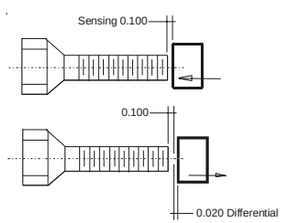
The measurements shown are nominal and can vary as much as .030-.050" depending on the material and size of target used in the application. As you can see, the best scenario for least differential is to orient the switch and target as shown in **Orientation B**. However, in this application, the possibility 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 0.090 ". 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!**



Orientation A



Orientation B

Special Conditions for Safe Use

—The oversheathed or individual conductors must be suitably protected against mechanical damage and terminated within a terminal or junction facility suitable for the conditions of use.
—Three wire/three pin devices are not provided with an external connection facility for the earthing or bonding conductor. It is the user's responsibility to ensure adequate earth continuity via the mounting arrangements.

CE 0539 Ex II 2 G
EEx d IIC T6 Tamb = -20°C to 50°C
Baseefa 02 ATEX 0112X
2A/240VAC
0.5A/24VDC

CE 0539 Ex II 2 G
EEx d IIC T3 Tamb = -40°C to 150°C
Baseefa 02 ATEX 0112X
2A/240VAC
0.5A/24VDC

Reference Baseefa Certificate for special conditions.

All area classifications are dictated by the model number. Reference GO Switch catalog for complete listing.

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.
  —All conduit connected electrical devices, including GO® Switches, must be sealed against water ingression through the conduit system. 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 carefully filled with electronics grade RTV to prevent water ingressionand to prevent premature switch failure. A drip loop with provision for water to escape has also been installed.

For hazardous locations install per Electrical Code. Dry contact devices, such as GO Switch, maybe installed intrinsically safe with matched barrier. When installed as explosion proof, lead seal fittings required within 18" of switch.

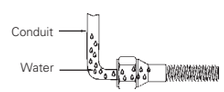


Figure 1. Incorrect

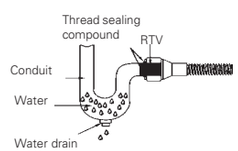
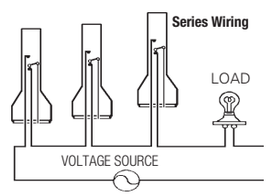


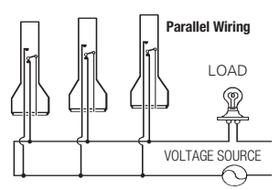
Figure 2. Correct

All GO® Switches are "pure" contact switches, meaning 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 Wiring
Any number of GO® Switches may be wired in series, without voltage drop. By contrast, solid state switches have about two volts drop across the switch when operated. In a 12 volt solid state system with four switches in series, 8 volts is dropped across the switches. Only 4V is left to operate the load. When using GO® Switches, 12V is still available to operate the load. (Except 7L - approx. 5V drop)

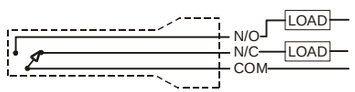
Parallel Wiring
When solid state switches are placed in parallel, there is about 100 microamps leakage through each switch. If ten solid state switches were wired in parallel, the total leakage current would be 1000 microamps or one milliamp - sufficient current to indicate an "ON" condition to a programmable logic controller (PLC). **Any number of GO® Switches may be wired in parallel, with no current leakage and without drawing operating current.** (Except 7L - approx. 5V drop)





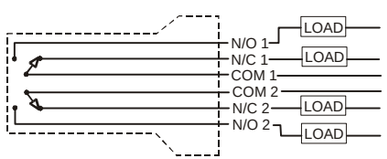
GO SWITCH HOOK-UP DIAGRAMS

71, 72, 73, 74, 75, 76, 77 & 7G & I (Hermetically sealed) Models



SPDT (Form C) Contacts
May be wired Form A (N/O) or B (N/C)

7G, 7H & 7I Models



DPDT (2 Form C) Contacts

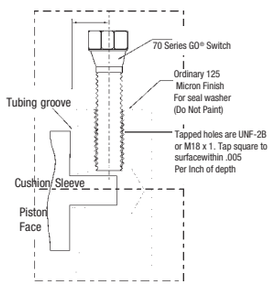
Air and Hydraulic Cylinders

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.

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.

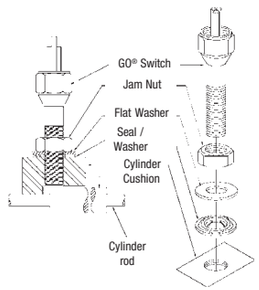
Cylinder Application Detail



Cylinder Applications Switch Sealing Torque Values

Models 71-72 -3/8" Diam/12mm
Torque Jam Nuts to:
15 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

Models 73-76 & 7L - 5/8" Diam/18mm
Torque Jam Nuts to:
15 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



Wiring Diagrams: 70 Series - SPDT

3 Wire PVC & HiTemp Leads	
N/C	Red
N/O	Blue
COM	Black

Terminations A & F

3 Conductor PVC Cable	
N/C	Red
N/O	White
COM	Black

Termination B

4 Wire PVC & HiTemp Leads	
N/C	Red
N/O	Blue
COM	Black
GND	Green

Terminations A & F

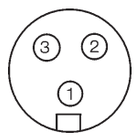
4 Conductor PVC Cable	
N/C	Red
N/O	White
COM	Black
GND	Green

Termination B

Mini-Change QDC - 3 Pin	
Pin 1	COM
Pin 2	N/C
Pin 3	N/O

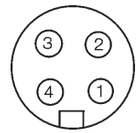
Termination DCA

Mini-Change QDC - 3 Pin for 7L	
Pin 1	GND
Pin 2	COM
Pin 3	N/O



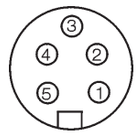
Mini-Change QDC - 4 Pin	
Pin 1	COM
Pin 2	N/O
Pin 3	N/C
Pin 4	GND

Termination DCD



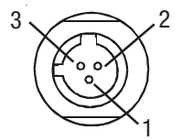
Mini-Change QDC - 5 Pin	
Pin 1	N/O
Pin 2	N/C
Pin 3	GND
Pin 4	Inactive
Pin 5	COM

Termination DCG



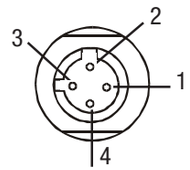
Micro-Change QDC - 3 Pin	
Pin 1	COM
Pin 2	N/C
Pin 3	N/O

Termination DBD



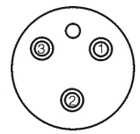
Micro-Change QDC - 4 Pin	
Pin 1	COM
Pin 2	N/O
Pin 3	N/C
Pin 4	GND

Termination DBA



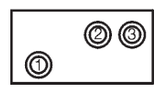
SubSea - 3 Pin - Lock Sleeve	
Pin 1	N/C
Pin 2	COM
Pin 3	N/O

Termination 3DD



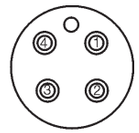
SubSea - 3 Pin - Right Angle	
Pin 1	COM
Pin 2	N/O
Pin 3	N/C

Termination 3DE



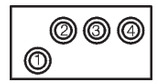
SubSea - 4 Pin - Lock Sleeve	
Pin 1	COM
Pin 2	N/O
Pin 3	N/C
Pin 4	GND

Termination 4DD



SubSea - 4 Pin - Right Angle	
Pin 1	COM
Pin 2	N/O
Pin 3	N/C
Pin 4	GND

Termination 4DE



DPDT (7G, 7H, 7I)

PVC Leads, Cable & Teflon Leads	
N/C1 - Red	N/C2 - Red/White Strp
N/O1 - Blue	N/O2 - Blue/White Strp
COM1 - Black	COM2 - Black/White Strp
	GND - Green

Mini-Change QDC - 7 Pin	
Pin 1	N/O_2
Pin 2	COM_1
Pin 3	N/C_2
Pin 4	N/C_1
Pin 5	COM_2
Pin 6	N/O_1
Pin 7	GND

Termination DCH

MANUFACTURER'S WARRANTY

TopWorx, Inc., warrants that each item of new equipment manufactured by it will be free from defects in material and workmanship under normal use and service; its obligation under this Warranty, being limited to making good, at its factory, and part of parts thereof, which shall be returned to it with transportation charges prepaid, within one year after the date of the purchase of such equipment by the original purchaser, and which its examination shall disclose to its satisfaction to have been thus defective. TopWorx, Inc., however, assumes no risk or liability for results of the use of the products purchased from it.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER OF MERCHANTABILITY FITNESS, OR OTHERWISE EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES AND GENERAL EQUIPMENT AND MANUFACTURING COMPANY, INC., NEITHER ASSUMES , NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THIS EQUIPMENT.

No claims for labor in replacing defective parts and equipment and consequential damages will be allowed by the Company.

This Warranty shall not apply to equipment which has been subjected to misuse, negligence or accident.

This Warranty shall not apply to any equipment which shall have been repaired or altered, outside the Company's factory so as to affect such equipment's stability or reliability in the judgement of the Company.

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Form# S-K029 Rev. 6, 11/03

Installation, Operation & Maintenance