

## Introduction

The 70 Series GO™ Switch with connection head assembly provides the reliability of the GO™ Switch for use in increased safety applications. The connection head is available with an M20 or 1/2 NPT conduit entry and has labeled terminal blocks for ease of end user installation. 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.

## WARNING

To reduce risk of death, serious injury or property damage:

- Personnel installing, maintaining, or operating this equipment must be qualified, must read, understand, and follow these instructions before proceeding.
- This document must be retained for future reference.
- Please contact local Topworx representative for questions, clarifications, or comments.

## 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. The switch / terminal assembly is bonded together by the internal cement/potting. Any attempt to separate the parts (except the threaded cover) will void the warranty and certification
- 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 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 body as possible. This eliminates undue stress caused by heavy cables, connectors, etc.

- 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:

73, 75, 77: .100" (2.54mm) 2,000 PSI  
73, 75, 77: .072" (1.83mm) 5,000 PSI  
73, 75, 77: .060" (1.52mm) 10,000 PSI

## Range with Target Magnet:

Up to .35" (9mm)

## Differential:

Approx. .020" (.5mm)

## Repeatability:

.002" (0.05mm) Under identical operating conditions

## Response time:

8 milliseconds

## Thread Options:

73, 75: 5/8-18 UNF; M18 x 1  
77: 3/4-16 UNF; M20 x 1.5

## Temperature Rating:

T4 Tamb = -40°C to +100°C  
T6 Tamb = -40°C to +50°C

## Contact Material:

Palladium silver with Sawtooth® surface Configuration

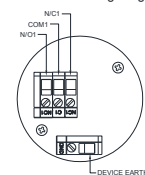
## Contacts:

Single Pole, Double Throw, Form C

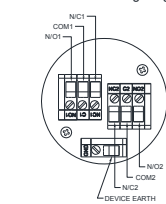


## Connection Head Terminal Wiring Diagrams

SPDT Terminal Wiring Diagram



DPDT Terminal Wiring Diagram



**Electrical Ratings:** Resistive  
4A @ 120VAC / 3A @ 24VDC

## Target Material:

Ferrous metal; optional target magnets

## Connection Head Conduit Outlet:

1/2" -14NPT or M20. One location.

**Enclosure Material:** 70 Series GO™ Switch: 303 or 316 SST  
Connection Head: Die Cast Aluminum with Silicone o-ring

## Specifications - DPDT

## Sensing Distance:

.090" (2.3mm) end sensing (2000 PSI)

## Range with Target Magnet:

Up to .20" (5mm)

## Differential:

Approx. .020" (.5 mm)

## Repeatability:

.002" (0.05mm) Under identical operating conditions

## Response time:

8 milliseconds

## Thread Options:

7G: 5/8"-18 UNF; M18 x 1  
7I: 1"-14 UNF

## Temperature Rating:

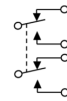
T4 Tamb = -40°C to +100°C  
T6 Tamb = -40°C to +50°C

## 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

## Connection Head Conduit Outlet:

1/2" -14NPT or M20. One location.

## Enclosure Material:

70 Series GO™ Switch: 303 or 316 SST  
Connection Head: Die Cast Aluminum with Silicone o-ring

## 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.

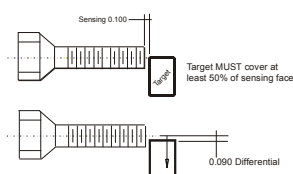
The **sensing distance** is the maximum distance between the switch and target when the switch first operates; the trip point. The **differential**, also known as deadband or hysteresis, is the distance that the target must move from the sensing area in order to allow the switch to reset.

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.

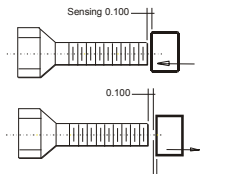
The measurements shown are nominal and can vary as much as .030-.050" depending on the material and size of target used in the application. As you can see, the best scenario for least differential is to orient the switch and target as shown in **Orientation B**. However, in this application, the possibility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

## Attachment of Conduit or Cable

Attach conduit or cable correctly.

- When using long runs of conduit or cable, place supports close to the switch assembly to avoid pulling the assembly out of position.
- If switch assembly 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 70 Series GO Switches with connection head assemblies, must be sealed against water ingress 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 assembly may be fitted with a certified threaded cable entry device (user supplied) in accordance with the manufacturer's instructions.
- To prevent water ingress and to prevent premature switch failure. A drip loop with provision for water to escape has also been installed.

When installed, lead seal fittings are required within 18" of switch assembly.

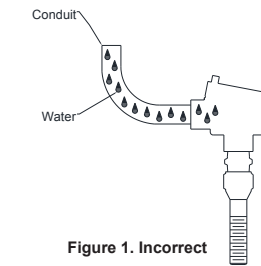


Figure 1. Incorrect

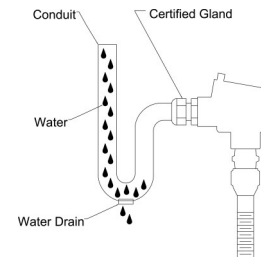


Figure 2. Correct

## 70 Series with Connection Head

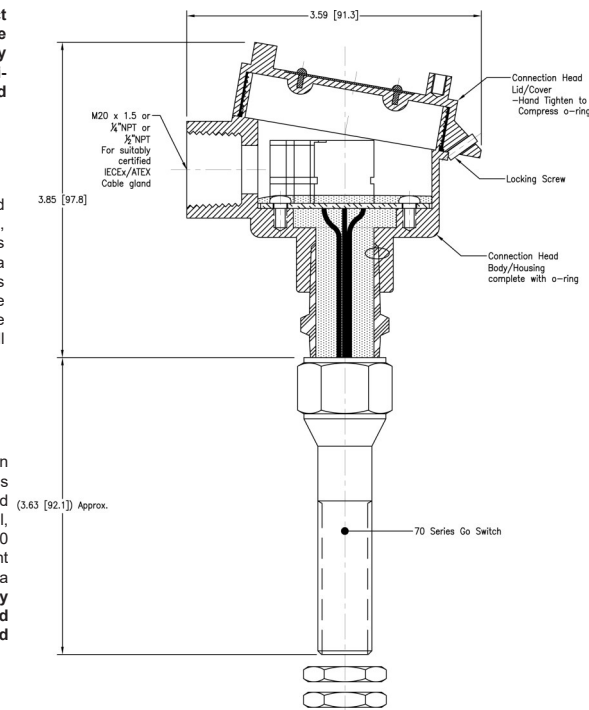
All GO Switches are "pure" contact switches, meaning they have no voltage drop when closed, nor do they have any leakage current when open. For multi-unit installation, switches may be wired in series or parallel, as shown below.

## 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.

## 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 micro-amps 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.**



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## EU Declaration of Conformity

The products described herein, conform to the provisions of the following Union Directives, including the latest amendments:

Low Voltage Directive (2014/35/EU)  
EMD Directive (2014/30/EU)  
UNION Directive (2014/34/EU)

## 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 Applications Switch Sealing Torque Values

### Models 73, 75 & 7G:

5/8" Diameter/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

### Models 77:

3/4" Diameter/20mm

### Torque Jam Nuts to:

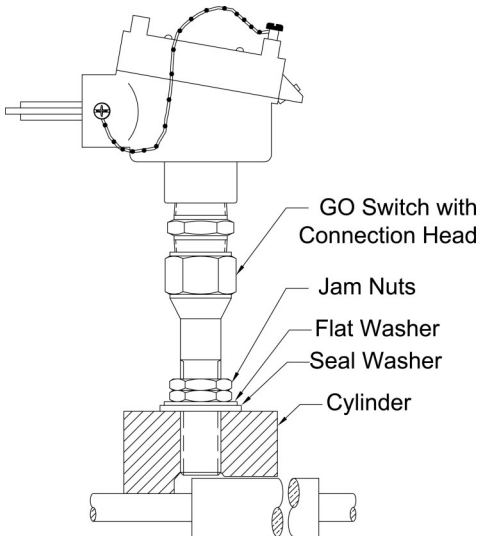
20 lbs-ft to achieve seal at 2,000 PSI  
65 lbs-ft to achieve seal at 5,000 PSI  
Do not exceed 75 lbs-ft

### Models 71:

1" Diameter

### Torque Jam Nuts to:

25 lbs-ft to achieve seal at 2,000 PSI  
75 lbs-ft to achieve seal at 5,000 PSI  
Do not exceed 125 lbs-ft



II 2 GD Ex db eB IIC T\* Gb; Ex tb IIIC T\* C Db  
Ambient temperatures as low as -40°C up to 100°C available for certain products  
Baseefa 09ATEX0281X  
IECEx BAS 09.0135X  
BAS 21UKEX0420X

## Special Conditions for Safe Use

- The 70 Series GO Switch with Connection Head assembly shall be suitably earthed by its installation via the male thread of the GO Switch body.
- Do not allow dust layers to build up on this product.
- All terminal screws, used and unused, shall be fully tightened down by end user.
- No more than one single multi-stranded lead shall be connected to the terminal unless multiple conductors have been joined in a suitable manner, e.g. two conductors into a single insulated bootlace ferrule, or any method indicated on the terminal certificate.
- All terminals and accessories, such as cross-connectors, shall be installed in accordance with the terminal manufacturer's instructions. TopWorx Incorporated will supply the relevant terminal manufacturer's instructions with each assembly covered by Baseefa09ATEX0281X & IECEx BAS 09.0135X certificates.
- The maximum voltage and current shown in the rating label must not be exceeded.
- When connecting conductors of cross section below the maximum 2.3mm<sup>2</sup> allowed for the terminal, then the maximum amps per pole must be reduced inline with the maximum amps permitted for a terminal equivalent to the conductor size fitted.

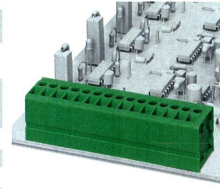
## Technical Assistance

- TopWorx engineers are available 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.



## PCB-Terminal Block

Article description	FRONT 2,5-V/SA 5-EX * FRONT 2,5-V/SA 10-EX *
EC-Type Examination Cert. IECEx-Certificate	KEMA 00ATEX2053 U IECEx KEM 07.0023 U
Marking	Ex e II KEMA 00ATEX2053 U IECEx KEM 07.0023 U
Assembly on	Printed circuit board
Stipping length	9 mm
Torque	0,4 - 0,5 Nm
Assembly instructions	See page 2
Operating temperature range	-50 °C ... +110 °C



## Technical data according to EN 60079-7:2007 / IEC 60079-7:2006 (increased safety „e“)

Rated insulation voltage	160 V	
- without spacer	250 V	
- with one spacer	400 V	
- with two spacer		
Rated voltage	176 V	
- without spacer	275 V	
- with one spacer	440 V	
- with two spacer		
Rated current	22 A	ΔT = 40 K
Contact resistance	0,6 mΩ	

## Connection capacity

Max. conductor cross-section	2,5 mm <sup>2</sup>	AWG 14
Connectable conductor cross-section area	0,2 - 2,5 mm <sup>2</sup>	AWG 24 - 14

## Multi-conductor connection (2 conductors of the same cross-section and conductor type)

rigid / flexible	0,2 - 0,75 mm <sup>2</sup>	AWG 24 - 18
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## Insulation material

Description	PA 6.6
Creep resistance acc. to IEC 60112 / material group	CTI 600 / I

## Accessories

Accessories	Description	Article no.
Cover	D-FRONT 2,5-V	1700011
Spacer	RZ 2,5-FRONT 2,5 V-EX	1700794

\* may be followed by color designation

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有毒或有害物質 (Hazardous Substance)						
零件名称 (Part Name)	铅 (Lead) (Pb)	汞 (Mercury) (Hg)	镉 (Cadmium) (Cd)	六价铬 (Hexavalent Chromium) (Cr+6)	多溴联苯 (Polybrominated biphenyls) (PBB)	多溴二苯醚 (Polybrominated diphenyl ethers) (PBDE)
接触组件 (Contact Assembly)	X	○	○	○	○	○
磁铁 (Magnets)	○	○	○	○	○	○
壳体 (Enclosure)	○	○	○	○	○	○
塑料 (Plastic)	○	○	○	○	○	○
接线 (Wiring)	X	○	○	○	X	X

○: 表示该有毒有害物质在该部件所有物质材料中的含量均低于GB/T26572规定的限量要求以下  
X: 表示该有毒有害物质至少在该部件的某一物质材料中的含量超出GB/T26572规定的限量

## Important assembly instructions – increased safety „e“

The Printed Circuit Single Terminal Blocks are suitable for use in enclosures on printed circuit boards in atmospheres with flammable gases or combustible dust. For flammable gases these enclosures must satisfy the requirements according to EN 60079-0 and EN 60079-7.

The Printed Circuit Single Terminal Blocks may be used at ambient temperatures of -50 °C to +40 °C at the mounting position in electrical apparatus, e.g. junction and connection boxes, for temperature class T6. When the Terminal Blocks are used in electrical apparatus of temperature classes T1 up to T5, the highest temperature of the insulating material shall not exceed the maximum value of the operating temperature range.

If smaller cross section as the rated cross section are used, the belonging lower current has to be laid down in the EC-Type Examination Certificate of the complete apparatus.

When assembling with other certified series and sizes of PCB-terminal blocks and using belonging accessories, the required creepage distances and clearances have to be observed.

## Operational instructions – Intrinsic safety “i”

EN 60079-14 Clause 12 describes modular terminal blocks as simple apparatus when used in intrinsically-safe circuits. Testing by a notified body and marking is not required. If terminal blocks be identifiable as part of an intrinsically circuit are marked by a colour, the colour used shall be light blue.

Testing for compliance to intrinsically safe requirements including clearance, creepage, and solid insulation distances specified in EN 60079-0 and EN 60079-11 have been performed for circuits up to 60 V.

Compliance with distance requirements of EN 60079-14 Clause 12.2.3 for the connection of separated intrinsically-safe circuit accessories is met. A minimum distance of 50 mm to separate clamping units of intrinsically-safe and non intrinsically-safe circuits is required through the use of a separating plate or similar device.

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