

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.

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 middle of the body as possible. This eliminates undue stress caused by heavy cables, connectors, etc.

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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



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" (.5mm)

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

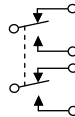
Response time:
 8 milliseconds

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 effects 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!**

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.

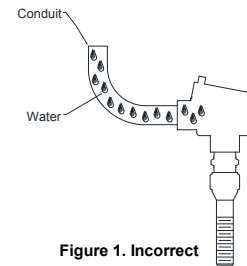


Figure 1. Incorrect

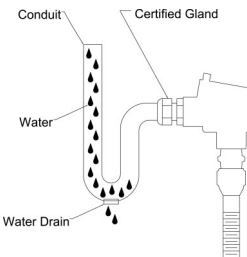


Figure 2. Correct

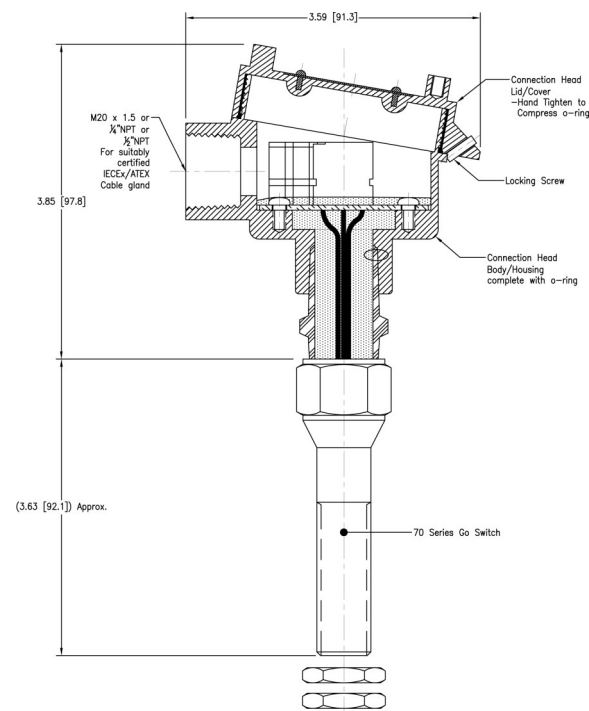
All GO Switches are "pure" contact switches, meaning they have no voltage drop when closed, nor do they have any leakage current when open. For multi-unit installation, switches may be wired in series or parallel, as shown below.

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.

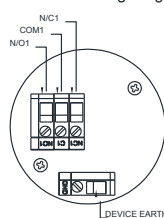
Parallel Wiring

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 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.**

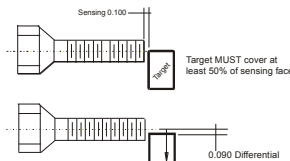
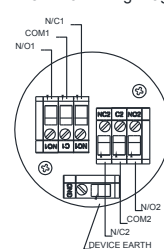


Connection Head Terminal Wiring Diagrams

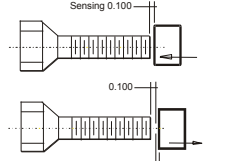
SPDT Terminal Wiring Diagram



DPDT Terminal Wiring Diagram



Orientation A



Orientation B

TOPWORX

Visit www.topworx.com for comprehensive information on our company, capabilities, and products – including model numbers, data sheets, specifications, dimensions, and certifications.

info.topworx@emerson.com

www.topworx.com



GLOBAL SUPPORT OFFICES

Americas
 3300 Fern Valley Road
 Louisville, Kentucky 40213 USA
 +1 502 969 8000

Europe
 Horsfield Way
 Bredbury Industrial Estate
 Stockport SK6 2SU
 United Kingdom
 +44 0 161 406 5155

Africa
 24 Angus Crescent
 Longmeadow Business Estate East
 Modderfontein
 Gauteng
 South Africa
 +27 11 451 3700

Asia-Pacific
 1 Pandan Crescent
 Singapore 128461
 +65 6891 7550

Middle East
 P.O. Box 17033
 Jebel Ali Free Zone
 Dubai 17033
 United Arab Emirates
 +971 4 811 8283

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8. TAXES: Any tax or governmental charge payable by the Seller because of the manufacture, sale or delivery of the Goods, or provision of Services, may at Seller's option be added to the price herein specified. The foregoing shall not apply to taxes based upon Seller's net income.

9. TERMS OF PAYMENT: Subject to the approval of Seller's Credit Department, terms are F.O.B. shipping point, net 30 days from date of Seller's invoice in U.S. currency, except for applicable milestone payments covered below or export shipments for which Seller may require other arrangements. Freight charges may include shipping and handling charges, and Buyer shall pay all such charges. If any payment owed to Seller hereunder is not paid when due, it shall bear interest at a rate 1-1/2% per month interest from the date on which it is due until it is received and future shipments may be placed on hold. Seller shall have the right, among other remedies, either to terminate the Agreement or to suspend further deliveries under this and/or other agreements with Buyer in the event Buyer fails to make any payment hereunder when due. Buyer shall be liable for all expenses attendant to collection of past due amounts, including attorneys' fees. Unless otherwise provided in Seller's written quotation, periodic milestone payments shall be made by Buyer when the purchase price of this Agreement exceeds \$100,000. In such cases, invoices shall be issued by Seller and paid by Buyer based on the following milestones: Milestone 1: 30% of price upon acceptance of order by Seller. Milestone 2: 30% of price upon release by Seller of approved bills of material to manufacturing for assembly. Milestone 3: 40% of price upon shipment of the Goods by Seller. Seller reserves the right to designate additional Milestones where the Agreement provides for Services in excess of \$50,000.

10. SOFTWARE AND FIRMWARE: Notwithstanding any other provision herein to the contrary, Seller or applicable third party owner shall retain all rights of ownership and title in its respective firmware and software, including all copyrights relating to such firmware and software and all copies of such firmware and software. Except as otherwise provided herein, Buyer is hereby granted a nonexclusive, royalty free license to use firmware and software, and copies of firmware and software, incorporated into the Goods only in conjunction with such Goods and only at the Buyer's plant site where the Goods are first used. Buyer may negotiate with Seller separate licenses to use such copies and firmware and software at other plant sites. Buyer's use of certain firmware (as specified by Seller) and all other software shall be governed exclusively by Seller's and/or third party owner's applicable license terms.

11. BUYER SUPPLIED DATA: To the extent that Seller has relied upon any specifications, information, representation of operating conditions or other data or information supplied by Buyer to Seller ("Data") in the selection or design of the Goods and/or provision of the Services and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer and relied upon by Seller, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

12. EXPORT/IMPORT: Buyer agrees that all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which items may be supplied will apply to its receipt and use of Goods and Services. In no event shall Buyer use, transfer, release, import, export, or re-export Goods in violation of such applicable laws, regulations, orders, or requirements.

13. GENERAL PROVISIONS: (a) Buyer shall not assign its rights or obligations under the Agreement without Seller's prior written consent; (b) there are no understandings, agreements or representations, express or implied, not specified in the Agreement; (c) no action, regardless of form, arising out of transactions under the Agreement, may be brought by either party more than two years after the cause of action has accrued; (d) any modification of these terms and conditions must be set forth in a written instrument signed by a duly authorized representative of Seller; (e) the Agreement is formed and shall be construed, performed and enforced under the laws of the State of Missouri (however, Buyer and Seller agree that the proper venue for all actions arising under the Agreement shall be only in the State where the Goods involved in such actions were manufactured; (f) The 1980 United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement; (g) if any provision of the Agreement is invalid under any statute or rule of law, such provision, to that extent only, shall be deemed to be omitted without affecting the validity of the remainder of the Agreement; (h) Seller specifically objects to the application of any Federal Acquisition Regulation ("FAR") or other governmental procurement provision or clause to the Agreement; (i) UNLESS OTHERWISE SPECIFICALLY PROVIDED IN SELLER'S QUOTATION, GOODS AND SERVICES HEREUNDER ARE NOT INTENDED FOR USE IN ANY NUCLEAR OR NUCLEAR RELATED APPLICATIONS. Buyer (i) accepts Goods and Services in accordance with the restriction set forth in the immediately preceding sentence, (ii) agrees to communicate such restriction in writing to any and all subsequent purchasers or users and (iii) agrees to defend, indemnify and hold harmless Seller from any and all claims, losses, liabilities, suits, judgments and damages, including incidental and consequential damages, arising from use of Goods and Services in any nuclear or nuclear related applications, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability; (j) The rights, remedies and protections afforded to Seller under this Agreement, including but not limited to indemnification of Seller, limitation of remedy and liability and limited warranty shall extend to Seller and to its affiliates, subsidiaries, or related companies performing or supplying work, services, or products under this Agreement or any agreement into which it is incorporated by reference; and (k) Seller does not agree to: (i) indemnify Buyer; or (ii) name Buyer as an additional insured.

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

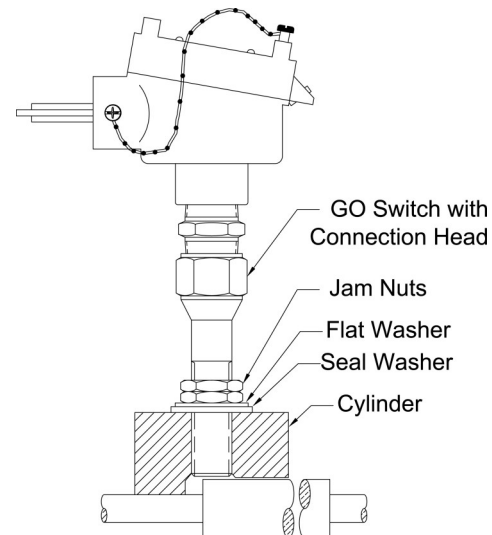
Torque Jam Nuts to:
15 lbs-ft to achieve seal at 2,000 PSI
25 lbs-ft to achieve seal at 5,000 PSI
Do not exceed 30 lbs-ft

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



Baseefa09ATEX0281X
IECEX BAS 09.0135X
Ex de IIC T4/T6 Gb
Ex tb IIIC T130°C/T85°C Db IP66
T4/T130°C Tamb: -40°C to +100°C
T6/T85°C Tamb: -40°C to +50°C

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 2.3mm² 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.

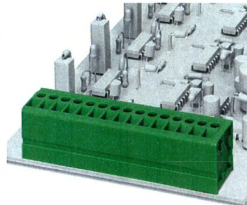
Technical Assistance

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

Connection capacity

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

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

rigid / flexible	0,2 - 0,75 mm ²	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

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.

* may be followed by color designation