



# Cycle-Indicator Proximity Switches

## DESCRIPTION

Graco's Trabon Cycle Proximity Switches are used for providing a signal to a Monitor, Controller or Programmable Logic Controller (PLC) to indicate the number of cycles and cycle rate of a Series-Progressive (SP) divider valve; this signal is transmitted via a feedback loop to the Controller, providing the status of the lubrication cycle it is programmed to monitor and record.

Graco offers three types of proximity switches for use on Series-Progressive divider valves: Reed-Type (Reed) Proximity Switch, Field Sensing Magnetic (FSM) Proximity Switch, and Field Sensing Mechanical (FS<sub>mech</sub>) Proximity Switch. All are magnetically operated, single-throw switches that sense the movement of the divider valve's piston when it is cycling.

**The Reed-Type proximity switch** is available as an unattached version (magnetically attached to piston) for oil-only applications using MSP, MH or MGO divider valve assemblies.

**The Field-Sensitive Magnetic proximity switch** is a dry contact, ceramic magnet operated switch. It can be used in either grease or oil applications and is available in three sizes compatible with MSP, MH, MX/MXP, and MGO assemblies and its use is not limited by valve section size. This switch is also available in an explosion-proof design with a six-foot long cable for use in MS/MH divider valves.

**The FS<sub>mech</sub> proximity switch** is designed to provide a greater reliability of operation when used with the very low signal power conditions common to DC-powered PLC's. It is a magnetically activated proximity switch that contains a miniature snap-action switch, activated by the attraction of its internal magnet to the divider valve's moving piston. The 24 volt DC-only version of this switch is available with integral light-emitting diodes (LED) for local verification of power and cycling activity. Similar designs without LED's are suitable for either AC or DC power operation; there is also an explosion-proof version with six foot long pigtail leads. FS<sub>mech</sub> proximity switches are available for MSP, MH, and MX/MXP divider valve assemblies.

Each type of Graco Proximity Switch is available with a variety of customer-required options to fulfill each of their application's particular specifications: 24 VDC or 115 VAC power, LED cycle

indicator lights for DC applications, and various types of electrical connection options: Brad Harrison or Crouse Hinds cables with either 3,4, or 5 pin connectors, 6 ft., 3-wires (for explosion-proof versions), 1/2" NPT conduit (Reed Switch types only), or M12x1 Micro 4-pin connection.

A complete list of the cycle and proximity switches with their available options appears on Page 2.

## OPERATION

Proximity Switches are installed in place of an o-ring seal piston enclosure plug in one of the working sections of a Series-Progressive divider valve assembly. They are actuated by movements of the lube-dispensing piston inside the section and thereby send a signal to the Controller indicating the rate and amount of activity of the proportioning divider as lubricant is pumped through it.

Reed type switches utilize a pin attached magnetically to a piston to cause the switch contacts to close. Field sensing magnetic type of switches sense the proximity of the pistons' mass to cause contact closure. When the piston moves in the opposite direction away from the switch, the Reed switch is deactivated by the withdrawal of the actuating pin and opens its contacts. Similarly, the FSM Proximity Switch's sensing of the piston is lost and its contacts open. The two contact transitions (open-to-closed and closed-to-open) are detected by the Monitor/Controller, which has been programmed to interpret such a signal as one complete cycle of the divider section, and therefore one complete cycle of the entire SP divider valve assembly.

Depending upon the individual lubrication system's design and lubrication requirements, the Controller or PLC programming then uses the feedback signals from the Proximity Switch in each lubrication zone to start and stop the lubrication cycle periodically as required by the system design specifications. If the Controller or PLC does not receive the expected signal within a time period specified in the lubrication system's design, and programmed into the PLC as the "Monitor Time", the PLC can initiate various responses as specified by the user. These responses can include triggering a local audible and/or visual warning or sending an electronic notification to a remote computer terminal.

**O-RING SEAL STYLE<sup>(1)</sup> CYCLE-INDICATOR PROXIMITY SWITCHES**

Modular Divider Type	Proximity Switch Part No. (Old Part No.)	Proximity Switch Type	Operating Voltage	Cable Electric Connection	LED	Max Cycle Rate Per Min	Max Pressure Rating - psi	Rated Life Cycle
MGO	UL+CSA 563495 (527-007-120)	FSM	10-32 VDC	4-pin CH Mini	No	125	10,000**	50,000,000+
MGO	UL+CSA 564402 (527-007-160)	FSM	115 VAC	5-pin BH Mini	No	125	10,000**	50,000,000+
MGO	— (570-155-001)	Reed	115 VAC	1/2 in NPT cond	No	60	7,500	10,000,000+
MGO	UL+CSA 563970 (570-999-060)	FSM	115 VAC	3-pin BH Mini	No	125	3,500	50,000,000+
MGO	UL+CSA Disc. (570-999-220)	FSM	115 VAC	5-pin BH Mini	No	125	3,500	50,000,000+
MXP/MX/MXO	UL+CSA 564399 (527-005-190)	FSM	115 VAC	5-pin BH Mini	No	125	3,500	50,000,000+
MXP/MX/MXO	UL+CSA 563476 (527-005-520)	FSM	115 VAC	3-pin BH Mini	No	125	3,500	50,000,000+
MXP/MX/MXO	563486 (527-006-130)	FS <sub>mech</sub>	20-32 VDC	3-pin BH Mini	Yes	100	7,500	10,000,000+
MXP/MX/MXO	564400 (527-006-140)	FS <sub>mech</sub>	20-32 VDC	5-pin BH Mini	Yes	100	7,500	10,000,000+
MXP/MX/MXO	CSA <sub>NRTL</sub> 564401 (527-006-150)	FS <sub>mech</sub>	115 VAC or 10-32 VDC	Explosion-Proof*	No	100	7,500	10,000,000+
MXP/MX/MXO	UL+CSA 557752 (527-007-110)	FSM	10-32 VDC	4-pin CH Mini	No	125	10,000**	50,000,000+
MXP/MX/MXO	UL+CSA 558938 (527-007-140)	FSM	115 VAC	5-pin BH Mini	No	125	10,000**	50,000,000+
MXP/MX/MXO	UL+CSA 564403 (527-007-269)	FSM	10-32 VDC	4-pin Micro	No	125	10,000**	50,000,000+
MSP/MH	UL+CSA 557741 (527-003-251)	FSM	115 VAC	3-pin BH Mini	No	125	3,500	50,000,000+
MSP/MH	⚡ 557745 (527-003-431)	FSM	115 VAC	Explosion-Proof*	No	125	3,500	50,000,000+
MSP/MH	UL+CSA 557746 (527-004-111)	FSM	115 VAC	5-pin BH Mini	No	125	3,500	50,000,000+
MSP/MH	UL+CSA 557747 (527-004-112)	FSM	10-32 VDC	4-pin CH Mini	No	125	3,500	50,000,000+
MSP/MH	563477 (527-005-670)	FS <sub>mech</sub>	20-32 VDC	5-pin BH Mini	Yes	100	7,500	10,000,000+
MSP/MH	563478 (527-005-690)	FS <sub>mech</sub>	20-32 VDC	3-pin BH Mini	Yes	100	7,500	10,000,000+
MSP/MH	563484 (527-006-050)	FS <sub>mech</sub>	115 VAC or 10-32 VDC	5-pin BH Mini	No	100	7,500	10,000,000+
MSP/MH	CSA <sub>NRTL</sub> 563485 (527-006-060)	FS <sub>mech</sub>	115 VAC or 10-32 VDC	Explosion-Proof*	No	100	7,500	10,000,000+
MSP/MH	563427 (527-001-231)	Reed	115 VAC or 10-32 VDC	1/2 in NPT cond	No	60	7,500	10,000,000+
MSP/MH	563501 (527-007-273)	FS <sub>mech</sub>	20-32 VDC	4-pin Micro	Yes	100	7,500	10,000,000+

UL+CSA = Approved

CSA<sub>NRTL</sub> = Approved for hazardous locations: Class I, Groups A, B, C & D - Division 1

⚡ = UL and CSA approved for hazardous locations: Class I, Groups A, B, C & D - Division 1; Class II, Groups E, F & G - Division 1

\*Includes 6ft, 3 conductor cable, shown on page 4

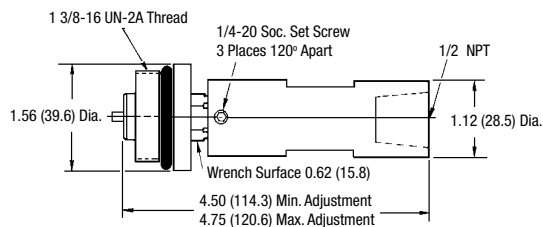
\*\*Specially-developed and recommended for stamping press applications

<sup>(1)</sup>NOTE: Cycle Indicator Proximity Switches shown in this bulletin are for use in divider valves having O-ring sealed piston closure ports only.

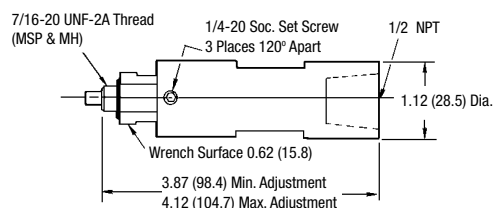
**TRABON® REED-TYPE PROXIMITY SWITCHES**

SPECIFICATIONS	
Material	Aluminum HSG, SS Magnet HSG, Buna-N O-Ring
Electrical	0.5A @ 50 VDC, 10mA @ 115 VAC, N.O.
Lubricant	Oil Only
Max Cycle Rate	60 cpm
Temperature Range	-20° F to 180° F (-29° C to 83° C)
Max Pressure	7500 psi

Part No. (570-155-001) – Used on MGO Divider Valves

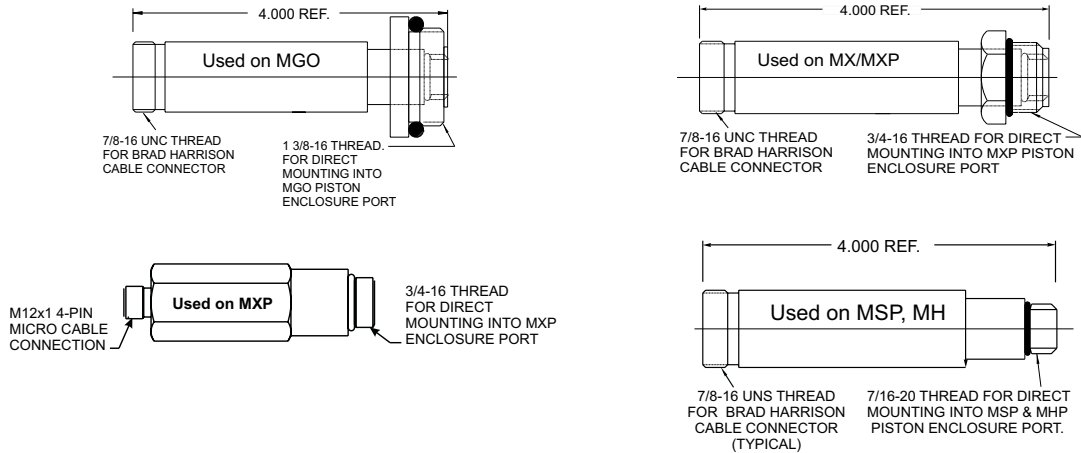


Part No. 563427 (527-001-231) – Used on MH, MSP Divider Valves



**TRABON® FSM-TYPE PROXIMITY SWITCHES – 3 PIN, 4 PIN, 5 PIN, EXPLOSION-PROOF**

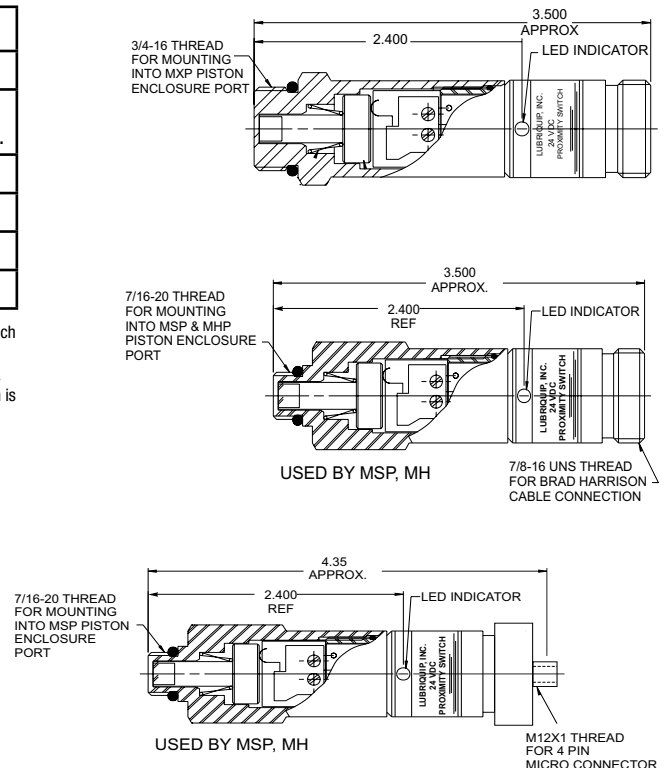
SPECIFICATIONS	
<b>Material</b>	Type 303 SS Housing, Buna-N O-Ring
<b>Electrical</b>	2A @ 120/240 VAC, 1A @ 12-32 VDC, N.O.
<b>Lubricant</b>	Oil or Grease
<b>Max Cycle Rate</b>	125 cpm (See rated life cycles in table)
<b>Temperature Range</b>	-22° F to 250° F (-30° C to 121° C)
<b>Max Pressure</b>	(See Table)



**TRABON® FS<sub>MECH</sub>-TYPE PROXIMITY SWITCHES – 3 PIN, 4 PIN, 5 PIN, EXPLOSION-PROOF**

SPECIFICATIONS	
<b>Material</b>	Type 303 SS Housing, Viton O-Ring
<b>Electrical†</b>	With LEDs 25mA @ 24 VDC, N.O.; Without LEDs 1.2 VA @ 24 VDC, 5A @ 115/230 VAC, N.O.
<b>Lubricant</b>	Oil or Grease
<b>Max Cycle Rate</b>	100 cpm (See rated life cycles in table)
<b>Temperature Range</b>	-58° F to 167° F (-50° C to 75° C)
<b>Max Pressure</b>	7500 psi

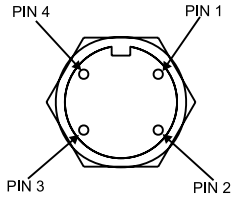
† The FS<sub>mech</sub> illuminated Proximity Switches (i.e. 527-005-670) are designed to work with controllers and PLCs which have a typical input impedance of 1500 ohms or less. Using the switch on devices which have an input impedance about 3000 ohms or larger may cause the input to not recognize a change of state to the closed position. If using a high impedance input, it is suggested that a 527-006-050 non illuminated FS<sub>mech</sub> switch be used. If state indication is required, a connecting cable with LEDs should be used.



## ACCESSORIES – CABLES

Graco offers a variety of connecting cables for use with its proximity switches. Cables are available with either straight or right-angle Mini, or Micro connectors; with or without indicator lights and in lengths from three to twelve feet as listed in the tables below. (Pin call outs shown below are from connecting cable).

DC PROX. SWITCH CABLES - 4 PIN  
(MINI CONNECTOR 7/8-16 TH'D)

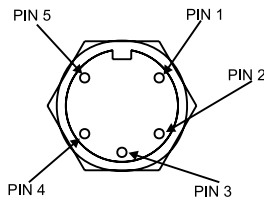


4-PIN CABLE OPTIONS For DC-Powered Applications with LED Power/ Operational Indicators			
Connector	Polarity	Part No. (Old)	Cable Length
Straight	NPN	558968 (570-999-937)	12 ft
90°	NPN	— (570-999-938)	12 ft
Straight	PNP	558025 (570-999-953)	12 ft
90°	PNP	558026 (570-999-954)	12 ft

EURO CABLE WIRES COLOR CODE	DC CABLE PIN ASSIGNMENTS	
	PNP Cable* (with LED Operational Indicators)	NPN Cable** (with LED Operational Indicators)
Black	Pin 1 - N.O.	Pin 1 - N.O.
Blue	Pin 3 - Common	Pin 2 - Common
White	Pin 4 - Ground	Pin 4 - Ground
Brown	Pin 2 - Power	Pin 3 - Power

\*Sourcing \*\*Sinking

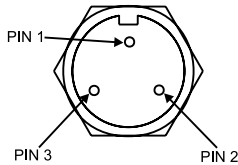
AC & DC PROX. SWITCH CABLES - 5 PIN  
(MINI CONNECTOR 7/8-16 TH'D)



5-PIN CABLE OPTIONS for AC or DC-Powered Applications (No Operational Indicators in Cables)		
Connector	Part No. (Old)	Cable Length
Straight	— (570-999-180)	3 ft
Straight	558023 (570-999-160)	6 ft
Straight	558024 (570-999-170)	12 ft
90°	558965 (570-999-390)	6 ft

USA COLOR CODES	AC CABLE PIN ASSIGNMENTS
White	Pin 1 - N.O.
Red	Pin 2 - Not Used
Green	Pin 3 - Ground
Orange	Pin 4 - Not Used
Black	Pin 5 - Common

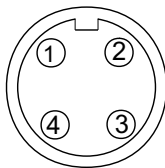
AC & DC PROX. SWITCH CABLES - 3 PIN  
(MINI CONNECTOR 7/8-16 TH'D)



3-PIN CABLE OPTIONS for AC or DC-Powered Applications (No Operational Indicators in Cables)		
Connector	Part No. (Old)	Cable Length
Straight	Disc. (570-999-070)	3 ft
Straight	558021 (570-999-080)	6 ft
Straight	558022 (570-999-090)	12 ft
90°	Disc. (570-999-350)	6 ft

USA COLOR CODES	AC CABLE PIN ASSIGNMENTS
Green	Pin 1 - Ground
Black	Pin 2 - Common
White	Pin 3 - N.O.

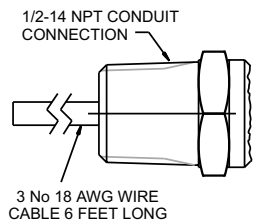
DC PROX. SWITCH CABLES - 4 PIN  
(MICRO CONNECTOR M12 X 1 THREAD)



COLOR CODES	DC CABLE PIN ASSIGNMENT
Brown	Pin 1 - Common (Power)
White	Pin 2 - Not Used
Blue	Pin 3 - Ground
Black	Pin 4 - N.O.

4-PIN CABLE OPTIONS for DC-Powered Applications		
Connector	Part No. (Old)	Cable Length
Straight	— (570-999-590)	6.6 ft
90°	Disc. (570-999-600)	6.6 ft

### EXPLOSION-PROOF PROXIMITY SWITCHES



Part No. (Old)	Wire Color For		
	Common	Normally Open	Ground
557745 (527-003-431)	Black	White	Red
563485 (527-006-060)	Black or Red w/Black Stripes	White or Red w/ White Stripes	Green
564401 (527-006-150)	Black or Red w/Black Stripes	White or Red w/ White Stripes	Green

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