Instruction Leaflet **IL053005EN** Effective September 2016

Series F25 Mechanical Limit Switches

Introduction

All Series F25 limit switches consist of three modular, interchangeable, plug-in components: operating head, switch body, and wiring receptacle. Operating heads (side rotary, top and side push, and wobble stick) are mounted on top of the switch body in any of four positions. Both SPDT and DPDT switch bodies employ snap-acting, leaf contact springs providing high reliability and extended life. All assembled limit switches are UL Listed, CSA Certified, and rated with Enclosure Types 3, 3S, 4, 4X, 6, 6P, and 13.

Table 1. Design characteristics.

Contacts	SPDT, DPDT Form Z (four terminal, double-break-double make)
Contact ratings	NEMA A600, R300
Repeat accuracy	0.3% maximum deviation
Construction	Die-cast zinc alloy
Enclosure type	IP67/NEMA/UL Enclosure Types 3, 3S, 4, 4X, 6, 6P, & 13
Operating temp.	See operating head temperature table on pg. 2

Connection diagram – SPDT, DPDT

The following connection diagram appears on the switch body nameplate.

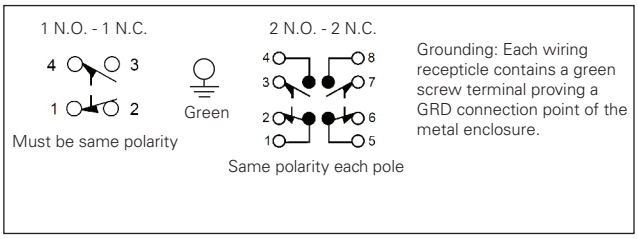


Figure 1. Connection diagram.

Electrical data - contact ratings per pole

Table 2. SPDT, DPDT.

	AC (NEMA A600)					DC (NEMA R300)	
Volts	**Current amperes**			**Volt amperes**			
	Make	**Break**	**Cont.**	**Make**	**Break**	**Volts**	**Current amperes**
120	6	6				120	0.25
240	3	3				240	0.125
480	1.5	1.5	10	7200	720		
600	1.2	1.2					

Torque requirements for limit switch assembly

Tighten the operating head and switch body screws to a torque value within the following ranges to ensure and maintain the enclosure type ratings for the assembled limit switch.

Switch body screws – Tighten to ensure contact of switch body to wiring receptacle: 25 – 30 in.-lb (2.8 – 3.4 N•m).

Operating head screws – Tighten to ensure contact of head to switch body: 14 – 18 in.-lb (1.6 – 2.0 N•m).

The wiring receptacle provides the mounting means for an assembled limit switch. Two holes provide for front mounting with #10 screws. Two threaded holes provide for rear mounting using #10 – 32 screws. The larger threaded hole in the bottom of the switch provides the means for routing and sealing a connecting cable, or for inserting a connector receptacle. Sealing of the ½ inch NPT conduit entrance threads should be done by using sealing compound or Teflon® tape. This will ensure and maintain the limit switch Enclosure Type Ratings.

Switch bodies and receptacles are keyed to prevent a single pole switch from being plugged into a double pole receptacle or vice versa. Receptacle wiring terminals are numbered and correspond with the diagram printed on the switch body nameplate. Pressure plate terminals accept AWG #18 through #12 wire. A grounding screw (colored green) provides enclosure grounding. Limit switches should be rigidly mounted with suitable clearances to permit component replacement.

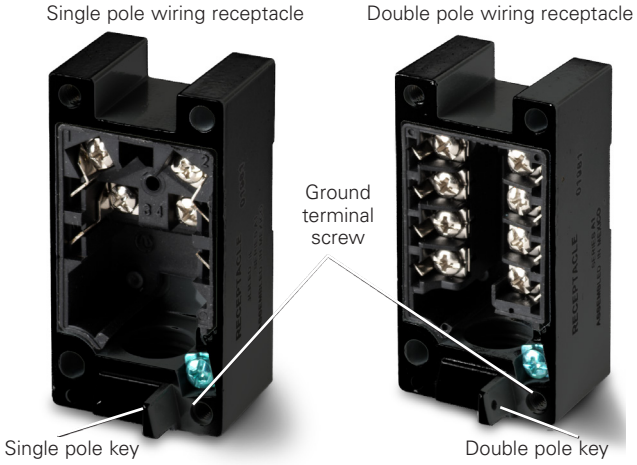


Figure 2. Single and double pole wiring receptacles.

Powering Business Worldwide

Operating head positioning

Heads can be mounted on the switch body in any of four orientations, each, 90 degrees apart. Torque screws according to requirements on pg 1.

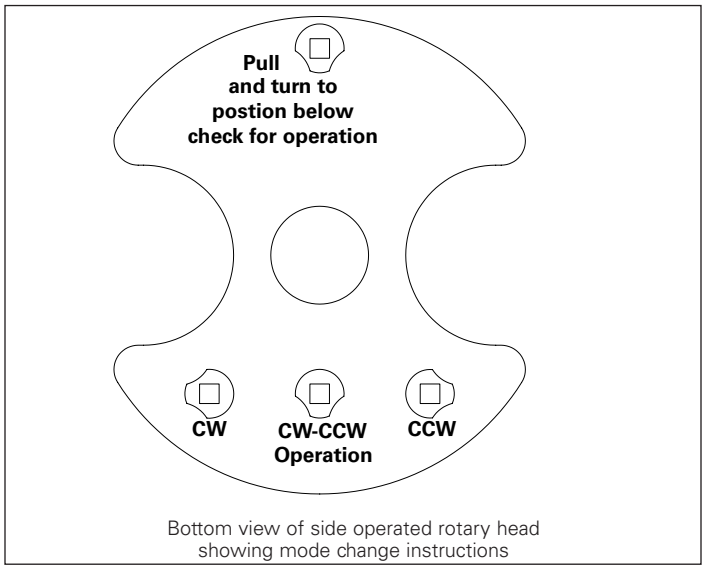


Figure 3. Head label.

Side Rotary - the operating mode (clockwise (CW), counter-clockwise or clockwise (CCW or CW), and counter-clockwise (CCW)) of these spring return operating heads is easily changed without tools as shown in Figure 3. Remove the head from the switch body. Pull out the plunger and turn until its position matches that shown on the diagram for the desired operation mode.

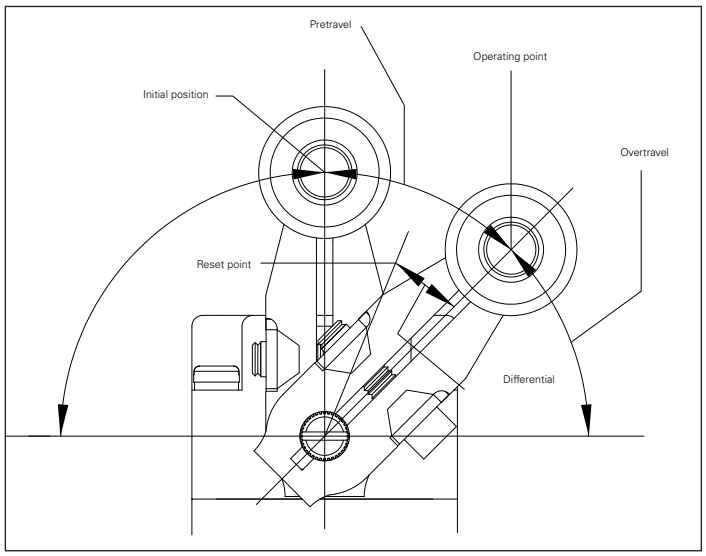


Figure 4. Side rotary characteristics.

Mechanical life can be extended by adhering to these guidelines:

A. Minimize the severity of the impact of the target material on the limit switch operator

B. Limit the overtravel of the switch as much as possible given the needs of the application.

Levers are adjustable to any angle on the operating shaft, to achieve desired switch performance using the diagram above as a reference. The operating shaft screwdriver slot can be used to maintain shaft position during lever installation.

Push Operated - these spring return top push or side push operating heads are available in pushbutton and roller styles. The push roller style can be converted from vertical to horizontal operation or vice versa. Pull roller out of the head until it can be rotated 90 degrees to the desired orientation. When released, it will snap into the set position.

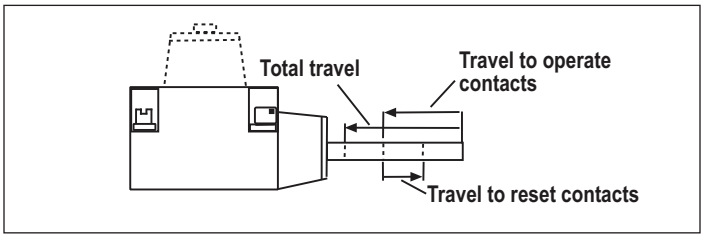


Figure 5. Travel.

Wobble Stick - these spring return, top operated heads, use different rod-type operators to detect motion in any direction perpendicular to the operator. The operator screws onto the threaded head stub.

Table 3. Limit Switch Operating Temperature Ranges.

Table	Operation		Temp. range
A	Side Rotary	Spring return	+10°F (-12°C) to +200°F (94°C)
B	Side Push	Spring return	+14°F(-10°C) to +200°F (94°C)
C	Top Push Wobble Stick	Spring return Spring return	+14°F(-10°C) to +250°F (121°C)

Note: Temperature performance below +32°F (89°C) is based on absence of freezing moisture or water.

Repeat accuracy

The type of operating head used on an assembled limit switch determines repeat accuracy for the switch assembly. The highest levels of repeat accuracy come from assembled switches that do not use operating levers or rollers on operating heads. Switches of this type have a repeat accuracy as listed in Table 4 below.

Table 4. Operating head repeat accuracy specifications.

Note: Measured along arc for 1-1/2 in. lever or measured along push operator axis.

Operating head	Repeat accuracy
Side operated:	
	Within 0.0012 in. (0.0305 mm)
Side Push	Within 0.003 in. (0.076 mm)
Top operated	
Top Push	Within 0.002 in. (0.051 mm)

Assembled switches that use operating levers or rollers on operating heads have a repeat accuracy determined as follows: add the repeat accuracy tolerance of Table 4 for the type of operating head used to the concentricity tolerance of Table 5 for the type of roller used on the lever or operator. The combination of these two tolerances is the limit switch repeat accuracy.

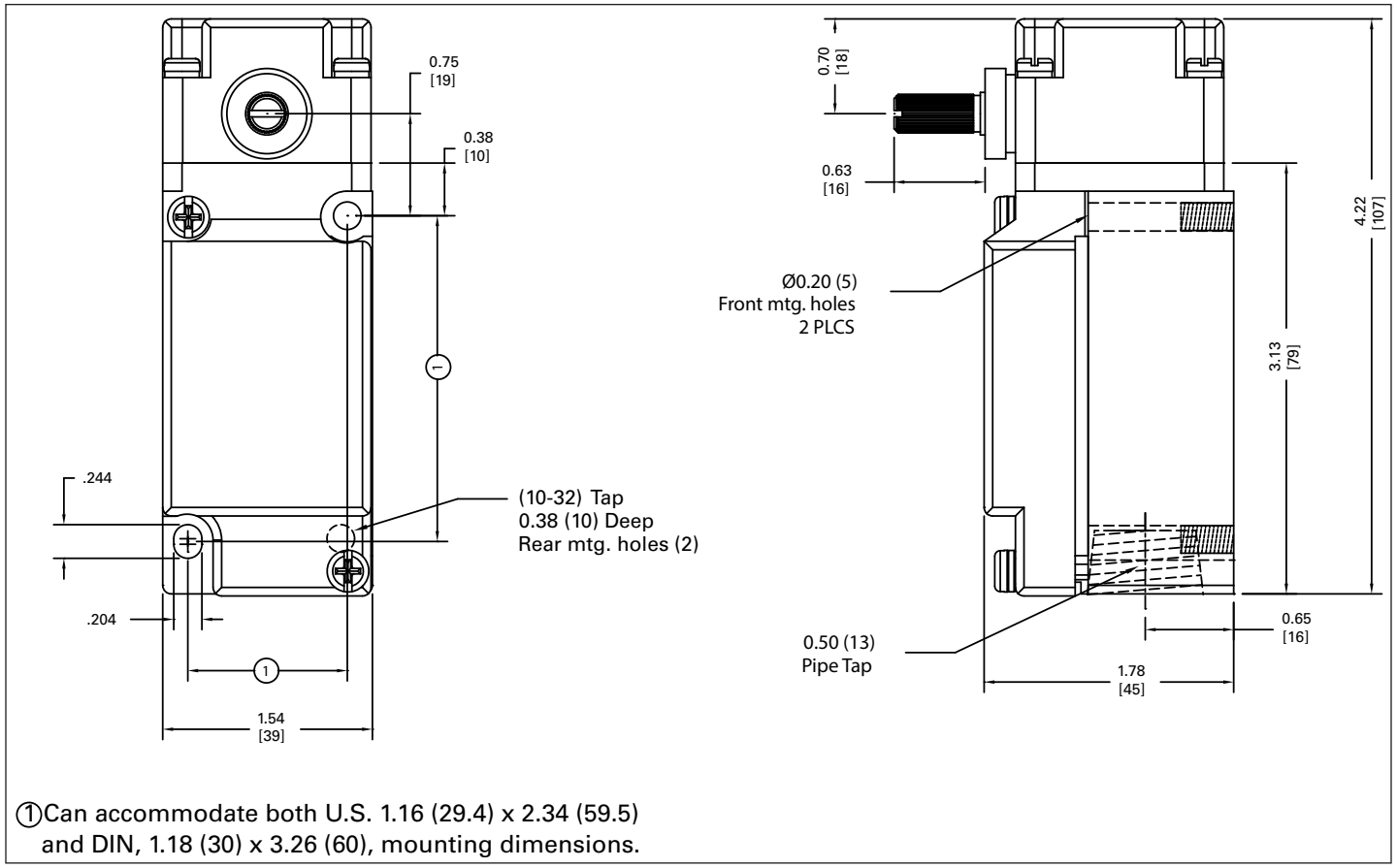
Table 5. Operating head tolerance specifications.

	Type	Diameter	Width	Concentricity tolerance
Lever roller	Nylon	3/4 in. (19.05 mm)	5/16 in. (7.9 mm)	± 0.002 in. (0.051 mm)
	Metal	3/4 in. (19.05 mm)	5/16 in. (7.9 mm)	± 0.001 in. (0.025 mm)
	Ball Brg.	11/16 in. (17.53 mm)	1/4 in. (6.35 mm)	± 0.005 in. (0.127 mm)
Push roller	Metal	7/16 in. (11.18 mm)	5/32 in. (4.06 mm)	± 0.002 in. (0.051 mm)

Table 6. Operating head data.

		Operating data - nominal						
Type	**Version**	**Travel to operate contacts**	**Travel to reset contacts**	**Total travel**	**Force to operate contacts**	**Force to return contacts**	**Temp. range (Table 3)**	**Catalog numbers**
Side Rotary 	Standard spring return	5°	2°	90°	3 in.-lbs (0.34 N•m)	4.5 in.-oz. (0.03 N•m)	A	F25ASRLxxx, F25BSRLxxx
Side Push 	Pushbutton spring return	0.065 in. (1.651 mm)	0.030 in. (0.762 mm)	0.290 in. (7.366 mm)	4 lbs. (1.81 kg)	8 oz. (2.22 N)	B	F25ASP1, F25BSP1
	Pushbutton adj. spring return	0.065 in. (1.651 mm)	0.030 in. (0.762 mm)	0.290 in. (7.366 mm)	4 lbs. (1.81 kg)	8 oz. (2.22 N)	B	F25ASP2, F25BSP2
	Push roller spring return	0.065 in. (1.651 mm)	0.030 in. (0.762 mm)	0.290 in. (7.366 mm)	4 lbs. (1.81 kg)	8 oz. (2.22 N)	B	F25ASP3, F25BSP3
Top Push 	Pushbutton spring return	0.04 in. 1.0 mm)	0.020 in. (0.508 mm)	0.280 in. (7.366 mm)	4 lbs. (1.81 kg)	8 oz. (2.22 N)	C	F25ATP1, F25BTP1
	Pushbutton adj. spring return	0.04 in. 1.0 mm)	0.020 in. (0.508 mm)	0.280 in. (7.366 mm)	4 lbs. (1.81 kg)	8 oz. (2.22 N)	C	F25ATP2, F25BTP2
	Push roller spring return	0.04 in. (1.0 mm)	0.020 in. (0.508 mm)	0.280 in. (7.366 mm)	4 lbs. (1.81 kg)	8 oz. (2.22 N)	C	F25ATP3, F25BTP3
Wobble Stick	Spring return	10°	6°	15°	2 in.-lbs (0.23 N•m)	2-4 in.-oz. (0.01-0.03 N•m)	C	F25AWx, F25BWx

Side Rotary operator - in. (mm)



①Can accommodate both U.S. 1.16 (29.4) x 2.34 (59.5) and DIN, 1.18 (30) x 3.26 (60), mounting dimensions.

Figure 6. Dimension diagram.

Top Push operators - in. (mm)

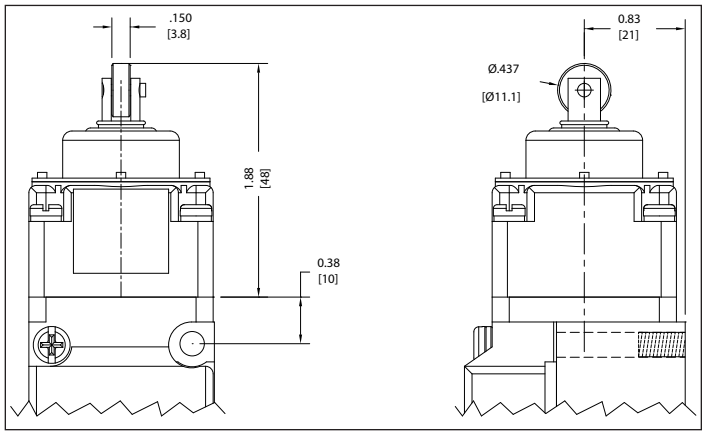


Figure 7. Top Push Roller.

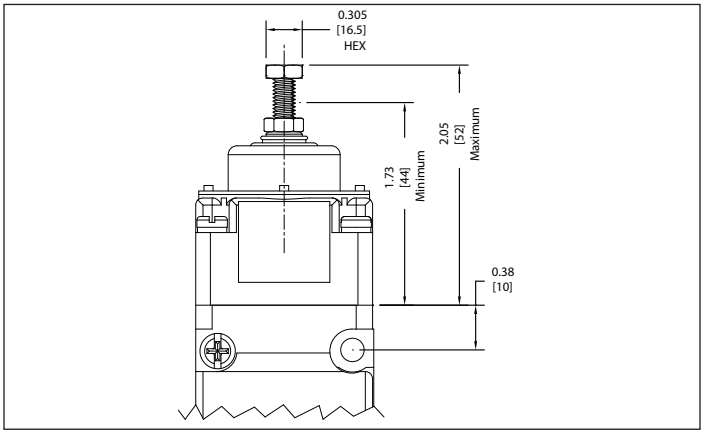


Figure 8. Top Push Adjustable Pushbutton.

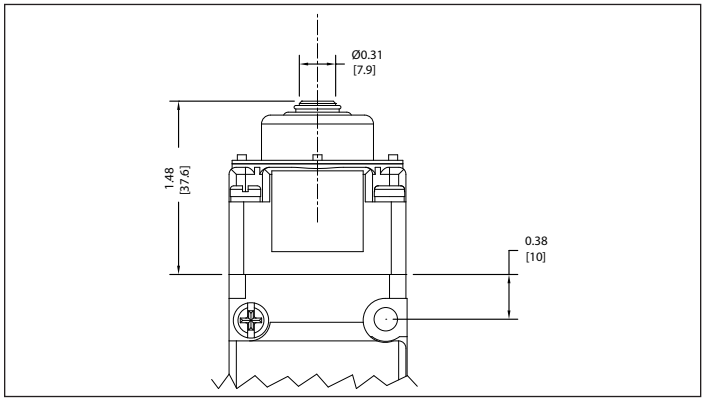


Figure 9. Top Push Pushbutton.

Side Push operators - in. (mm)

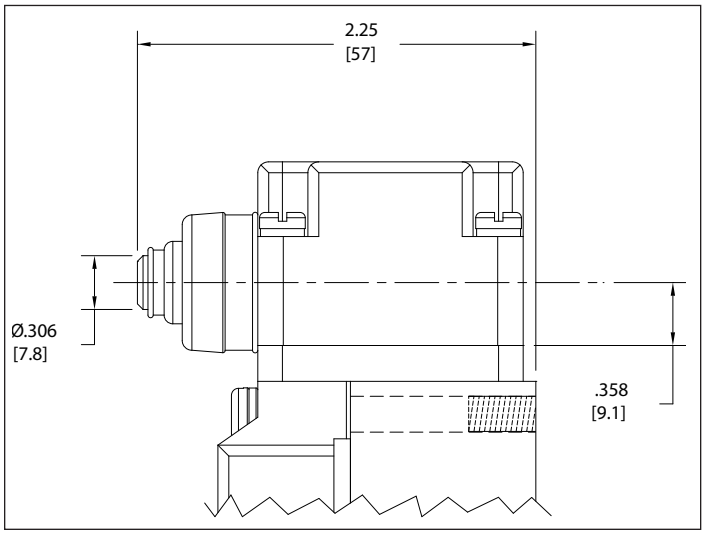


Figure 10. Side Push Pushbutton.

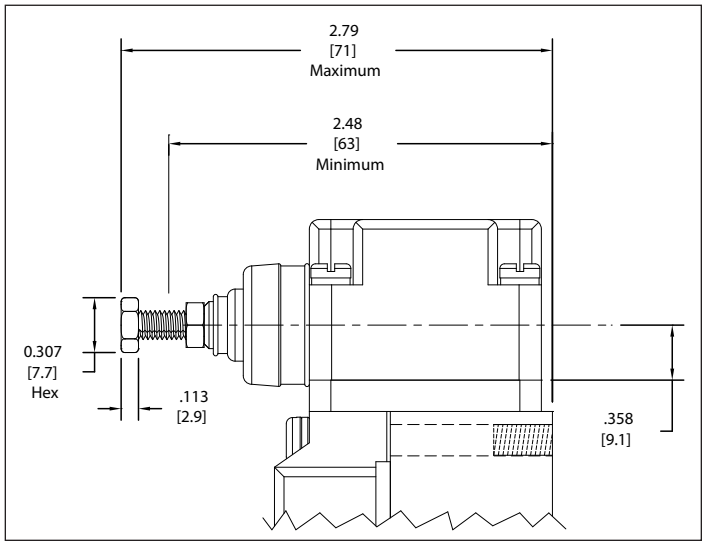


Figure 11. Side Push Adjustable Pushbutton.

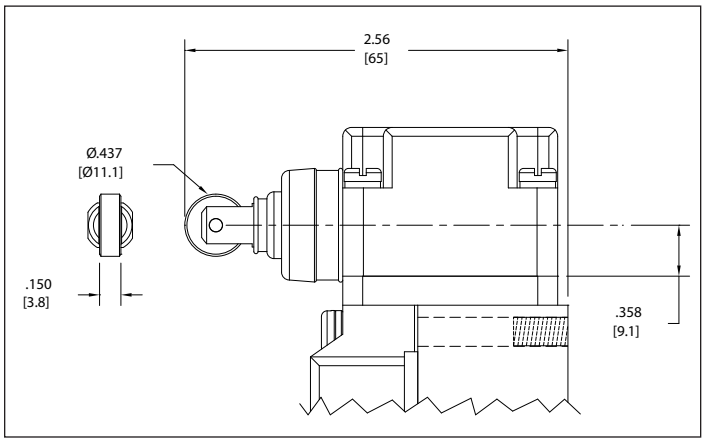


Figure 12. Side Push Roller.

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

Eaton
W126 N7250 Flint Drive
Menomonee Falls,
WI 53051, USA

Printed in USA
Publication No. IL053005EN / TBG001336
September 2016

Powering Business Worldwide