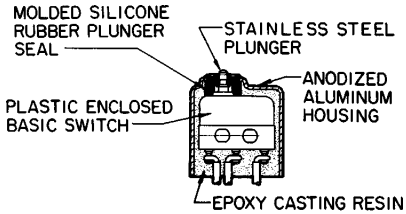


# Position Sensors

## Environment-Sealed Basic Switches



### GENERAL INFORMATION


SE and XE switches are the smallest environment-sealed switches offered by MICRO SWITCH. Both types enclose basic switches within a corrosion resistant aluminum housing to seal precision switch contacts from contamination. SE switches include a SM basic switch, and XE switches include the smaller SX basic switch.

Switches held depressed for extended periods of time at temperature extremes may experience retarded plunger return upon deactuation. Where such a condition exists in the application, contact the 800 number for special designs that are available.

### FEATURES



- Watertight seal per enclosure design symbol 3, MIL-S-8805
- Power load switching capability up to 7 amps
- Temperature tolerance up to +221°F (105°C)
- High temperature construction for use to +300°F (149°C)
- Several auxiliary actuators
- Choice of termination
- Military standard construction with listings qualified to MIL-S-8805
- All 4SE switches are UL recognized and CSA certified
- 4XE switches are UL recognized

### ELECTRICAL RATINGS

Circuitry	Electrical Rating Code	
Single-Pole Double-Throw 	<b>A</b> 5 amps res., 3 amps ind., (sea level), 5 amps res., 2.5 amps ind., (50,000 feet) 28 vdc. 5 amps res., 5 amps ind., 125 or 250 vac, 60 Hz.	<b>D</b> UL Rating 7 amps, 250 vac 60 Hz
	<b>B</b> UL and CSA Rating 5 amps, 250 vac, 60 Hz	<b>E</b> 7 amps res., 4 amps ind., (sea level), 7 amps res., 2.5 amps ind., (50,000 feet), 28 vdc.
	<b>C</b> 7 amps res., 4 amps ind., (sea level), 7 amps res., 2.5 amps ind., (50,000 feet), 28 vdc. 7 amps res., 4 amps ind., (sea level), 115 vac, 400 Hz	<b>R</b> 1 amp res., 0.50 amp ind., 28 vdc.

**Characteristics:** O.F. — Operating Force; R.F. — Release Force; P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel; O.P. — Operating Position

### SE SWITCHES ORDER GUIDE

	Catalog Listing	Recommended For	Electrical Rating Code	Characteristics					
				O.F. Newtons ounces	R.F. min. Newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches
 <p>Fig. 1</p>	1SE1	Most applications	A	1,39-4,73 5-17	1,11 4	1,27 .050	0,08 .003	0,1 .004	10,8 .425
	1SE2	SPST — Normally-closed	A	1,39-4,73 5-17	1,11 4	1,27 .050	0,08 .003	0,1 .004	10,8 .425
	1SE3	SPST — Normally-open	A	1,39-4,73 5-17	1,11 4	1,27 .050	0,08 .003	0,1 .004	10,8 .425
	4SE1	UL and CSA listing and UL and CSA listed lead wire	B	1,39-4,73 5-17	1,11 4	1,27 .050	0,08 .003	0,1 .004	10,8 .425
	5SE1	Oil resistant Fluorosilicone seal	A	1,39-4,73 5-17	1,11 4	1,27 .050	0,08 .003	0,1 .004	10,8 .425
	7SE1	Lower force	A	1,11-2,22 4-8	0,56 2	1,27 .050	0,08 .003	0,1 .004	10,8 .425
 <p>Fig. 2</p>	12SE4-T	High return force	A	1,39-5,28 5-19	1,11 4	1,27 .050	0,08 .003	0,1 .004	10,8 .425
	1SE1-T	For customer leading	A	1,39-4,73 5-17	1,11 4	1,27 .050	0,08 .003	0,1 .004	10,8 .425

Position Sensors







# Position Sensors

# SE Series

## Environment-Sealed Basic Switches

### AUXILIARY ACTUATORS FOR SE SWITCHES ORDER GUIDE (Switches are not included with actuators)

Characteristics: O.F. — Operating Force; R.F. — Release Force;  
P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel;  
O.P. — Operating Position

	Catalog Listing	Description	Actuator Length A mm inches	Characteristics measured with actuators mounted to a 1SE1						
				O.F. max. Newtons ounces	R.F. min. Newtons ounces	P.T. approx. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches	F.P. mm inches
 Fig. 3	JE-1	Straight leaf (mounting hardware included)	16,8 .66	3,34 12	0,56 2	3,81 .150	0,38 .015	0,64 .025	11,2 .440	15±0,76 .590±.030
 Fig. 4	JE-4	Roller leaf. Roller turned 90° to switch axis (mounting hardware included).	16,8 .66	3,34 12	0,56 2	3,81 .150	0,38 .015	0,64 .025	16,3 .640	20,1 .790 approx.
 Fig. 5	JE-5	Roller leaf (mounting hardware included)	14,2 .560	3,34 12	0,56 2	3,81 .150	0,38 .015	0,64 .025	16,3 .640	20,1±0,76 .790±.030
 Fig. 6	JE-17	Roller leaf. Reversed position (mounting hardware included)	14,2 .560	3,34 12	0,56 2	3,81 .150	0,38 .015	0,64 .025	16,3 .640	20,1±0,76 .790±.030
 Fig. 7	JE-21	Roller lever	13,7 .540	1,67 6	0,28 1	2,54 .100	0,25 .010	0,41 .016	16,3 .640	18,8±0,76 .740±.030
 Fig. 8	JE-22	Tandem Roller Lever	17,8 .700	4,73 17	1,11 4	2,54 .100	0,15 .006	0,3 .012	16,8±1,3 .660±.050	19,3±1,3 .760±.050



# Position Sensors

## Environment-Sealed Basic Switches

XE Series



Characteristics: O.F. — Operating Force; R.F. — Release Force; P.T. — Pretravel; D.T. — Differential Travel; O.P. — Operating Position.

### XE SWITCHES ORDER GUIDE

	Catalog Listing	Recommended For	Electrical Rating Code	Characteristics					
				O.F. max. Newtons ounces	R.F. max. Newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches ±.020 (0,51)
 <p>Fig. 9</p>	1XE1 (MS27994-1)	Most applications MIL-S-8805 requirements	C	1,39-4,73 5-17	1,11 4	1,27 .050	0,1 .004	0,13 .005	10,8 .425
	1XE201 (MS27994-4)	General Use MIL-S-8805 requirements MIL-W-22759/11 wire	C	1,39-4,73 5-17	1,11 4	1,27 .050	0,1 .004	0,13 .005	10,8 .425
	1XE3	SPST-Normally Open	C	1,39-4,73 5-17	1,11 4	1,27 .050	0,1 .004	0,13 .005	10,8 .425
	1XE301 (MS27994-5)	Gold Contacts MIL-W-22759/11 wire	R	1,39-4,73 5-17	1,11 4	1,27 .050	0,1 .004	0,13 .005	10,8 .425
	4XE1	UL listing and UL and CSA listed leadwire	D	1,39-4,73 5-17	1,11 4	1,27 .050	0,1 .004	0,13 .005	10,8 .425
	5XE1	Oil resistant Fluorosilicone seal	C	1,39-4,73 5-17	1,11 4	1,27 .050	0,1 .004	0,13 .005	10,8 .425
 <p>Fig. 10</p>	14XE1	Less operating force Use to +300°F (149°C)	E	2,50 9 max.	0,56 2	0,76 .030	0,1 .004	0,13 .005	10,9 .430
	14XE1-T	For customer leading Use to +300°F (149°C)	E	2,50 9 max.	0,56 2	0,76 .030	0,1 .004	0,13 .005	10,9 .430
	1XE1-T (MS27994-3)	For customer leading	C	1,39-4,73 5-17	1,11 4	1,27 .050	0,1 .004	0,13 .005	10,8 .425

### AUXILIARY ACTUATORS FOR XE SWITCHES ORDER GUIDE (Switches are not included with the actuators)

Characteristics: O.F. — Operating Force; R.F. — Release Force; P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel; O.P. — Operating Position; F.P. — Free Position.

	Catalog Listing	Description	Characteristics measured with actuator mounted on a 1XE1						
			O.F. max. Newtons ounces	R.F. min. Newtons ounces	P.T. approx. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches	F.P. mm inches
 <p>Fig. 11</p>	JM-1	Straight leaf	5,84 21	0,83 3	3,18 .125	0,23 .009	0,3 .012	10,8±0,76 .425±.030	14±0,76 .550±.030
 <p>Fig. 12</p>	JM-5	Roller leaf	5,84 21	0,83 3	3,18 .125	0,23 .009	0,3 .012	15,9±0,89 .625±.035	19,1±0,89 .750±.035

Position Sensors

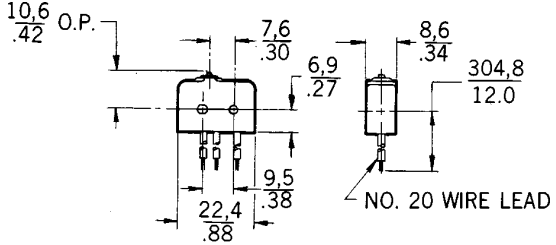
# Position Sensors

# SE Series

## Environment-Sealed Basic Switches

### SE MOUNTING DIMENSIONS (For reference only)

SE switches



MOUNTING HOLES WILL ACCEPT PINS OR SCREWS OF 22,1/.087 MAX DIA

Fig. 1

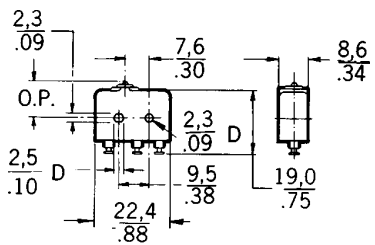


Fig. 2

SE auxiliary actuators

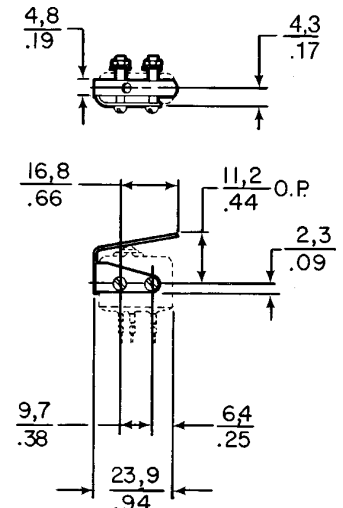


Fig. 3

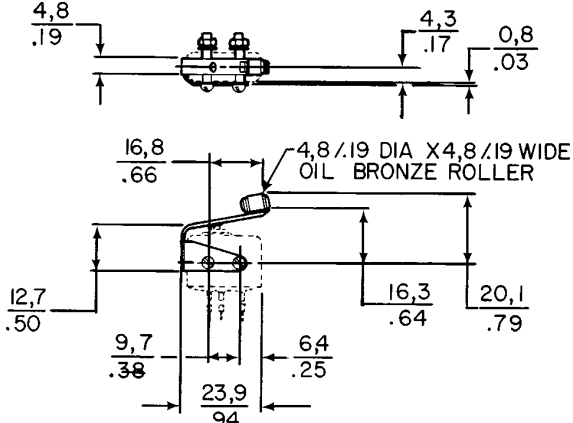


Fig. 4

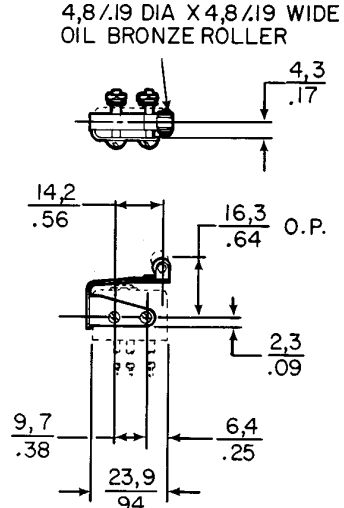


Fig. 5

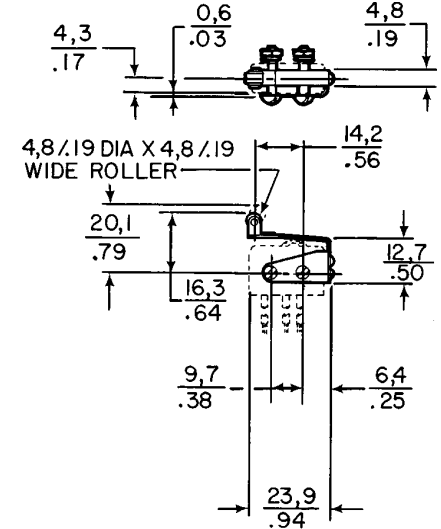


Fig. 6

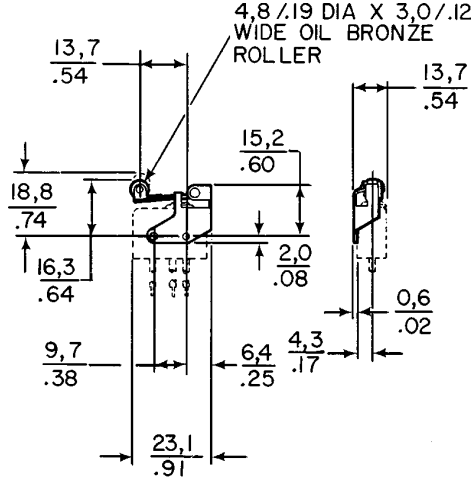


Fig. 7

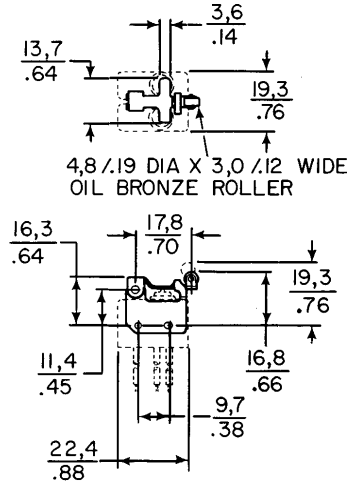


Fig. 8

Key: 0,0 = mm  
0.00 = inches

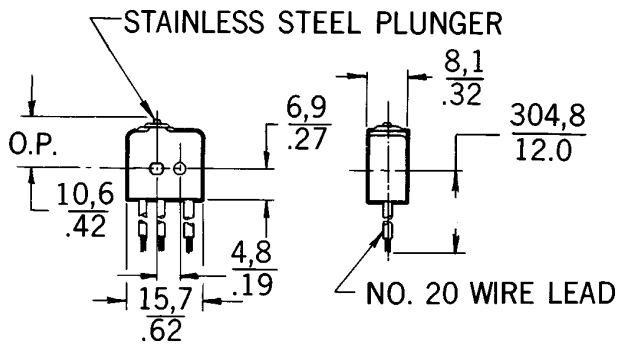
# Position Sensors

XE Series

## Environment-Sealed Basic Switches

XE MOUNTING DIMENSIONS (For reference only)

XE switches



MOUNTING HOLES WILL ACCEPT PINS OR OR SCREWS OF 22,1/ .087 MAX DIA

Fig. 9

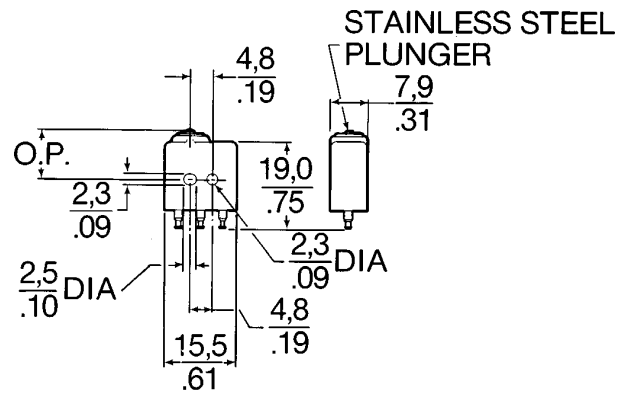


Fig. 10

XE auxiliary actuators

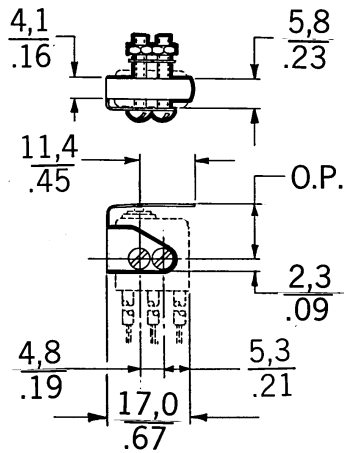


Fig. 11

4,8/.19 D X 2,3/.09 W ROLLER

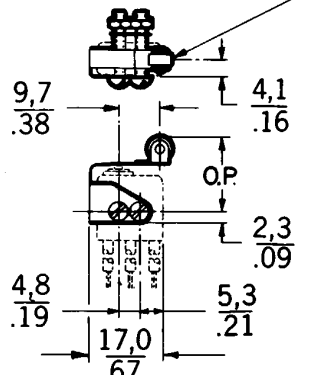


Fig. 12

Key: 0,0 = mm  
0.00 = inches

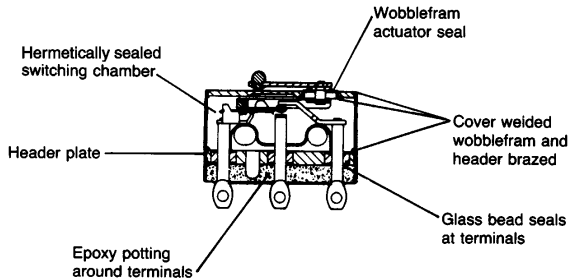
Position Sensors

# Position Sensors

## Miniature Hermetically Sealed Switches



**GENERAL INFORMATION**  
 HM switches are not generally recommended for 115 VAC, 60 Hz. If you have a 60 Hz application in the milliamp range, contact our 800 number for special design variations that are available.



- FEATURES**
- Hermetically sealed per enclosure design symbol 5, MIL-S-8805
  - Power load switching capability up to 4 amperes, 28 VDC and 2 Amps 115 VAC, 400 Hz
  - Temperature tolerance from -85°F to +250°F (-65°C to +121°C)
  - High temperature construction for use from -85°F to +500°F (-65°C to +260°C)
  - Variety of auxiliary actuators
  - Choice of terminal styles
  - Gold contacts for special applications
  - Military standard construction with listings on the MIL-S-8805 qualified products list.

**ELECTRICAL RATINGS**

Circuitry	Electrical Rating Code
Single-Pole Double-Throw	<b>H</b> 1 amp res., 0.25 amp ind., 28 VDC.
Single-Pole Double-Throw	<b>I</b> 2 amps res., 2 amps ind., 0.5 amps lamp load, 115 VAC, 400 Hz. 4 amps res., 2 amps ind., 1 amp lamp load, 28 VDC
Single-Pole Double-Throw	<b>J</b> 1/2 amp res., 1/4 amp ind. (sea level or 70,000 ft.), 28 VDC
Single-Pole Double-Throw	<b>K</b> 3 amps res., 1 amp ind. (sea level or 70,000 ft.), 28 VDC 1 amp res. or ind. (sea level), 115 VAC., 400 Hz.
Single-Pole Double-Throw	<b>L</b> 3 amp res., 1 amp ind., 28 VDC 1 amp res., 1 amp ind., 115 VAC, 400 Hz.

**APPLICATION NOTES**

1. Honeywell does *not* recommend the use of silver cadmium oxide switch contacts in non-arcing loads. Non-arcing loads are generally loads less than 12 volts and/or 0.5 amp. Catalog listings in the 5, 6, 15, and 16HM Series use silver cadmium oxide contacts. If you have specific questions, contact the MICRO SWITCH Application Center at 1-800-537-6945.
2. For applications involving non-arcing loads, catalog listings in the 9, 10, 19 and 20HM Series are recommended.
3. The 1, 2, 5, and 6HM Series are recommended for use only in 3 to 4 amp range applications.





# Position Sensors

## Miniature Hermetically Sealed Switches

HM Series

Characteristics: O.F. — Operating Force; R.F. — Release Force;  
 P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel;  
 O.P. — Operating Position.

**HM ORDER GUIDE**

	Catalog Listing	Recommended For	Electrical Rating Code	Operating Characteristics					
				O.F. max. Newtons ounces	R.F. min. Newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches ±.015 (0,38 mm)
 Fig. 1	11HM1 (MS27216-5)	Most applications. Exceeds MIL-S-8805 requirements for shock and vibration.	K	1,95 7	0,28 1	0,76 .030	0,08 .003	0,15 .006	8,38 .330
	13HM1	Applications requiring gold contacts	H	1,95 7	0,28 1	0,76 .030	0,08 .003	0,15 .006	8,38 .330
	9HM1 (MS27216-6)	Bifurcated gold contacts	J	1,95 7	0,28 1	0,76 .030	0,08 .003	0,15 .006	8,38 .330
 Fig. 2	2HM19-1 (MS27216-2)	MIL-S-8805 application requirements 1 ft. (305mm) leads	I	1,95 7	0,28 1	0,76 .030	0,08 .003	0,15 .006	8,38 .330
	2HM19-5 (MS27216-4)	5 foot (1524mm) long leads	I	1,95 7	0,28 1	0,76 .030	0,08 .003	0,15 .006	8,38 .330
 Fig. 3	16HM1-1	High temperature to 500°F (260°C) flat spring	L	1,95 7	0,28 1	0,76 .030	0,08 .003	0,15 .006	8,38 .330
 Fig. 4	15HM2	Operating in temperatures to +500°F (260°C) with weld tab termination.	L	1,95 7	0,28 1	0,76 .030	0,08 .003	0,15 .006	8,38 .330

Position Sensors

**HM MOUNTING**

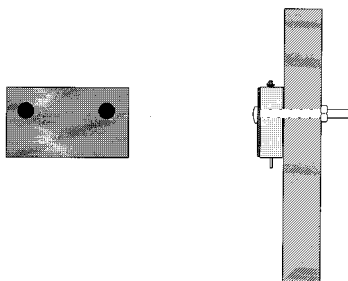
A force spreading plate is recommended to reduce the chance of product damage due to excessive mounting force.

**MOUNTING PLATE**

19PA137-HM

**NOTICE**

Torque on #2 mounting screws must be restricted to 1.5 inch pounds max. to prevent switch damage. The force spreading mounting plate used as shown will allow up to 2.5 inch pounds of mounting torque.




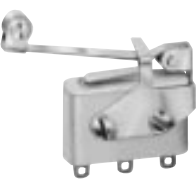


# Position Sensors

## Miniature Hermetically Sealed Switches

### AUXILIARY ACTUATORS FOR HM SWITCHES ORDER GUIDE (Switches are not included)

Characteristics: O.F. — Operating Force; R.F. — Release Force;  
P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel;  
O.P. — Operating Position; F.P. — Free Position.

	Catalog Listing	Description	Temp. (Max.)	Operating Characteristics with Actuator Mounted on a 6HM1-1						
				O.F. max. Newtons ounces	R.F. min. Newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches	F.P. mm inches
 Fig. 5	JS-254	Leaf	500°F (260°C)	2,50 9	0,56 2	—	0,76 .030	0,76 .030	8,64 .340 approx.	12,2 .480 approx.
 Fig. 6	JS-151	Roller leaf	500°F (260°C)	2,50 9	0,56 2	—	0,76 .030	0,76 .030	14 .550 approx.	17,5 .690 approx.
 Fig. 7	JS-307	Straight lever	500°F (260°C)	0,42 1.5	0,03 .11	3,18 .125 approx.	0,64 .025	1,42 .056	10,3 .406 approx.	
 Fig. 8	JS-308	Roller lever	500°F (260°C)	0,42 1.5	0,03 .11	3,18 .125 approx.	0,64 .025	1,42 .056	14,3 .562 approx.	

**MOUNTING TORQUE:**  
JS-254 2.5 inch pounds  
all others 1.5 inch pounds  
See optional mounting plate – previous page.

All standard JS actuators in the SM Section of Catalog 10 can be used with the HM line. However, hardware, insulator, and oil impregnated roller supplied with these actuators may not provide the required service at temperatures above 250°F (121°C).



# Position Sensors

## Miniature Hermetically Sealed Switches

HM Series

HM MOUNTING DIMENSIONS (For reference only)  
Pin plunger switches

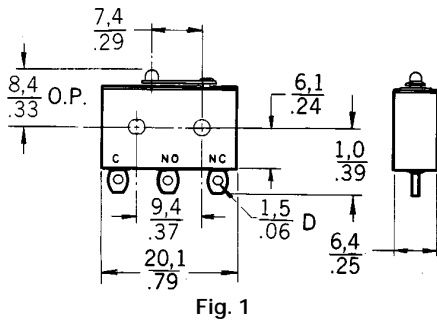


Fig. 1

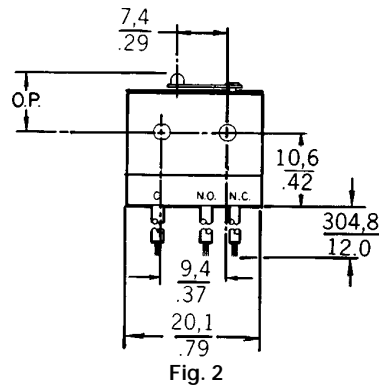


Fig. 2

MOUNTING HOLES WILL ACCEPT PINS OR  
SCREWS OF 1,9/.08 DIA

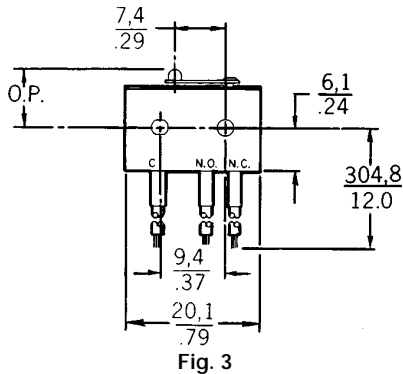


Fig. 3

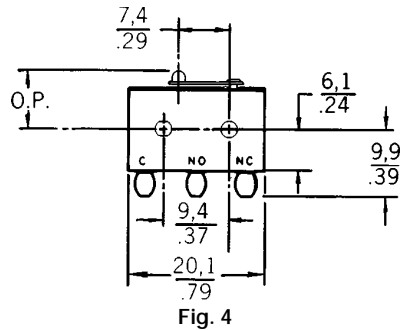


Fig. 4

### Auxiliary actuators

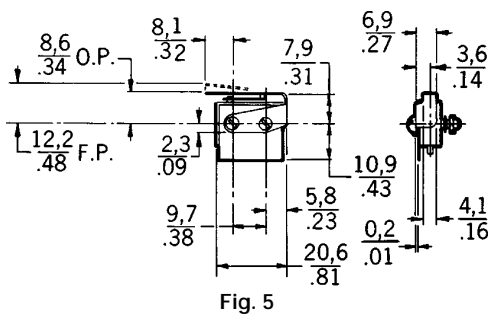


Fig. 5

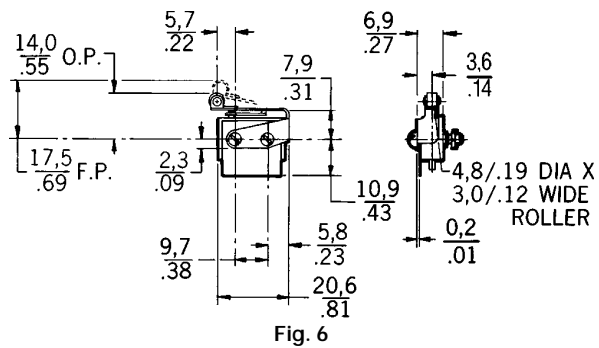


Fig. 6

4,8/.19 DIA X  
3,0/.12 WIDE  
ROLLER

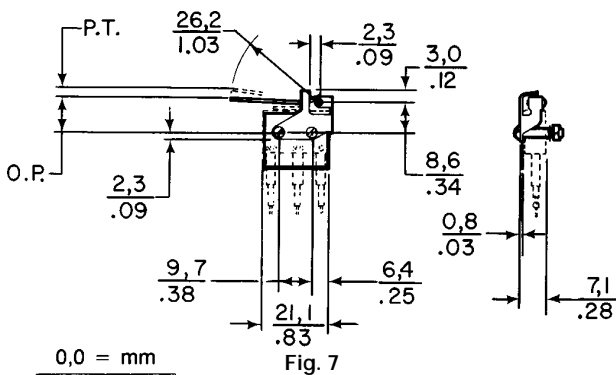


Fig. 7

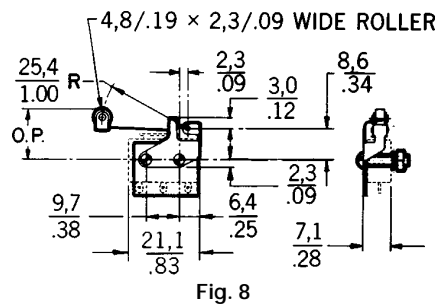


Fig. 8

Key: 0,0 = mm  
0.00 = inches

Position Sensors

# Position Sensors

## Hermetically Sealed Switches

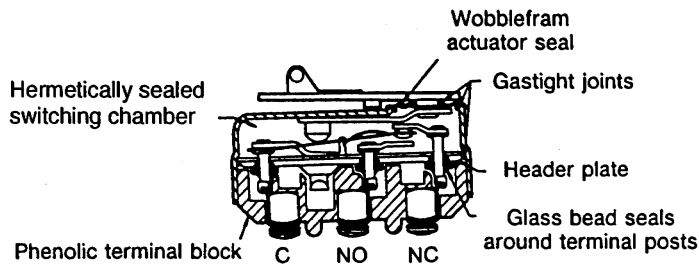


### GENERAL INFORMATION

HS switches are designed for applications where maximum electrical rating and maximum sealing are essential, and where size and weight requirements are less critical. These switches are side mounted through mounting holes that are outside the sealed switching chamber.

### FEATURES

- Hermetically sealed per MIL-S-8805, design symbol 5 (-67° to +180°F or -55° to 82°C)
- Power load switching capability up to 25 amperes, 28 VDC
- Temperature tolerance from -67°F to +250°F (-55°C to +125°C)
- High temperature construction for use to +300°F (149°C)
- Several styles of integral lever actuators
- Two styles of terminals
- Military standard construction with listings on the MIL-S-8805 qualified products list
- UL recognized File #E12252; CSA certified LR 4442



### ELECTRICAL RATINGS

Circuitry	Electrical Rating Codes
Single-Pole Double-Throw	<b>M</b> 25 amps res., 8 amps ind., 5 amps motor, 3 amps lamp load, 28 vdc; 1 amp res., 1 amp ind., 115 vac, 60 Hz UL-CSA Rating: 1 amp., 115 vac, 60 Hz.
	<b>N</b> 15 amps res., 8 amps ind., 28 vdc; 1 amp res., 1 amp ind., 115 vac, 60 Hz
	<b>O</b> 20 amps res., 8 amps ind., 28 vdc; 1 amp res., 1 amp ind., 115 vac, 60 Hz UL-CSA Rating: 1 amp, 115 vac, 60 Hz
	<b>P</b> 10 amps res., 5 amps ind., 28 vdc; 1 amp res., 1 amp ind., 115 vac, 60 Hz UL-CSA Rating: 1 amp., 115 vac, 60 Hz.






# Position Sensors

## Hermetically Sealed Switches

HS Series

Characteristics: O.F. — Operating Force; R.F. — Release Force; P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel; O.P. — Operating Position.

### HS ORDER GUIDE

	Catalog Listing	Recommended For	Electrical Rating Code	Operating Characteristics					
				O.F. max. Newtons ounces	R.F. min. Newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches
 Fig. 1	1HS1 (MS25011-1)	Most applications MIL-S-8805 (M8805/47)	M	2,78-6,12 10-22	1,11 4	1,65 .065	0,25 .010	0,51 .020	13,5 ± 0,38 .530 ± .015
	101HS1	Operating in temperatures to +250°F (121°C)	O	2,78-6,12 10-22	1,11 4	1,65 .065	0,25 .010	0,51 .020	13,5 ± 0,38 .530 ± .015
	102HS1	Operating in temperatures to +300°F (149°C)	P	2,78-8,34 10-30	1,11 4	1,65 .065	0,25 .010	0,51 .020	13,5 ± 0,38 .530 ± .015
 Fig. 2	4HS4-118	Lead wire termination	N	2,78-6,12 10-22	1,11 4	1,65 .065	0,25 .010	0,51 .020	15,6 .615 ± .020
 Fig. 3	1HS41	Applications requiring added overtravel	M	1,11-5,56 4-20	0,56 2	—	1,57 .062 max.	2,54 .100	13,54 .533 approx.
 Fig. 4	1HS6 (MS25011-4)	MIL-S-8805 requirements. More operating force	M	6,12-7,78 22-28	1,11 4	2,16 .085	0,25 .010	0,51 .020	13,5 ± 0,38 .530 ± .015
 Fig. 5	1HS3	Roller lever	M	2,78-6,12 10-22	1,11 4	1,65 .065	0,25 .010	0,51 .020	18,3 ± 0,38 .720 ± .015

HS MOUNTING DIMENSIONS (For reference only)  
Mounting holes will accept pins or screws of .139" (3,53mm) diameter.

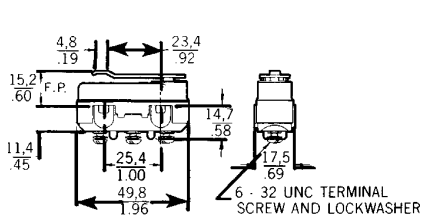


Fig. 1

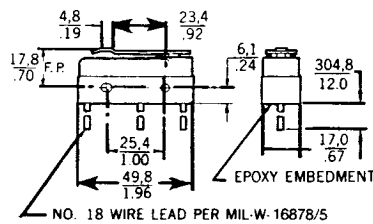


Fig. 2

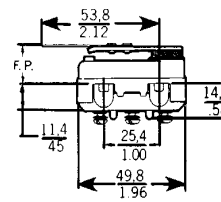


Fig. 3

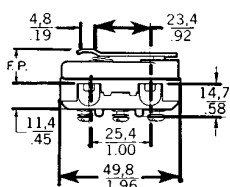


Fig. 4

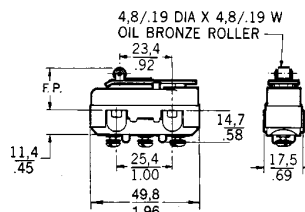


Fig. 5

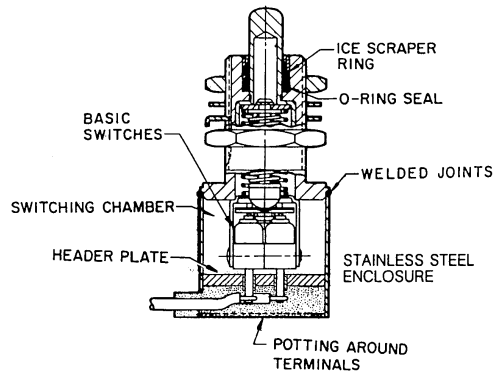
Key:  $\frac{0,0}{0.00} = \frac{\text{mm}}{\text{inches}}$

Position Sensors

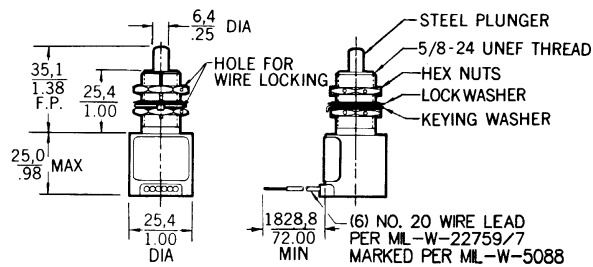
# Position Sensors

## Environment-Sealed Limit Switches

EN Series



1EN1-6



### FEATURES

- Environment-proof seal per Symbol 4, MIL-S-8805
- Qualified to MIL-S-8805
- Standard temperature range: -65°F to +185°F (-54°C to +85°C)
- High temperature range listings: -65°F to +257°F (-54°C to +125°C)
- Meets or exceeds mechanical and electrical life as defined in MIL-S-8805

### ELECTRICAL SPECIFICATIONS

The electrical ratings charted below are referenced in the order guides. Refer to appropriate MIL specification for ratings applicable to specific switches.

#### DC RATINGS (Amps)

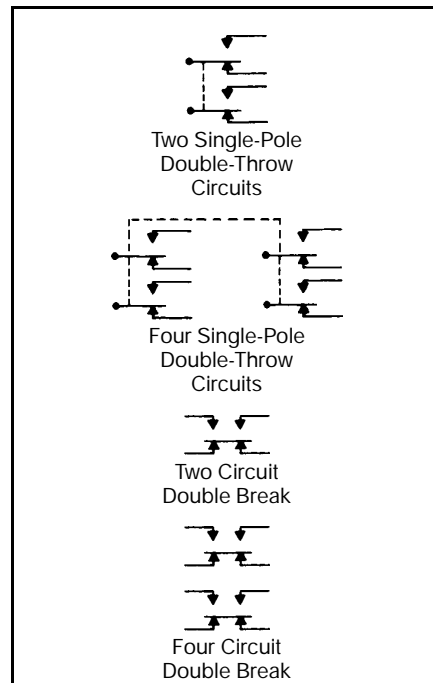
Rating <sup>2</sup> Code	Voltage	Sea Level				50,000 Feet			
		Inrush	Motor	Res.	Ind.	Inrush	Motor	Res.	Ind.
A	28 VDC	24	4	4	2	24	4 <sup>3</sup>	4 <sup>1</sup>	2
B	28 VDC	36	6	10	3	36	6 <sup>3</sup>	10	3
C	28 VDC	30	5	15	10	30	5 <sup>3</sup>	15	10
D	28 VDC	24	4	5	3	N/A			
E	28 VDC	N/A		1	.5	N/A		1	.5
F	28 VDC	24	4	7	4	24	4 <sup>3</sup>	7	2.5

Notes:  
<sup>1</sup> 5 amps for rotary switches  
<sup>2</sup> For other electrical data, contact your nearest MICRO SWITCH Sales Office. MIL-S-8805 ratings apply when this specification is invoked.  
<sup>3</sup> Application information only.

#### AC RATINGS (Amps)

Rating Code	Voltage	Sea Level			
		Motor		Res.	Ind.
		Make	Break		
A&D	125/460 VAC @ 60 Hz	24	4	5	3
	125 VAC @ 400 Hz	24	4	5	5
B	125/250 VAC @ 60 Hz	20	3	5	5
	460 VAC @ 60 Hz	20	3	3	3
	125 VAC @ 400 Hz	36	6	10	6
C	125/250 VAC @ 60 Hz	20	3	5	5
	460 VAC @ 60 Hz	20	3	3	3
	125 VAC @ 400 Hz	30	5	10	6
F	125/460 VAC @ 60 Hz	12	2	2	2
	125 VAC @ 400 Hz	24	4	5	5

### CIRCUITRY



Position Sensors

# Position Sensors

## Environment-Sealed Limit Switches

### TERMINATION

Termination is specified in the order guides. Leadwires are generally six feet long, and of the gage and Military Specifications noted in the order guides.

### MOUNTING

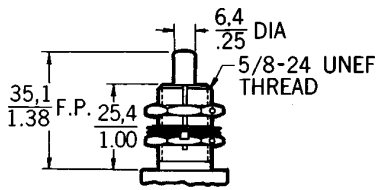
Plunger actuator switches mount through  $\frac{5}{8}$  inch or  $\frac{15}{32}$  inch diameter holes. Lock washer, keyed washer, and wire lock hexagon mounting nuts lock the switches in their mounting holes.

Rotary actuator switches mount through  $\frac{15}{32}$  inch diameter holes. A lock washer wire lock hexagon nut and locating pins on the top of the housing prevent switch rotation.

### OPERATION

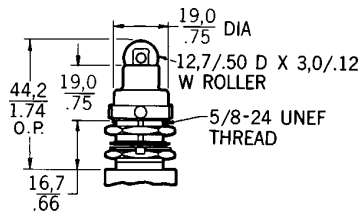
#### Plunger Actuators

For in-line actuation. An ice scraper ring cleans the actuator with each operation.



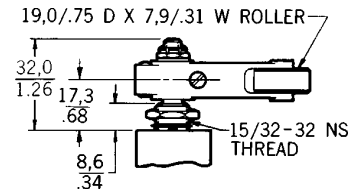
#### Roller Plunger Actuators

For cam and slide actuation not to exceed 20° rise. Roller adjusts laterally in 45° increments. An ice scraper ring cleans the actuator with each operation.



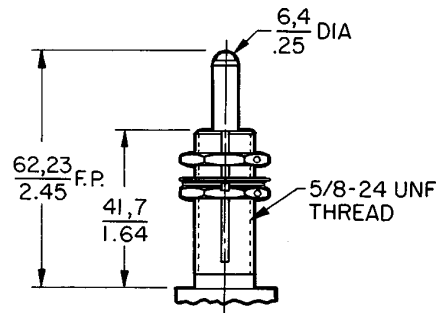
#### Rotary Roller Lever Actuator

For cam and slide actuation with more than a 30° rise. A spring returned mechanism, this actuator is available in clockwise and counterclockwise operation designs. The actuator adjusts laterally to any position through 360°. The roller is laminated phenolic.



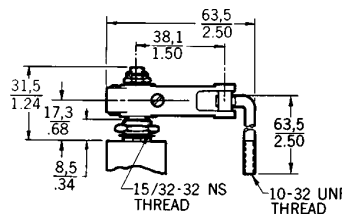
#### Ball Bearing Plunger Actuator

For random direction operation. An ice scraper ring cleans the actuator with each operation. For further information, contact your nearest MICRO SWITCH Sales Office.



#### Rotary Linkage Lever Actuator

A threaded rod attaches to the rotary lever for positive actuation. The rotary lever operates in either direction and adjusts laterally to any position through 360°. The threaded rod pivots in two planes. The actuator has no spring return, but is controlled directly by the movement of the actuating device.



Key:  $\frac{0,0}{0.00} = \frac{\text{mm}}{\text{inches}}$

DIMENSIONS SHOWN ARE FOR REFERENCE ONLY

# Position Sensors

## Environment-Sealed Limit Switches

EN Series

MIL-S-8805 PERFORMANCE APPROVED SWITCHES

EN Standard Size Switches

Catalog Listing	Procurement Part No.	Terminal Strength Newtons lbs.	Strength of Actuating Means Newtons lbs.	Strength of Mounting Bushing Nm in. lbs.	Vibration	Shock	Moisture Resistance	Salt Spray	Explosion	Acceleration	Seal Resilient (Symbol 4)
1EN1-6 2EN1-6 3EN1-6 4EN1-6	MS24331-1 MS24331-2 MS24331-3 MS24331-4	66,7 15	133 30	1,7 15	10-58 Hz at .060 in. (1,52mm) Double Amplitude 58-500 Hz at 10gs	100gs .006 sec. pulse sawtooth	Applicable test	Applicable test	Applicable test	N/A	Applicable test
31EN11-6 31EN1-6 32EN11-6 32EN1-6 33EN11-6 33EN1-6 34EN11-6 34EN1-6	MS21320-1 MS21320-2 MS21320-3 MS21320-4 MS21320-5 MS21320-6 MS21320-7 MS21320-8	66,7 15	44,5 10	1,7 15	10-58 Hz at .060 in. (1,52mm) Double Amplitude  58-500 Hz at 10gs	100gs .006 sec. pulse sawtooth	Applicable test	Applicable test	Applicable test	N/A	Applicable test
41EN1-6 42EN1-6 43EN1-6 44EN1-6	MS24420-1 MS24420-2 MS24420-3 MS24420-4	66,7 15	—	1,7 15	10-58 Hz at .060 in. (1,52mm) Double Amplitude  58-500 Hz at 10gs	100gs .006 sec. pulse sawtooth	Applicable test	Applicable test	Applicable test	N/A	Applicable test
1EN75-R3	M8805/65-001	—	44,5 10	1,7 15	10-70 Hz at .060 in. (1,52mm) Double Amplitude 70-2000 Hz at 15gs	High impact type "H"	Applicable test	Applicable test	Applicable test	20g	Applicable test



1EN1-6



1EN1-S



1EN42-R

Characteristics: O.F. – Operating Force; R.F. – Release Force; P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

### EN STANDARD SIZE SWITCHES ORDER GUIDE

Circuitry	Actuator	Termination	Elec. Rating <sup>1</sup> Code	Catalog Listing	Characteristics					Housing Dimensions <sup>2</sup>			Repl. Mtg. Hdw. Pkt. <sup>6</sup>
					O.F. N lbs.	R.F. min. N lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	Height mm inches	Dia. mm inches	Wgt. max. g oz.	
	Plunger	No. 20 Leadwire MIL-W-22759/7	A	1EN1-6 (MS24331-1) (8805/40)	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	24,9 .980	25,4 1.0	207 7.3	1
	Ball Bearing Plunger	as above	A	2001EN1-6	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	24,9 .980	25,4 1.0	207 7.3	1
	Plunger	Screw <sup>4</sup>	A	1EN1-S	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	38,2 1.505	25,4 1.0	99 3.5	3
	Plunger	Side <sup>5</sup> Receptacle	A	1EN42-R	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	26,9 1.06	58,4 <sup>3</sup> 2.3	221 7.8	3

Position Sensors

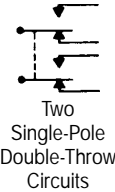
Notes:  
<sup>1</sup> Electrical ratings are on page 25.  
<sup>2</sup> Combine housing diameter and height with actuator on page 26 for overall size.  
<sup>3</sup> Maximum length rather than housing diameter.  
<sup>4</sup> This listing has 4-48 NF x .175 inch round head screws with lockwashers. Terminals are well isolated by phenolic barriers and epoxy casting resin.  
<sup>5</sup> These listings have pin receptacles (mating connectors should be ordered from a local supplier).  
<sup>6</sup> See page 33 for replacement mounting hardware packet catalog listings.  
 N = Newtons

**Position Sensors**  
Environment-Sealed Limit Switches



Characteristics: O.F. — Operating Force; R.F. — Release Force;  
P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel.

**EN STANDARD SIZE SWITCHES ORDER GUIDE**

Circuitry	Actuator	Termination	Elec. Rating <sup>1</sup> Code	Catalog Listing	Characteristics					Housing Dimensions <sup>2</sup>			Repl. Mtg. Hdw. Pkt. <sup>4</sup>
					O.F. N lbs.	R.F. min. N lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	Height mm inches	Dia. mm inches	Wgt. max. g oz.	
 Two Single-Pole Double-Throw Circuits	Plunger	Bottom <sup>3</sup> Receptacle	A	1EN43-R	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	53,3 2.1	25,4 1.0	204 7.2	3
	Plunger	No. 18 Leadwire MIL-W-22759/7	B	2EN1-6 (MS24331-2) (8805/40)	26,7-53,4 6-12	22,8 5	1,27 .050	6,35 .250	0,89 .035	38,1 1.5	38,1 1.5	156 5.5	1
	Roller Plunger	No. 20 Leadwire (MIL-W-22759/7)	A	21EN9-6	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	24,9 .980	25,4 1.0	252 8.9	4
	Roller Plunger	No. 18 Leadwire (MIL-W-22759/7)	B	22EN9-6	26,7-53,4 6-12	22,2 5	1,02 .040	6,35 .250	0,76 .030	38,1 1.5	38,1 1.5	38,3 13.5	4
	Rotary Roller Lever	No. 20 Leadwire MIL-W-22759/7	A	31EN11-6 (CW) (MS21320-1) (8805/48) 31EN1-6 (CCW) (MS21320-2)	1,4-2,8 Nm max. 12-25 in. lb.	1,0 Nm 9 in. lb.	— 13"	— 32"	4" max.	53,6 2.11	25,4 1.0	269 9.5	5 5
	Rotary Roller Lever	No. 18 Leadwire MIL-W-22759/7	B	32EN11-6 (CW) (MS21320-3) (8805/48) 32EN1-6 (CCW) (MS21320-4) (8805/48)	1,4-2,8 Nm max. 12-25 in. lb.	1,0 Nm 9 in. lb.	— 20"	— 25"	6" max.	68,6 2.7	38,1 1.5	368 13	5 5
	Rotary Linkage Lever	No. 20 Leadwire MIL-W-22759/7	A	41EN1-6 (MS24420-1)	0,34 Nm max. 3 in. lb.	—	—	—	12" max.	25,4 1	25,4 1.0	213 7.5	5
	Rotary Linkage Lever	No. 18 Leadwire MIL-W-22759/7	B	42EN1-6 (MS24420-2) (8805/49)	0,57 Nm max. 5 in. lb.	—	—	—	12" max.	42,2 1.66	38,1 1.5	220 7.75	5

Notes:  
<sup>1</sup> Electrical ratings are on page 25.  
<sup>2</sup> Combine housing diameter and height with actuator on page 26 for overall size.

<sup>3</sup> These listings have pin receptacles (mating connectors should be ordered from a local supplier).

<sup>4</sup> See page 33 for replacement mounting hardware packet catalog listings.  
 N = Newtons

# Position Sensors

# EN Series

## Environment-Sealed Limit Switches



5EN1-6



25EN9-6



3EN1-6



23EN9-6



33EN1-6



4EN1-6



24EN9-6



34EN1-6



44EN1-6

Characteristics: O.F. — Operating Force; R.F. — Release Force;  
P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel.

### EN STANDARD SIZE SWITCHES ORDER GUIDE

Circuitry	Actuator	Termination	Elec. Rating <sup>1</sup> Code	Catalog Listing	Characteristics					Housing Dimensions <sup>2</sup>		Wgt. max. g oz.	Repl. Mtg. Hdw. Pkt. <sup>3</sup>
					O.F. N lbs.	R.F. min. N lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	Height mm inches	Dia. mm inches		
Four Single-Pole Double-Throw Circuits  (See p. 25 for circuit drawing)	Plunger	No. 20 Leadwire (MIL-W-5086)	A	5EN1-6	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,76 .030	30,5 1.2	38,1 1.5	346 12.2	3
	Roller Plunger	No. 20 Leadwire (MIL-W-5086)	A	25EN9-6	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,76 .030	30,5 1.2	38,1 1.5	360 12.7	4
Two Circuit Double Break	Plunger	No. 18 Leadwire MIL-W-22759/7	C	3EN1-6 (MS24331-3) (8805/40)	26,7-53,4 6-12	22,2 5	1,52 .060	6,35 .250	0,89 .035	33,3 1.31	38,1 1.5	241 8.5	1
	Roller Plunger	No. 18 Leadwire (MIL-W-5086)	C	23EN9-6	26,7-53,4 6-12	22,2 5	1,52 .060	6,35 .250	0,89 .035	33,3 1.31	38,1 1.5	255 9	4
	Rotary Roller Lever	No. 18 Leadwire MIL-W-22759/7	C	33EN11-6 (CW) (MS21320-5) (8805/48) 33EN1-6 (CCW) (MS21320-6) (8805/48)	1,4-2,8 Nm 12-25 in. lb.	0,9 Nm 8 in. lb.	15°	30°	5°	62 2.44	38,1 1.5	269 9.5	5 5
Four Circuit Double Break	Plunger	No. 18 Leadwire MIL-W-22759/7	C	4EN1-6 (MS24331-4) (8805/40)	26,7-53,4 6-12	22,2 5	1,78 .070	6,35 .250	1,14 .045	43,2 1.7	38,1 1.5	368 13	1
	Roller Plunger	No. 18 Leadwire (MIL-W-5086)	C	24EN9-6	26,7-53,4 6-12	22,2 5	1,78 .070	6,35 .250	1,14 .045	43,2 1.7	38,1 1.5	368 13	4
	Rotary Roller Lever	No. 18 Leadwire MIL-W-22759/7	C	34EN11-6 (CW) (MS21320-7) (8805/48) 34EN1-6 (CCW) (MS21320-8) (8805/48)	1,4-2,8 Nm 12-25 in. lb.	0,9 Nm 8 in. lb.	15°	30°	10°	71,6 2.82	38,1 1.5	439 15.5	5 5
	Rotary Linkage Lever	No. 18 Leadwire MIL-W-22759/7	C	44EN1-6 (MS24420-4) (8805/49)	1,1 Nm max. 10 in. lb.	—	—	—	20°	45,7 1.8	38,1 1.5	451 15.9	5

Position Sensors

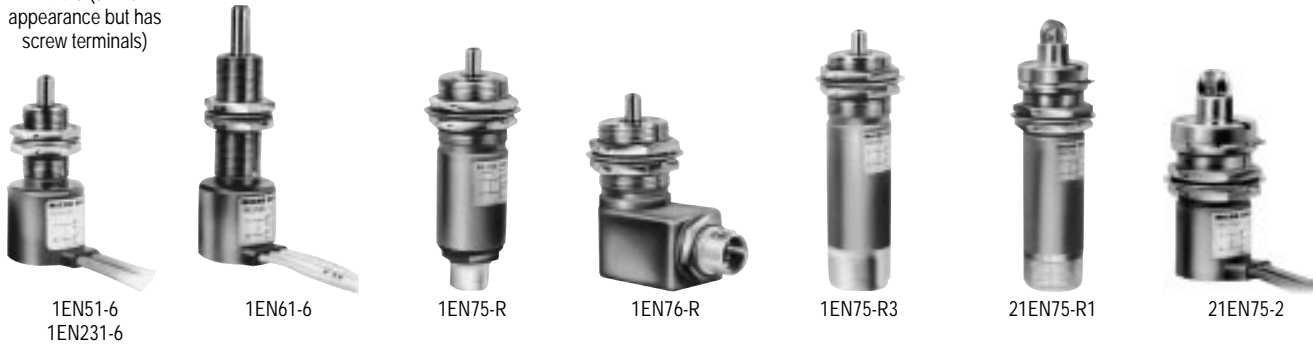
Notes:  
<sup>1</sup> Electrical ratings are on page 25.  
<sup>2</sup> Combine housing diameter and height with actuator dimension on page 26 for overall size.  
<sup>3</sup> See page 33 for replacement mounting hardware packet catalog listings.  
 N = Newtons



# Position Sensors

## Environment-Sealed Limit Switches

1EN194-S (similar in appearance but has screw terminals)



**Characteristics:** O.F. – Operating Force; R.F. – Release Force; P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

### EN SPECIAL REQUIREMENTS ORDER GUIDE

Special <sup>2</sup> Requirement	Actuator	Termination	Circuitry	Elec. Rating <sup>1</sup> Code	Catalog Listing	Characteristics					Wgt. max. g oz.	Repl. Mtg. Hdw. Pkt. <sup>3</sup>
						O.F. N lbs.	R.F. min. N lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches		
High Velocity Actuation	Plunger	No. 20 Leadwire (MIL-W-22759/1)	(2)SPDT	A	1EN231-6	26,7-53,4 6-12	17,8 4	1,02 .040	5,84 .230	0,51 .020	207 7.3	3
Low Force Operation	Plunger	No. 20 Leadwire (MIL-W-5086)	(2)SPDT	A	1EN51-6	13,3-26,7 3-6	8,9 2	1,02 .040	6,35 .250	0,51 .020	213 7.5	3
Increased Overtravel	Plunger	No. 20 Leadwire (MIL-W-5086)	(2)SPDT	A	1EN61-6	26,7-53,4 6-12	17,8 4	1,02 .040	12,7 .500	0,51 .020	227 8	3
Increased Overtravel	Plunger	Screw	(2)SPDT	A	1EN194-S	26,7-53,4 6-12	17,8 4	0,38-1,02 .015-.040	21,8 .860	0,51 .020	113 4	7
High Shock	Plunger	Bottom Receptacle	(2)SPDT	A	1EN75-R	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	198 7	8
High Shock	Plunger	Side Receptacle	(2)SPDT	A	1EN76-R	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	227 8	8
High Shock	Plunger	Bottom Receptacle	(2)SPDT	D	1EN75-R3 (M8805/65-001)	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	198 7	8
High Shock	Roller Plunger	Bottom Receptacle	(2)SPDT	A	21EN75-R1	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	204 7.2	11
High Shock	Roller Plunger	No. 20 Leadwire (MIL-W-22759/7)	(2)SPDT	A	21EN75-2	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	207 7.3	11

Notes:  
<sup>1</sup> Electrical ratings are on page 25.

<sup>2</sup> These are just a few of the designs that have been developed to meet special application requirements. If you have similar or different special requirements, contact MICRO SWITCH for the right switch to meet them.

<sup>3</sup> See page 33 for replacement mounting hardware packet catalog listings  
 N = Newtons

### EXPLANATIONS OF SWITCHES WITH SPECIAL REQUIREMENTS

#### High velocity actuation

This switch is designed to withstand near “hammer-blow” actuation as is found in over-center locking mechanisms. It is dimensionally interchangeable with standard listing 1EN1-6.

#### Low force operation

Special spring construction within this switch reduces the normal 6 to 12 pound (26,7 to 53,4 N) EN operating force to 3 to 6 pounds (13,3 to 26,7 N). This switch is also dimensionally interchangeable with the standard size 1EN1-6. Low force 600 series ENs have 3 to 6 pounds (13,3 to 26,7 N) of operating force.

#### Increased overtravel

A longer plunger and bushing on the switch extends the EN overtravel capabilities from the normal .250 inch to .860 (6,35 to 21,8 mm). The longer bushing also permits additional adjustment of the plunger position.

#### High impact shock

Catalog listing 1EN75-R3 (M8805/65-001) has been qualified to MIL-S-8805, including high impact shock class H. Other switches rated for high impact shock applications incorporate the same plunger mechanism and internal switch design as used in the 1EN75-R3 and are expected to conform to the same requirements.

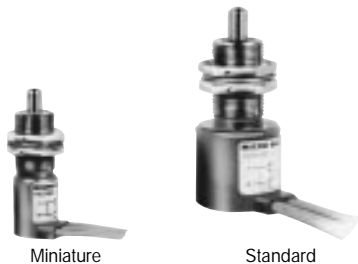
Terminations of these listings are:

- 1EN75-R                   DM-9601-7P-1D  
Deutch receptacle
- 1EN75-R3                GS02-16S-1P-003  
Canon receptacle
- 1EN76-R                   DM-9601-7P-1D  
Deutch receptacle
- 21EN75-R1               GS02-16S-1P-003  
Canon receptacle
- 21EN75-2                MIL-W-22759/7  
Two foot lead wire 20 gage

MICRO SWITCH does not furnish mating connectors with these products.

# Position Sensors

## Environment-Sealed Limit Switches



### FEATURES

- Meets or exceeds mechanical and electrical life as defined in MIL-S-8805.
- Seal definition: Environment-proof. Resilient per MIL-S-8805, symbol 4.
- Military specification: MIL-S-8805
- Temperature range: -67°F to +185°F (-55°C to +85°C)

### MINIATURE TYPE SWITCHES

Miniature type EN switches meet the demand for smaller size and lighter weight without sacrificing performance or electrical capacity. These types are of the same construction, seal, and materials as the standard size EN switches.

Type 400EN switches are directly interchangeable with their standard size EN counterpart, yet are smaller in diameter and lighter in weight. The miniature listing housing is .312 inch (7.92mm) smaller in diameter, and the switch weight ½ ounce (14,2g) less.

### ELECTRICAL RATINGS

Refer to page 25.

### MIL-S-8805 PERFORMANCE APPROVED SWITCHES

#### EN Miniature Switches

Catalog Listing	Procurement Part No.	Terminal Strength Newtons lbs.	Strength of Actuating Means Newtons lbs.	Strength of Mounting Bushing Nm in. lbs.	Vibration	Shock	Moisture Resistance	Salt Spray	Explosion	Acceleration	Seal Resilient (Design 4)
402EN1-6 404EN1-6	MS21321-1 MS21321-2	66,7 15	133 30	1,7 15	10-70 Hz at .060 in. (1,52mm) D.A. <sup>1</sup> 70-2000 Hz at 15gs	100gs .006 sec. pulse sawtooth	Applicable test	Applicable test	Applicable test	N/A	Applicable test
602EN1-6 604EN1-6 622EN1-6 624EN1-6 602EN222-6 604EN222-6 622EN222-6 624EN222-6	MS27240-1 MS27240-2 MS27240-3 MS27240-4 MS27240-5 MS27240-6 MS27240-7 MS27240-8	66,7 15	44,5 10	1,7 15	10-70 Hz at .060 in. (1,52mm) D.A. <sup>1</sup> 70-2000 Hz at 15gs	100gs .006 sec. pulse sawtooth	Applicable test	Applicable test	Applicable test	N/A	Applicable test

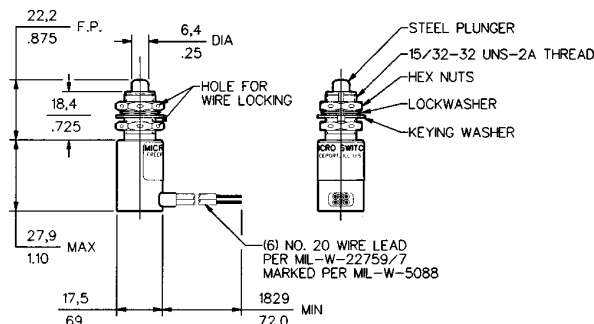
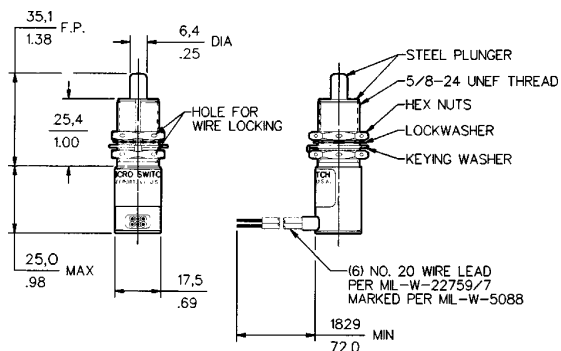
Notes:  
<sup>1</sup>D.A. = double amplitude or displacement.



402EN1-6



602EN1-6



Position Sensors

# Position Sensors

## Environment-Sealed Limit Switches

EN Series



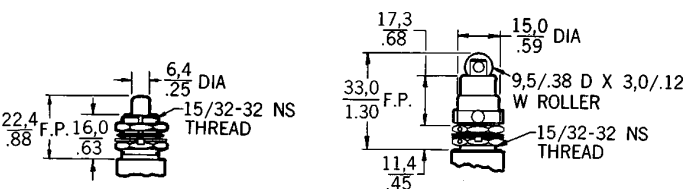
Characteristics: O.F. – Operating Force; R.F. – Release Force;  
P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

### EN MINIATURE SWITCHES ORDER GUIDE

Circuitry	Actuator	Elec. Rating Code	Catalog Listing	Characteristics					Housing Dimensions <sup>1</sup>		Wgt. g oz.	Repl. Mtg. Hdw. Pkt <sup>2</sup>
				O.F. N lbs.	R.F. min. N lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	Height mm inches	Dia. mm inches		
Two Single-Pole Double-Throw Circuits	Plunger	F	402EN1-6 (MS21321-1) (8805/39)	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	24,9 .980	17,5 .688	204 7.2	1
	Rotary Linkage Lever	F	442EN1-6	34 Nm max. 3 in. lbs.	—	—	—	12"	25,4 1.0	17,5 .688	207 7.3	9
Four Single-Pole Double-Throw Circuits	Plunger	F	404EN1-6 (MS21321-2) (8805/39)	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020	30,5 1.2	25,4 1.0	354 12.5	1
	Rotary Linkage Lever	F	444EN1-6	.34 Nm max. 3 in. lbs.	—	—	—	12"	30,2 1.19	25,4 1.0	340 12	6
Two SPDT Circuits	Plunger	F	602EN1-6 (MS27240-1) (8805/43)	26,7-53,4 6-12	17,8 4	1,02 .040	3,18 .125	0,51 .020	25,4 1.0	17,5 .688	176 6.2	2
		E	602EN222-6 (MS27240-5) (8805/43)									2
	Roller Plunger	F	622EN1-6 (MS27240-3) (8805/43)	26,7-53,4 6-12	17,8 4	1,02 .040	3,18 .125	0,51 .020	25,4 1.0	17,5 .688	204 7.2	10
		E	622EN222-6 (MS27240-7) (8805/43)									10
Four SPDT Circuits	Plunger	F	604EN1-6 (MS27240-2) (8805/43)	26,7-53,4 6-12	17,8 4	1,02 .040	3,18 .125	0,51 .020	30,5 1.2	25,4 1.0	354 12.5	2
		E	604EN222-6 (MS27240-6) (8805/43)									2
	Roller Plunger	F	624EN1-6 (MS27240-4) (8805/43)	26,7-53,4 6-12	17,8 4	1,02 .040	3,18 .125	0,51 .020	30,5 1.2	25,4 1.0	354 12.5	10
		E	624EN222-6 (MS27240-8) (8805/43)									
Two SPDT Circuits	.125 Dia. Plunger	F	602EN602-6	8,9-17,8 2-4	4,4 1	0,38 .015±.010	6,35 .250	0,51 .020	25,4 1.0	17,5 .688	170 6.0	2

Notes:  
<sup>1</sup> Combine housing diameter and height with actuator dimension on this page or page 26 for overall size of the switch.  
<sup>2</sup> All miniature EN limit switches listed here have 6 foot (1,8m) lengths of No. 20 leadwire per MS22759-7, marked per MIL-W-5088. For variations, contact MICRO SWITCH.  
<sup>3</sup> See page 33 for replacement mounting hardware packet catalog listings  
 N = Newtons

### 600EN ACTUATOR DIMENSIONS









400EN actuator dimensions are the same as those shown for standard size ENs on page 26.

# Position Sensors

## Environment-Sealed Limit Switches

EN Series

### EN REPLACEMENT PARTS ORDER GUIDE

	Catalog Listing	Description	For Use on:
	6PA30	Roller lever arm	30EN series
	6PA31 6PA357	Linkage lever arm Threaded rod only	40EN series
	6PA32 6PA202	Roller lever arm Roller lever arm	1EN & 1HE series 600EN & 600HE series
	15PA104 15PA105	Roller guide and locking ring Roller guide and locking ring	21EN, 422/424EN series (5/8" bushing) 622/624EN series (1 1/32" bushing)
	15PA137 15PA107	Locking ring only Locking ring only	21EN 422/424EN series (5/8" bushing) 622EN & 624EN series (1 1/32" bushing)
	19PA8 19PA9	Military-type mounting hardware Military-type mounting hardware	1EN series (5/8" bushing) 600EN series (1 1/32" bushing)

#### REPLACEMENT MOUNTING HARDWARE PACKETS

Refer to EN order guides on previous pages (catalog listing column and right hand column) for switch/mounting hardware cross-reference.

Repl. Mtg. Hdw. Pkt.	Catalog Listing	Repl. Mtg. Hdw. Pkt.	Catalog Listing
1	19PA8	7	19PA120-EN
2	19PA9	8	19PA121-EN
3	19PA78-EN	9	19PA122-EN
4	19PA115-EN	10	19PA123-EN
5	19PA117-EN	11	19PA124-EN
6	19PA119-EN		

<sup>1</sup> Other packets are available. Contact your local MICRO SWITCH sales office for more information.

Position Sensors

# Position Sensors

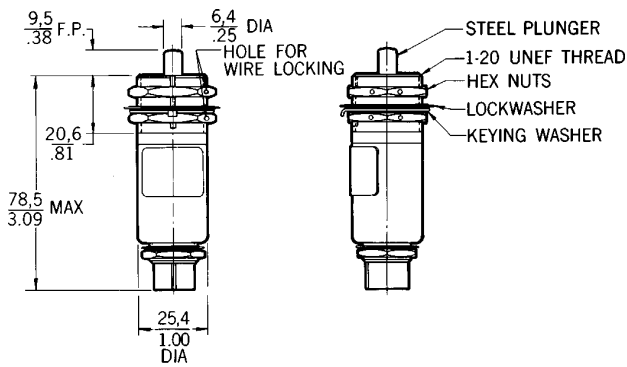
## Environment-Sealed Limit Switches

EN Series

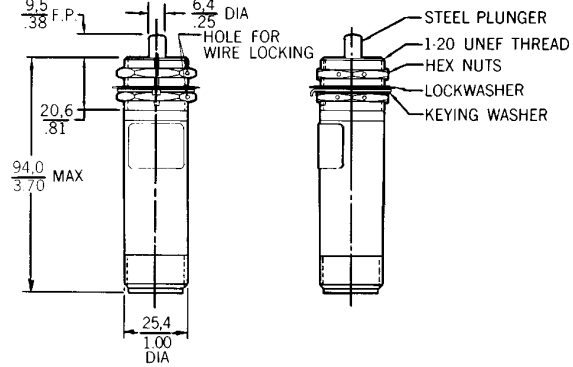
EN MOUNTING DIMENSIONS (For reference only)

Standard size EN switches

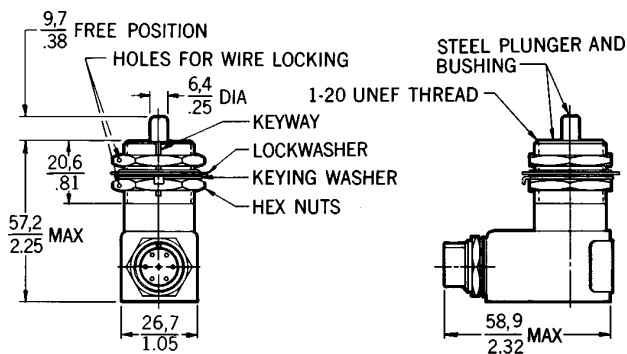
1EN75-R



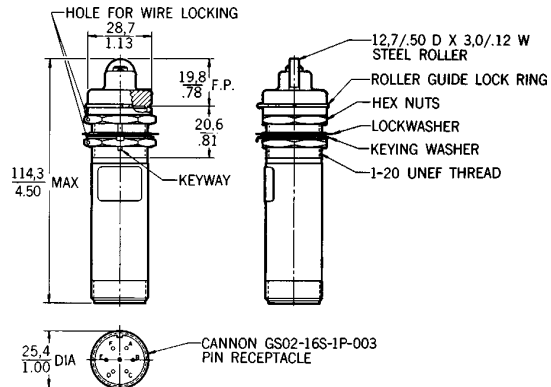
1EN75-R3



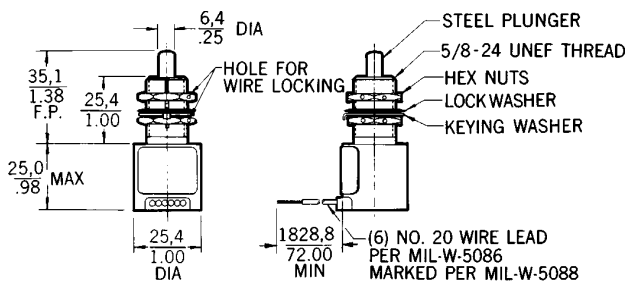
1EN76-R



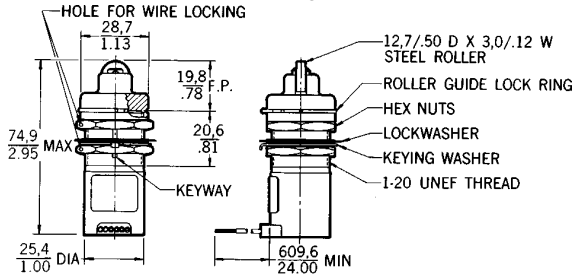
21EN75-R1



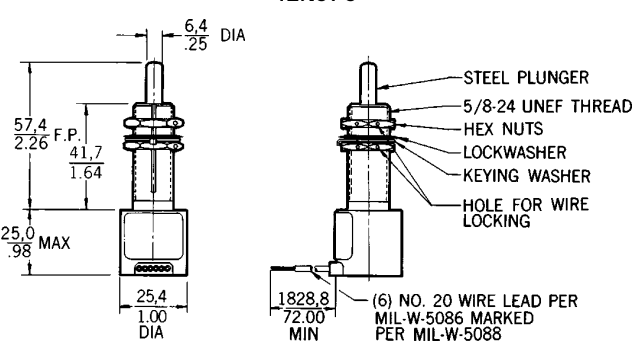
1EN51-6  
1EN231-6



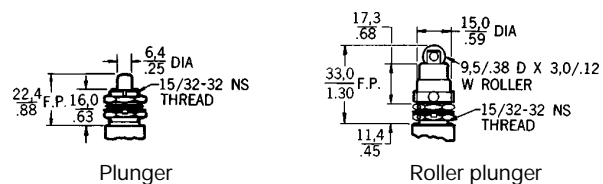
21EN75-2



1EN61-6



600EN actuators

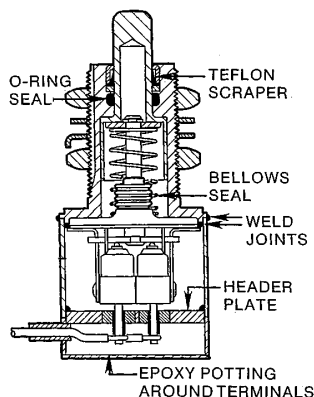


Key: 0,0 = mm  
0.00 = inches

# Position Sensors

# HE Series

## Hermetically Sealed Limit Switch



### GENERAL INFORMATION

True hermetic sealing with metal-to-metal, glass-to-metal construction assures maximum seal effectiveness for exceptionally long periods of time despite continuous changes in atmospheric pressures and temperatures.

1HE1-6 is directly interchangeable with the 1EN1-6 (MS24331-1) environment-proof switches, and has the same operating characteristics, physical dimensions, and electrical capacity. This switch features corrosion resistance, small size, one hole wire-lock mounting, and MIL-W-22759/7 leadwire.

Most EN type actuators can be provided on HE switches. Contact MICRO SWITCH for more information.

### FEATURES

- Sealing: Hermetic sealing per MIL-S-8805, hermetic symbol 5
- 1HE1-6 qualified to military specification: MIL-S-8805/80
- Vibration: 10 to 81 Hz at .060 in. (1,52mm) D.A. 81 to 2000 Hz at 20 gs
- Shock: 200 g, .007 second, half sine pulse
- Strength of actuating means: 250 lbs. (1112N)
- Strength of mounting means: 400 in. lbs. (45,2 Nm) - 1HE1-6, 200 in. lbs. -602/622 HE
- Also meets sand and dust, explosion, icing, minimum current, and moisture resistance requirements
- Temperature range: -67°F to +257°F (-55°C to +125°C)
- Weight: 7.3 oz. (207 g) max 1HE1-6, 6.5 oz. (184g) max. 602HE1-6 (including 6 ft. (1,8m) leadwires)
- Circuitry: Two or four single-pole, double-throw circuits
- Meets or exceeds mechanical and electrical life as defined in MIL-S-8805
- Modifications: Other leadwire types and lengths are available. Receptacle termination is also possible

### ELECTRICAL RATINGS amps at sea level and 100,000 feet (amps)

28 VDC	1HE1-6	602/622HE1-6 604/624HE1-6
Resistive	5	7
Inductive	3	4
Motor	4	4

Gold contacts can be provided with ½ amp inductive and 1 amp resistive at 28 VDC electrical rating.

Position Sensors

# Position Sensors


## Hermetically Sealed Limit Switch

HE Series



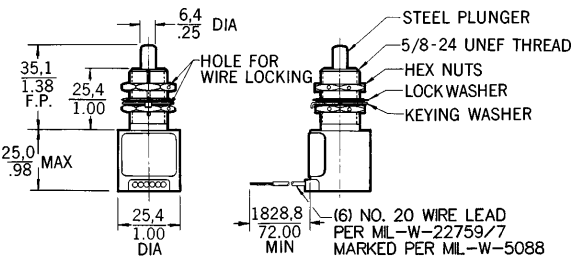
**Characteristics:** O.F. – Operating Force; R.F. – Release Force;  
P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

### HE ORDER GUIDE

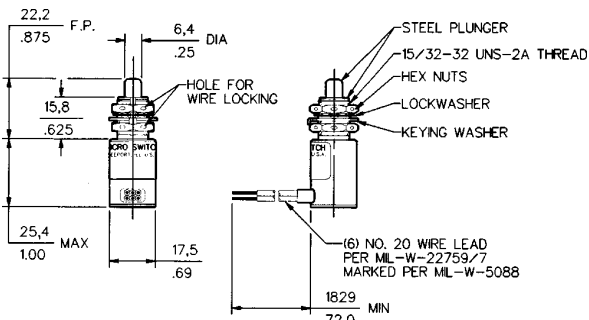
Circuitry	Catalog Listing	Actuator	Characteristics				
			O.F. Newtons lbs.	R.F. min. Newtons lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
 Two Single-Pole Double-Throw Circuits	1HE1-6 (MS8805/80-01)	Plunger	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020
	602HE1-6	Plunger	22,2-53,4 5-12	13,3 3	1,02 .040	3,18 .125	0,51 .020
	622HE1-6	Roller Plunger	22,2-53,4 5-12	13,3 3	1,02 .040	3,18 .125	0,51 .020
Four Single-Pole Double-Throw Circuits	604HE1-6	Plunger	26,7-53,4 6-12	17,8 4	1,02 .040	3,18 .125	0,51 .020
	624HE1-6	Roller Plunger	22,2-53,4 5-12	13,3 3	1,02 .040	3,18 .125	0,51 .020

### HE MOUNTING DIMENSIONS (For reference only)

#### 1HE1-6

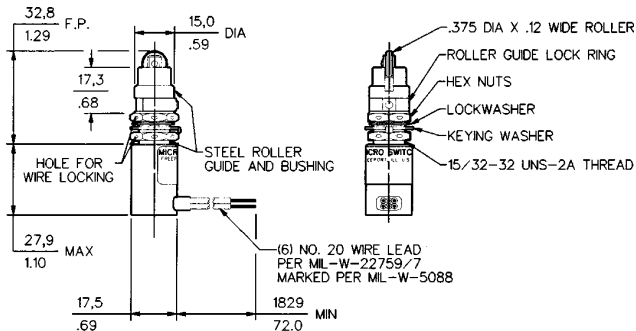


#### 602HE1-6



604HE1-6 has same dimensions as 602HE1-6, except housing dia. is 1.0/25,4; and housing height is 1.2/30,5.

#### 622HE1-6



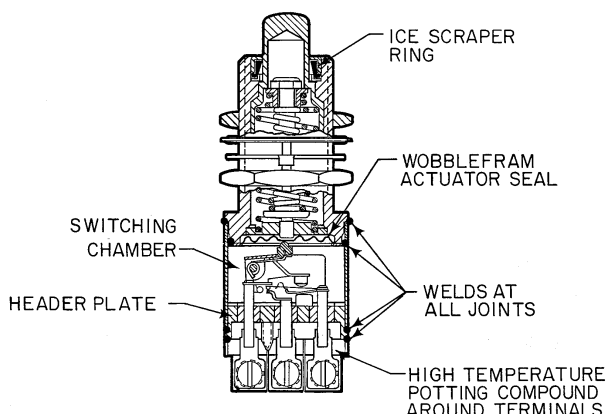
624HE1-6 has same dimensions as 622HE1-6, except housing dia. is 1.0/25,4; and housing height is 1.2/30,5.

Key:  $\frac{0,0}{0.00} = \text{mm}$   
 $\frac{0.00}{0.00} = \text{inches}$

# Position Sensors

# HR Series

## High Temperature Hermetically Sealed Switches



### FEATURES

- Enclosure seal: Sealed per MIL-S-8805, enclosure design Symbol 5\*
- Terminal strength: 15 lbs. (66,7N)
- Strength of actuating means: 35 lbs. (156N)
- Strength of mounting bushing: 15 in. lbs. (1,7Nm)
- Vibration: 10 to 58 Hz at .060 in. (1,52mm) D.A. 58 to 500 Hz at 20 gs
- Shock: 100 gs, .006 sec. sawtooth pulse
- Also meets moisture resistance, explosion, and salt spray requirements.
- Temperature range: -85°F to +600°F (-65°C to +315°C)
- Modifications: Receptacle termination is available. Temperature rating may be lowered because of receptacle limitations or customer-specified leadwire.

\* Watertight test not applicable per MIL-S-8805.

### GENERAL INFORMATION

HR switches combine maximum sealing, high (600°F, 315°C) temperature capabilities, and rugged, heavy duty, corrosion-resistant construction to provide reliable switching in the most demanding applications.

### MOUNTING

Plunger actuator switches bushing mount through 3/4 inch (19,1mm) diameter holes. Lock washer, keying washer, and wire lock hexagon mounting nuts lock the switches in their mounting.

Rotary actuator switches mount through 1 1/2 inch (11,9mm) diameter holes. A lock washer, wire lock hexagon nut, and locating pins on the top of the housing prevent switch rotation.

### ACTUATORS

#### Plunger

For in-line actuation. An ice scraper ring clears the actuator with each operation. Material is stainless steel.

#### Roller plunger

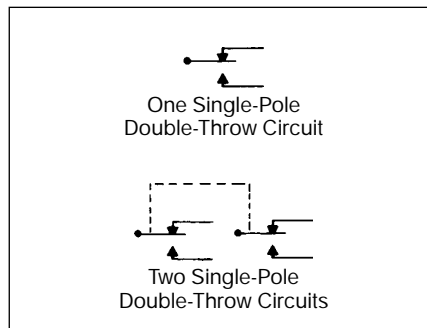
For cam and slide actuation not to exceed 20° rise. Roller adjusts laterally in 45° increments. An ice scraper ring clears the actuator with each operation. Material is stainless steel.

### ELECTRICAL RATING

MS24594-1 ratings apply when MIL-S-8805/41 is invoked.

Voltage	Amperage	
	Ind.	Res.
28 DC	2	5

### CIRCUITRY



Position Sensors





# Position Sensors

# HR Series

## High Temperature Hermetically Sealed Switches

Characteristics: O.F. – Operating Force; R.F. – Release Force;  
P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

### HR ORDER GUIDE

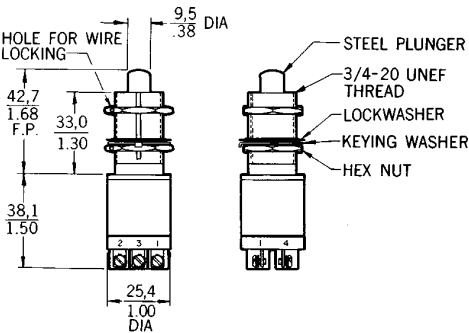
	Catalog Listing	Actuator	Circuitry	Terminals <sup>1</sup>	Characteristics					Weight g oz.
					O.F. Newtons lbs.	R.F. min. Newtons lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	
	12HR1-S <sup>2</sup> (MS24594-1)	Plunger	(2)SPDT	Screw	26,7-53,4 6-12	22,2 5	1,27 .050	6,35 .250	0,38 .015	127 4.5
	12HR8-6	Plunger	SPDT	Leadwire	26,7-53,4 6-12	22,2 5	1,27 .050	6,35 .250	0,38 .015	284 10
	22HR1-S	Roller Plunger	(2)SPDT	Screw	26,7-53,4 6-12	22,2 5	1,27 .050	6,35 .250	0,38 .015	142 5

Notes:  
<sup>1</sup> Screw terminals are 4-48 NF x .188 inch screw with sems washers. Leadwire terminals are 6 foot (1,8mm).  
<sup>2</sup> Meets MIL-S-8805/41 specification.

### MOUNTING DIMENSIONS (For reference only)

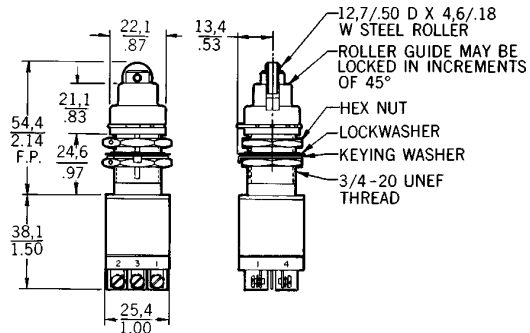
#### 12HR1-S

Fig. 1



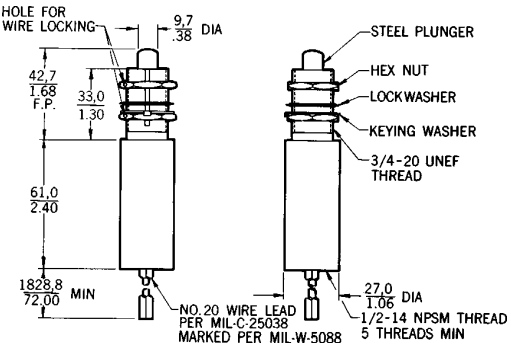
#### 22HR1-2

Fig. 2



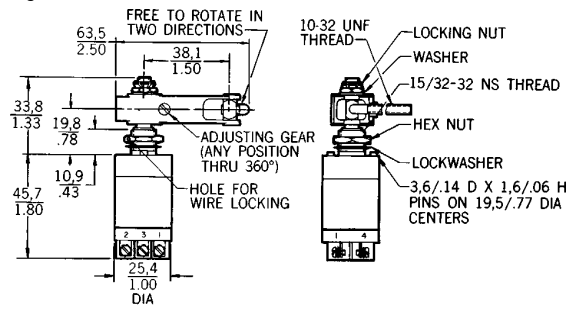
#### 12HR8-6

Fig. 3



#### 41HR1-S

Fig. 4



Key: 0,0 = mm  
0.00 = inches

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Switch Fixings](#) category:*

*Click to view products by [Honeywell](#) manufacturer:*

Other Similar products are found below :

[893102000](#) [00-5150](#) [LZZ1A](#) [0098.9234](#) [M2PA-5011](#) [630155](#) [635401](#) [6PA113](#) [6PA147-E6](#) [6PA148-E6](#) [6PA32](#) [6PA9](#) [700106](#) [700109](#)  
[700303A56](#) [700C1GRY](#) [700C2GRN](#) [704-6001](#) [704.960.9](#) [704.965.2](#) [704.965.6](#) [704.966.0](#) [7089-3](#) [710082-B11](#) [71M1048](#) [757200264](#)  
[764300000](#) [MHU35](#) [MHU37](#) [807039-1](#) [825.003.011](#) [825.005.011](#) [825.053.011](#) [825.055.011](#) [826.000.071](#) [827.020.011](#) [827.400.021](#)  
[835.900.023](#) [MML52C10C](#) [MML52E10C](#) [MML92HGH](#) [MML93K](#) [84211M02CNNS](#) [84212M02CNNS](#) [842.500.011](#) [843.000.011](#) [843187-](#)  
[000](#) [843487-000](#) [84-901](#) [84-902](#)