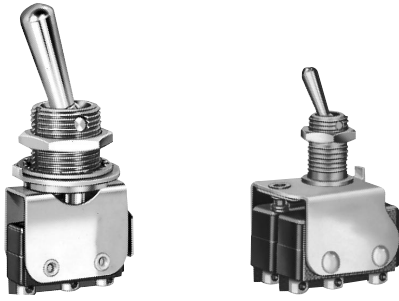


# Manual Switches

## Toggle Switch Assemblies

### 6AT SERIES



### FEATURES

- 2-position, momentary and maintained action.
- 1, 2 or 3 SPDT precision basic switches.
- Short behind-panel depth.
- Choice of 1/4 or 15/32-inch bushings.
- Silver or gold contacts.
- UL recognized, CSA certified basic switches.

### ELECTRICAL RATINGS — Basic Switches

	UL/CSA Rating	Load	30 VDC Rating	
			Amps	
			Sea Level	50,000 ft.
Silver Contacts	5 amps, 125-250 VAC	Inductive Resistive Max. Inrush	3 5 24	2.5 5 24
Gold Contacts	1 amp, 125 VAC	Inductive Resistive Max. Inrush	0.5 1 2	0.5 1 2

### 2-POSITION ORDER GUIDE

Mounting Style	Toggle Lever Position		Number of Poles	Types Contacts	Solder Terminals	"T" Terminals	"T2" Terminals
	Keyway	Opposite Keyway					
1/4" Bushing With Key Tab	Maint.	Maint.	1	Silver	6AT2	6AT2-T 6AT68-T*	6AT2-T2 6AT68-T2*
				Gold	6AT23		6AT23-T2
			2	Silver	6AT3	6AT3-T	6AT3-T2
				Gold	—	6AT13-T	6AT13-T2
			3	Silver	6AT501	6AT501-T	
1/4" Bushing Without Key Tab	Maint.	Maint.	1	Silver	6AT1	6AT1-T	6AT1-T2
				Gold			6AT56-T2
			2	Silver	6AT4	—	6AT4-T2
1/4" Bushing With Key Washer	Maint.	Maint.	1	Silver		6AT201-T	
			2	Gold			6AT231-T2
15/32" Bushing With Key Washer	Maint.	Maint.	1	Silver	6AT6	6AT6-T	6AT6-T2
				Gold	6AT17		6AT17-T2
			2	Silver	6AT7	6AT7-T	
				Gold	6AT42		6AT42-T2
			3	Silver	6AT10	6AT10-T	6AT10-T2
				Gold	6AT18		6AT18-T2

\* Extra long toggle lever (.67"/17.0 mm).

Toggle/Rockers

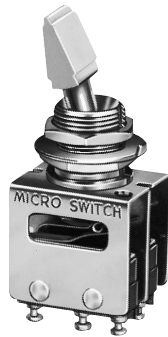
# Manual Switches

## Toggle Switch Assemblies

### 13AT/23AT SERIES



Standard lever



Tab lever



Pull-to-unlock lever

### FEATURES

- 2 or 3-position, momentary and maintained action.
- 2, 3 or 4 SPDT precision basic switches.
- Standard toggle, tab, or pull-to-unlock levers.
- Silver or gold contacts.
- 15/32-inch bushing.
- UL recognized, CSA certified basic switches.
- Lever-to-bushing seal option.

### ELECTRICAL RATINGS — Basic Switches

	UL/CSA Rating	Load	30 VDC Rating	
			Amps	
			Sea Level	50,000 ft.
Silver Contacts	5 amps, 125-250 VAC	Inductive Resistive Max. Inrush	3 5 24	2.5 5 24
Gold Contacts	1 amp, 125 VAC	Inductive Resistive Max. Inrush	0.5 1 2	0.5 1 2

### PULL-TO-UNLOCK TOGGLE LEVERS

As a guard against accidental operation, pull-to-unlock toggle levers must be pulled .090 inch/2, 3 mm (approx.) to change positions. A chart showing the 13 locking configurations and their catalog listing suffix code letters is shown on next page.

### 2-POSITION ORDER GUIDES

Keyway	Opposite Keyway	No. of Poles	Type Contacts	Standard Lever			Tab Lever "T2" Terminals	Pull-To-Unlock Lever Solder Terminals (Add locking letter ① to cat. listings below)	
				Solder Terminals	"T" Terminals	"T2" Terminals		23AT1- 23AT11- 23AT2- 23AT12- 23AT3-	Locking letters: D, F, or G
Maint.	Maint.	2	Silver	23AT1	23AT1-T	23AT1-T2	23AT402-T2	23AT1-	
			Gold	23AT11		23AT11-T2		23AT11-	
		3	Silver	23AT2	23AT2-T	23AT2-T2		23AT2-	
			Gold	23AT12		23AT12-T2		23AT12-	
		4	Silver	23AT3	23AT3-T	23AT3-T2		23AT3-	
			Gold	23AT8					
Mom.	Maint.	2	Silver	23AT4	23AT4-T	23AT4-T2	23AT403-T2		
			Gold	23AT19					
		3	Silver	23AT5					
			Gold						
		4	Silver	23AT6		23AT6-T2			
			Gold						

① See locking chart on next page.

### MIL-S-8805/26 Versions

Toggle Lever Position		No. of Poles	Type Contacts	Standard Lever "T2" Terminals		Tab Lever "T2" Terminals	
Keyway	Opposite Keyway			Catalog Listing	Military No.	Catalog Listing	Military No.
Maint.	Maint.	2	Silver	23AT73-T2	M8805/26-001	23AT473-T2	M8805/26-003
		4	Silver	23AT74-T2	M8805/26-002	23AT474-T2	M8805/26-004

# Manual Switches

## Toggle Switch Assemblies

### 13AT/23AT SERIES

### 3-POSITION ORDER GUIDES

Toggle Lever Position			No. of Poles	Type Contacts	Standard Lever			Tab Lever	Pull-To-Unlock Lever Solder Terminals (Add locking letter to cat. listings below)		
Keyway	Center	Opposite Keyway			Solder Terminals	"T" Terminals	"T2" Terminals	"T2" Terminals	Terminals		
Maint.	Maint.	Maint.	2	Silver	13AT2	13AT2-T	13AT2-T2	13AT402-T2	13AT2-	Locking letters: All types	
				Gold	13AT18	13AT18-T					
			3	Silver	13AT5			13AT5-			
				4	Silver	13AT9		13AT9-T2	13AT409-T2		13AT9-
					Gold	13AT29					
Mom.	Maint.	Mom.	2	Silver	13AT1	13AT1-T	13AT1-T2	13AT401-T2	13AT1-	Locking Letters: E, L, or N	
				Gold	13AT26			13AT423-T2			
			3	Silver	13AT4			13AT413-T2			
				4	Silver	13AT8		13AT8-T2			13AT8-
					Gold						
Maint.	Maint.	Mom.	2	Silver	13AT3	13AT3-T	13AT3-T2	13AT403-T2	13AT3-	Locking letters: E, G, B, L, P or N	
				Gold							
			4	Silver	13AT10			13AT410-T2	13AT10-		

### MIL-S-8805/26 VERSIONS

Toggle Lever Position			No. of Poles	Type Contacts	Standard Lever "T2" Terminals		Tab Lever "T2" Terminals	
Keyway	Center	Opposite Keyway			Catalog Listing	Military No.	Catalog Listing	Military No.
Mom.	Maint.	Mom.	2	Silver	13AT271-T2	M8805/26-005	13AT471-T2	M8805/26-006
			3	Silver			13AT474-T2	M8805/26-012
Maint.	Maint.	Maint.	2	Silver	13AT272-T2	M8805/26-007	13AT472-T2	M8805/26-008
			3	Silver	13AT275-T2	M8805/26-013		
Maint.	Maint.	Mom.	2	Silver	13AT273-T2	M8805/26-009	13AT473-T2	M8805/26-010

### LEVER-TO-BUSHING SEAL OPTION

A splash type lever-to-bushing seal can be provided to help prevent the entrance of moisture and dust behind the panel, or into the contact area. To specify 2-position switches with lever-to-bushing seals, change the 23AT catalog listing prefix to 32AT. Example: **32AT1** is a sealed 23AT1.

Convert 3-position catalog listings by changing the 13AT prefix to 31AT. Example: **31AT2-T** is a sealed 13AT2-T.

### HERMETICALLY SEALED BASIC SWITCH OPTION

AT's with <sup>15</sup>/<sub>32</sub>" bushings can be furnished with HM or HS hermetically sealed basic switches, which have metal-to-metal fusion around the cover, actuator base and mounting holes. Terminals are sealed glass-to-metal. The <sup>1</sup>/<sub>4</sub>" bushing 6AT design can also be provided with HM basic switches. For more information, contact the 800 number.



Shown with HM basic switches

### LOCKING CONFIGURATIONS

<b>A</b> 	<b>B</b>  Locked In Center and Extreme Position (Keyway Side)	<b>D</b>  Locked Out Of Center Position	<b>E</b>  Locked In Center Position	<b>F</b>  Locked In Extreme Position (Opposite Keyway)	<b>G</b>  Locked In Extreme Position (Keyway Side)	<b>H</b>  Locked Out Of Center And Extreme Position (Keyway Side)
<b>J</b>  Locked Out Of Center And Extreme Position (Opposite Keyway)	<b>K</b>  Locked In Center And Extreme Position (Opposite Keyway)	<b>L</b>  Locked Out Of Extreme Position (Keyway Side)	<b>M</b>  Locked Out Of And Into Extreme Position (Opposite Keyway)	<b>N</b>  Locked Out Of Extreme Position (Opposite Keyway)	<b>P</b>  Locked Out Of And Into Extreme Position (Keyway Side)	

Toggle/Rockers

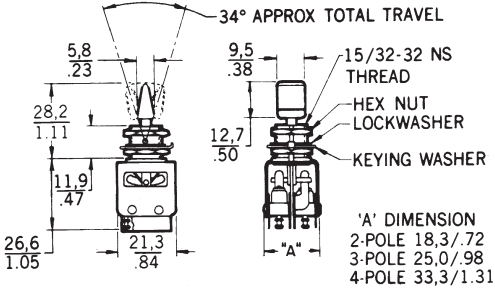
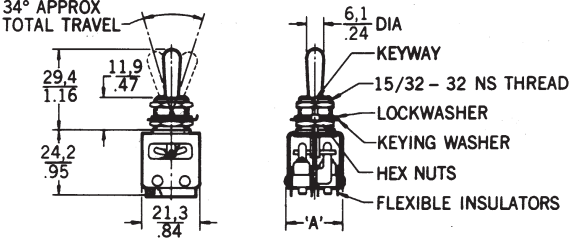
# Manual Switches

## Toggle Switch Assemblies

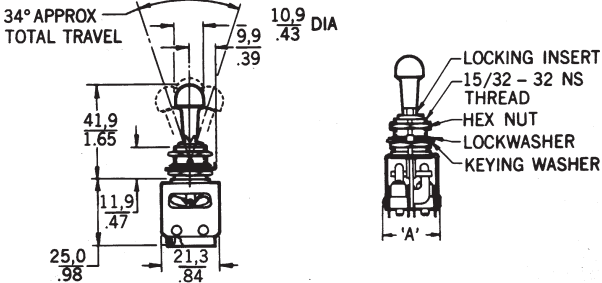
AT Series

MOUNTING DIMENSIONS (For reference only)

13/23AT

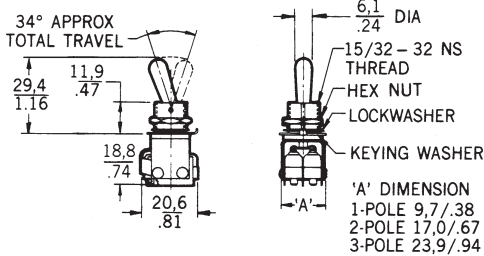


13AT40I-T2

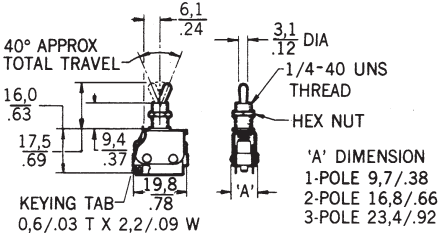
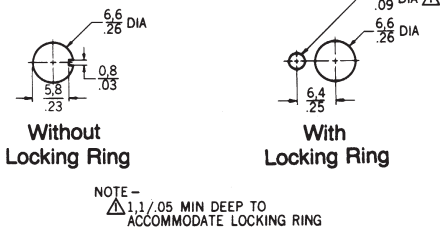


6AT

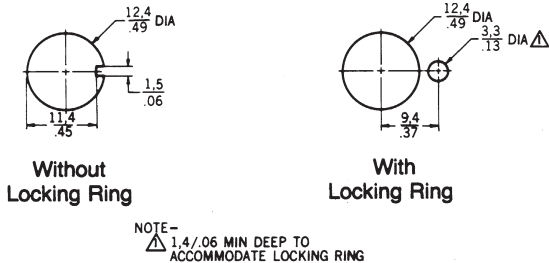
PANEL CUTOUTS



1/4" Bushing



1 5/32" Bushing



Bushing mounting torque is 10-15 in./lbs.

NOTE—  
64AT300, 66AT300, and 68AT300 (M8805/98) listings have a bushing seal and MS25196 panel seal.

# Flight Deck Toggle Switches

**CUSTOMER:**

Commercial and Military Aircraft Manufactures

**INDUSTRY:**

Commercial and Military Aerospace

**APPLICATION:**

Flight Deck Toggle switches

**PRODUCT:**

- 1TL887-3D
- 64AT22-3
- 64AT22-3D
- 64AT26-1
- 64AT34-7E
- 710AT25-1A

**DESCRIPTION:**

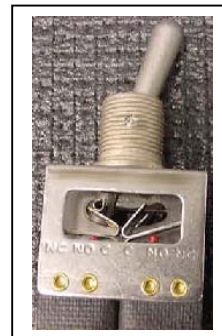
Electromechanical toggle switches provide a manual means to control various functions from the aircraft flight deck (cockpit). They control such items as fuel pumps and display, window heat, lights (navigation, taxi, strobe, rotating beacons, landing), Auxiliary Power Units, Navigation System control etc. The variety of circuitry requirements necessitate the need for Multi-Pole and Multi-Throw designs which provide the capability to make/carry/break unique electrical loads; providing independent output to motors, relays, lamps, and computers from a single toggle switch. Different toggle lever designs are also used to provide differentiation (looks and feel) for different required functions. Along with the different lever designs there are various lever-locking mechanisms that are sometimes required to prevent inadvertently actuating the toggle lever when it is not desired to do so. The above product list is a sampling of product that can be used in a Flight Deck.



**64AT22-3D**



**710AT25-1A**



**64AT22-3**



**1TL887-3D**

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<p><b>WARNING</b> Misuse of documentation</p>
<ul style="list-style-type: none"> <li>• The information presented in this product sheet is for reference only. DO NOT USE this document as product installation information.</li> <li>• Complete installation, operation and maintenance information is provided in the instructions supplied with each product.</li> </ul>
<p><b>Failure to comply with these instructions could result in death or serious injury.</b></p>

# Manual Switches

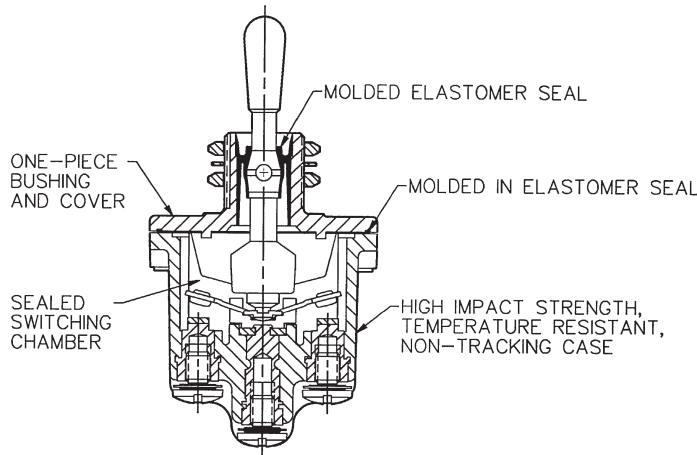
## Sealed Toggle Switches



### FEATURES

- Completely sealed switching chamber
- Step-design case provides added space between terminals to help prevent shorting
- 1, 2 or 4-pole circuitry
- Standard and pull to unlock levers.
- 2 or 3 positions, maintained and momentary action
- Spring-loaded actuating mechanism provides excellent tactile feedback
- High impact strength, non-tracking case enhances electrical stability
- Temperature range: -40 to 71°C (-40 to 160°F)
- UL recognized, File E12252, Vol. 1, Section 44
- CSA certified, File LR4442
- CE approved

### CONSTRUCTION



### GENERAL INFORMATION

MICRO SWITCH NT Series toggle switches meet severe environment application needs for a rugged, cost-effective toggle switch. Quality construction features include a molded-in elastomer seal between the toggle lever and bushing, and between the cover and case. In addition, the terminal inserts are molded into the high impact strength thermoplastic case.

Complete sealing of the switching chamber enables NT toggles to comply with UL 508, paragraph 13.3 hosedown test. These switches can be used where panels are subjected to periodic splash and washdowns, such as are common to food and beverage equipment. They will also withstand exposure to heavy accumulations of early morning dew that may condense on the control panel in cabs of vehicles left outdoors overnight.

### PULL-TO-UNLOCK LEVERS

Pull-to-unlock toggle levers prevent accidental toggle movement. The knobbed toggle lever must be pulled out approximately .09 in. (2,3 mm) to change positions. Thirteen different locking configurations are available. This lever style also has a non-glare matte nickel finish.

### UL AND CSA ELECTRICAL RATINGS

Rating Code*	Electrical Rating
L192	10 amps, 125, 250, 277 VAC; ¼ Hp, 125 VAC; ½ Hp, 250, 277 VAC; 3 amps, 125 VAC "L"
L191	15 amps, 125, 250, 277 VAC; ½ Hp, 125 VAC; 1 Hp, 250, 277 VAC; 5 amps, 125 VAC "L"

\* Referred to in order guides.

### ELECTRICAL RATINGS

#### In Amperes

Elect. Rating Code	28 Volts DC			115 VDC	250 VDC	115 Volts AC 60 & 400 Hz			230 VAC
	Ind.	Res.	Lamp	Res.	Res.	Ind.	Res.	Lamp	Res.
1	12	20	5	0.75	0.5	10	15	3	6
2	10	15	4	0.75	0.5	7	15	2	6
3	15	20	7	0.75	0.5	15	15	4	6
4	10	18	5	0.75	0.5	8	11	2	6
5	12	20	5	0.75	0.5	15	15	4	6
6	10	18	4	0.75	0.5	8	11	2	6

**Application Note:** Honeywell MICRO SWITCH 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. NT switches use silver cadmium oxide contacts. For other options, contact the MICRO SWITCH Application Center at 1-800-537-6945.

# Manual Switches

## Sealed Toggle Switches

NT Series

### NT 2-POSITION ORDER GUIDE

No. of Poles	Circuits Made With Toggle At:			Elect. Rating Code	Standard Lever Termination Style			Pull-To-Unlock Lever (Add suffix to Standard Lever Listing)
	Keyway Position	Opposite Keyway	UL Rating Code		Screw	Termination Style		
						Solder	Q-C	
1	OFF	2-3	L191	1	1NT1-2	11NT1-2	1NT91-2	D, F, G
	1-2	2-3	L191	1	1NT1-3	11NT1-3	1NT91-3	D, F, G
	OFF*	2-3	L192	2	1NT1-4	11NT1-4	1NT91-4	F
	1-2*	OFF	L192	2	1NT1-6	11NT1-6	1NT91-6	F
	1-2*	2-3	L192	2	1NT1-8	11NT1-8	1NT91-8	F
	OFF	2-3, 5-6	L191	3	2NT1-2	12NT1-2	2NT91-2	D, F, G
2	1-2, 4-5	2-3, 5-6	L191	3	2NT1-3	12NT1-3	2NT91-3	F
	OFF*	2-3, 5-6	L192	4	2NT1-4	12NT1-4	2NT91-4	F
	1-2, 4-5*	OFF	L192	4	2NT1-6	12NT1-6	2NT91-6	D, F, G
	1-2, 4-5*	2-3, 5-6	L192	4	2NT1-8	12NT1-8	2NT91-8	F
	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-2	14NT1-2	4NT91-2	D, F, G
	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-3	14NT1-3	4NT91-3	F
4	OFF*	2-3, 5-6, 8-9, 11-12	L192	6	4NT1-4	14NT1-4	4NT91-4	F
	1-2, 4-5, 7-8, 10-11*	OFF	L192	6	4NT1-6	14NT1-6	4NT91-6	D, F, G
	1-2, 4-5, 7-8, 10-11*	2-3, 5-6, 8-9, 11-12	L192	6	4NT1-8	14NT1-8	4NT91-8	F
	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-2	14NT1-2	4NT91-2	D, F, G
	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-3	14NT1-3	4NT91-3	F
	OFF*	2-3, 5-6, 8-9, 11-12	L192	6	4NT1-4	14NT1-4	4NT91-4	F

### NT 3-POSITION ORDER GUIDE

No. of Poles	Circuits Made With Toggle At:				Elect. Rating Code	Standard Lever Termination Style			Pull-To-Unlock Lever (Add suffix to Standard Lever Listing)
	Keyway Position	Center Position	Opposite Keyway	UL Rating Code		Screw	Termination Style		
							Solder	Q-C	
1	1-2	OFF	2-3	L191	1	1NT1-1	11NT1-1	1NT91-1	ALL TYPES
	1-2*	OFF	2-3	L192	2	1NT1-5	11NT1-5	1NT91-5	E, F, K, L, M, N
	1-2*	OFF	2-3*	L192	2	1NT1-7	11NT1-7	1NT91-7	E, L, N
	NONE**	OFF	2-3	L191	1	1NT1-21	11NT1-21	1NT91-21	E, F, K, M
	NONE**	1-2	2-3	L191	1	1NT1-31	11NT1-31	1NT91-31	E, F, K, M
	NONE**	1-2	2-3*	L192	2	1NT1-51	11NT1-51	1NT91-51	E
	1-2*	OFF	NONE**	L192	2	1NT1-61	11NT1-61	1NT91-61	E
	1-2, 4-5	OFF	2-3, 5-6	L191	3	2NT1-1	12NT1-1	2NT91-1	ALL TYPES
2	1-2, 4-5*	OFF	2-3, 5-6	L192	4	2NT1-5	12NT1-5	2NT91-5	E, F, K, L, M, N
	1-2, 4-5*	OFF	2-3, 5-6*	L192	4	2NT1-7	12NT1-7	2NT91-7	E, L, N
	NONE*	OFF	2-3, 5-6	L191	3	2NT1-21	12NT1-21	2NT91-21	E, F, K, M
	NONE**	1-2, 4-5	2-3, 5-6	L191	3	2NT1-31	12NT1-31	2NT91-31	E, F, K, M
	NONE**	1-2, 4-5	2-3, 5-6*	L192	4	2NT1-51	12NT1-51	2NT91-51	E
	1-2, 4-5*	OFF	NONE**	L192	4	2NT1-61	12NT1-61	2NT91-61	E
	1-2, 4-5	2-3, 4-5	2-3, 5-6	L191	3	2NT1-12	12NT1-12	2NT91-12	ALL TYPES
	1-2, 4-5	1-2, 5-6	2-3, 5-6	L191	3	2NT1-10	12NT1-10	2NT91-10	ALL TYPES
	1-2, 4-5*	1-2, 5-6	2-3, 5-6	L192	4	2NT1-50	12NT1-50	2NT91-50	L, F, K, L, M, N
	1-2, 4-5*	1-2, 5-6	2-3, 5-6*	L192	4	2NT1-70	12NT1-70	2NT91-70	E, L, N
	1-2, 4-5, 7-8, 10-11	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-1	14NT1-1	4NT91-1	ALL TYPES
	1-2, 4-5, 7-8, 10-11*	OFF	2-3, 5-6, 8-9, 11-12	L192	6	4NT1-5	14NT1-5	4NT91-5	E, F, K, L, M, N
	1-2, 4-5, 7-8, 10-11*	OFF	2-3, 5-6, 8-9, 11-12*	L192	6	4NT1-7	14NT1-7	4NT91-7	E, L, N
	NONE*	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-21	14NT1-21	4NT91-21	E, F, K, M
NONE**	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-31	14NT1-31	4NT91-31	E, F, K, M	
NONE**	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12*	L192	6	4NT1-51	14NT1-51	4NT91-51	E	
1-2, 4-5, 7-8, 10-11*	OFF	NONE**	L192	6	4NT1-61	14NT1-61	4NT91-61	E	
1-2, 4-5, 7-8, 10-11	2-3, 4-5, 7-8, 11-12	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-12	14NT1-12	4NT91-12	ALL TYPES	
1-2, 4-5, 7-8, 10-11	2-3, 4-5	2-3, 5-6	L191	5	4NT1-10	14NT1-10	4NT91-10	ALL TYPES	
7-8, 10-11	2-3, 4-5, 7-8, 11-12	2-3, 5-6, 8-9, 11-12	L192	6	4NT1-50	14NT1-50	4NT91-50	E, F, K, L, M, N	
1-2, 4-5, 7-8, 10-11*	2-3, 4-5	2-3, 5-6, 8-9, 11-12*	L192	6	4NT1-70	14NT1-70	4NT91-70	E, L, N	

Toggle/Rockers

\* These positions are momentary. All others are maintained.

\*\* Toggle lever is blocked from these products. Toggle becomes 2-position, with center being one extreme position.

# Manual Switches

## Sealed Toggle Switches














NT Series

### PULL-TO-UNLOCK OPTION

When ordering pull-to-unlock toggle listings, add the suffix letter shown in the chart below to the standard toggle listing and the MS number. For example, to or-

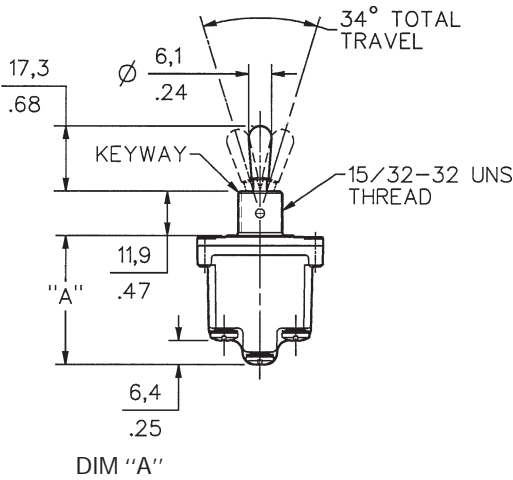
der a INTI-1 pull-to-unlock toggle switch with the lever locked in the center position, add the letter E; i.e., INTI-1E.

### LOCKING CONFIGURATIONS

 Locked In Three Positions	 Locked In Center and Extreme Position (Keyway Side)	 Locked Out Of Center Position	 Locked In Center Position	 Locked In Extreme Position (Opposite Keyway)	 Locked In Extreme Position (Keyway Side)	 Locked Out Of Center And Extreme Position (Keyway Side)
 Locked Out Of Center And Extreme Position (Opposite Keyway)	 Locked In Center And Extreme Position (Opposite Keyway)	 Locked Out Of Extreme Position (Keyway Side)	 Locked Out Of And Into Extreme Position (Opposite Keyway)	 Locked Out Of Extreme Position (Opposite Keyway)	 Locked Out Of And Into Extreme Position (Keyway Side)	

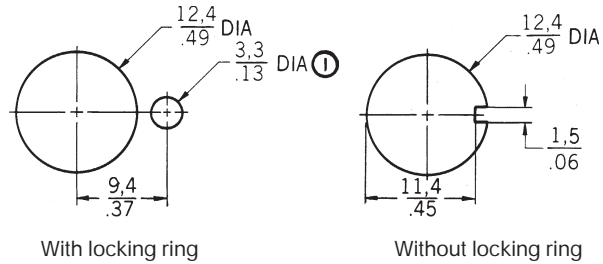
### MOUNTING DIMENSIONS:

(For reference only)



Key:  $\frac{0,0}{0.00} = \text{mm}$   
 $\frac{0.00}{.00} = \text{inches}$

### Panel cutout



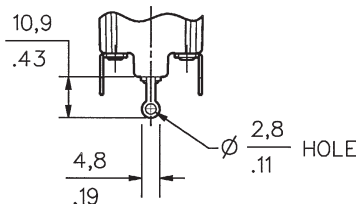
Note:  
 Ⓢ 1.4/.06 MIN DEEP TO ACCOMMODATE LOCKING RING. 15PA87 PANEL SEAL REQUIRES BLIND HOLE TO INSURE SEAL INTEGRITY

1-pole	29,5/1.16
2 & 4-pole	34,4/1.35

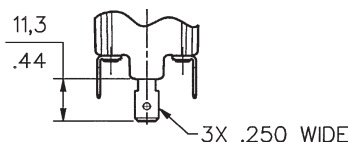
### NOTES:

- Pull-to-unlock levers have 10,7/42 dia. knob
- Locking ring, lockwasher, 2 hexnuts and terminal screws are furnished unassembled.

### Solder Terminals

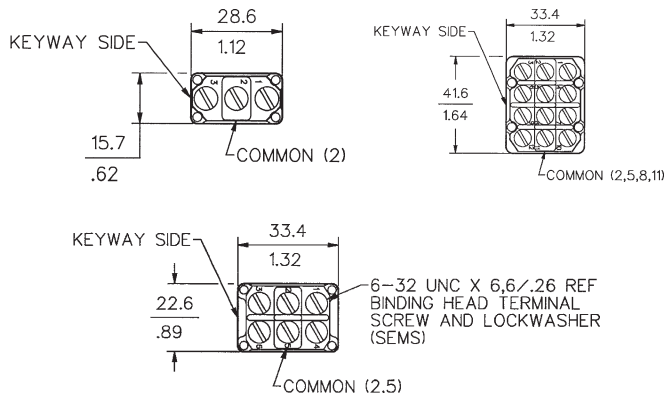


### Quick Connect Terminals



Bushing mounting torque is 10-15 in./lbs.  
 Terminal screw mounting torque is 5 in./lbs. max.

### Terminal Circuit Identification





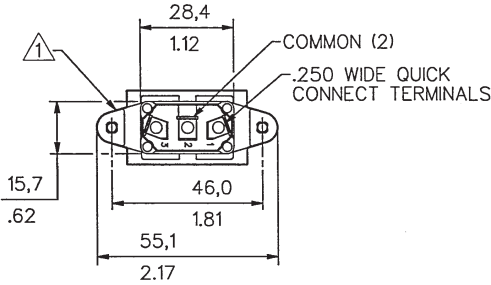
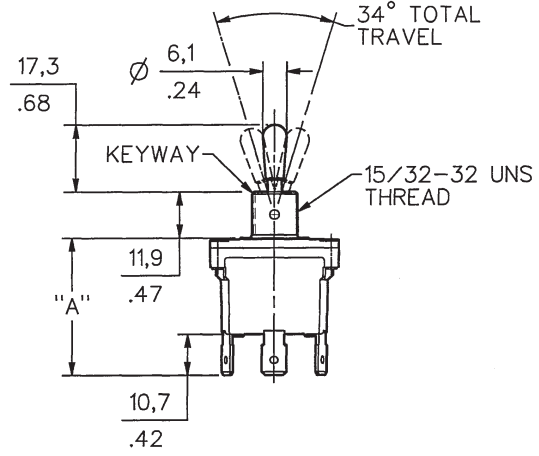
# Manual Switches

NT Series

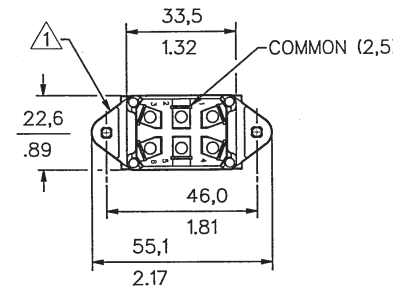
## Flat Base Sealed Toggles and Rockers

MOUNTING DIMENSIONS (For reference only)

Toggle Switches



IDENTIFICATION LUG SIDE



IDENTIFICATION LUG SIDE

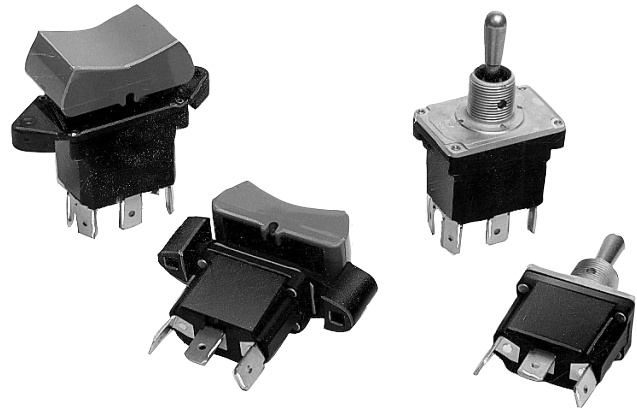
Bushing mounting torque is 10-15 in./lbs.

Toggle/Rockers

# Manual Switches

# NT Series

## Flat Base Sealed Toggles and Rockers



### FEATURES

- Sealed switching chamber
- 1 or 2-pole circuitry
- 2 or 3 position maintained and momentary action
- Flat base with quick-connect terminals – mating connectors are available
- Spring-loaded actuating mechanism provides tactile feedback
- High impact strength, non-tracking case enhances electrical stability
- Temperature range: -40 to 71°C (-40 to 160°F)
- UL Recognized, File E12252, vol. 1, section 44
- CSA Certified, File LR4442
- CE approved

### UL AND CSA ELECTRICAL RATINGS

Rating Code*	Electrical Rating
L192	10 amps, 125, 250, 277 VAC; ¼ Hp, 125 VAC; ½ Hp, 250, 277 VAC; 3 amps, 125 VAC "L"
L191	15 amps, 125, 250, 277 VAC; ½ Hp, 125 VAC; 1 Hp, 250, 277 VAC; 5 amps, 125 VAC "L"

### GENERAL INFORMATION

MICRO SWITCH NT Series toggle switches are designed to meet severe environment application needs for rugged, cost-effective manual switches. These flat base style products are identical to the stepped base style in construction and features.

### ELECTRICAL RATINGS

#### In Amperes

Rating Code	28 Volts DC			115 VDC	250 VDC	115 Volts AC 60 & 400 Hz			230 VAC
	Ind.	Res.	Lamp	Res.	Res.	Ind.	Res.	Lamp	Res.
1	12	20	5	0.75	0.5	10	15	3	6
2	10	15	4	0.75	0.5	7	15	2	6
3	15	20	7	0.75	0.5	15	15	4	6
4	10	18	5	0.75	0.5	8	11	2	6

The flat base allows for PC board or connector use for easy wiring/connection. The flat base NT toggle switches are provided with quick-connect (spade) termination. Mating connectors are available.

### TERMINAL CIRCUIT IDENTIFICATION

Terminal identifications are referenced in the order guides to indicate which circuits are made in each toggle position (e.g. "1-2" refers to circuit closure through terminals 1 and 2).

**Application Note:** Honeywell MICRO SWITCH 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. NT switches use silver cadmium oxide contacts. For other options, contact the MICRO SWITCH Application Center at 1-800-537-6945.

# Manual Switches

## Flat Base Sealed Toggles

### NT 2-POSITION ORDER GUIDE

No. of Poles	Circuits Made At:		UL Rating Code	Electrical Rating Code	Catalog Listing Toggle Q-C
	Keyway Position	Opposite Keyway			
1	OFF	2-3	L191	1	31NT91-2
	1-2	2-3	L191	1	31NT91-3
	OFF**	2-3	L192	2	31NT91-4
	1-2**	OFF	L192	2	31NT91-6
	1-2**	2-3	L192	2	31NT91-8
2	OFF	2-3, 5-6	L191	3	32NT91-2
	1-2, 4-5	2-3, 5-6	L191	3	32NT91-3
	OFF**	2-3, 4-6	L192	4	32NT91-4
	1-2, 4-5**	OFF	L192	4	32NT91-6
	1-2, 4-5**	2-3, 4-6	L192	4	32NT91-8

### NT 3-POSITION ORDER GUIDE














No. of Poles	Circuits Made At:			UL Rating Code	Electrical Rating Code	Catalog Listing Toggle Q-C
	Keyway Position	Center Position	Opposite Keyway			
1	1-2	OFF	2-3	L191	1	31NT91-1
	1-2**	OFF	2-3	L192	2	31NT91-5
	1-2**	OFF	2-3**	L192	2	31NT91-7
	NONE***	OFF	2-3	L191	1	31NT91-21
	NONE***	1-2	2-3	L191	1	31NT91-31
	NONE***	1-2	2-3**	L192	2	31NT91-51
	1-2**	OFF	NONE***	L192	2	31NT91-61
2	1-2, 4-5	OFF	2-3, 5-6	L191	3	32NT91-1
	1-2, 4-5**	OFF	2-3, 5-6	L192	4	32NT91-5
	1-2, 4-5**	OFF	2-3, 5-6**	L192	4	32NT91-7
	NONE***	OFF	2-3, 5-6	L191	3	32NT91-21
	NONE***	1-2, 4-5	2-3, 5-6	L191	3	32NT91-31
	NONE***	1-2, 4-5	2-3, 5-6**	L192	4	32NT91-51
	1-2, 4-5**	OFF	NONE***	L192	4	32NT91-61
	1-2, 4-5	2-3, 4-5	2-3, 5-6	L191	3	32NT91-12
	1-2, 4-5	1-2, 5-6	2-3, 5-6	L191	3	32NT91-10
	1-2, 4-5**	1-2, 5-6	2-3, 5-6	L192	4	32NT91-50
	1-2, 4-5**	1-2, 5-6	2-3, 5-6**	L192	4	32NT91-70

\*\* These positions are momentary. All others are maintained.  
 \*\*\* Toggle lever is blocked from these positions. Toggle becomes 2-position, with center being one extreme position.

### MATING CONNECTORS ORDER GUIDE

Description	Catalog Listing
2-pole connector	19PA168-NT
1-pole connector, same package size as 2-pole connector	19PA169-NT

### LOCKING CONFIGURATIONS

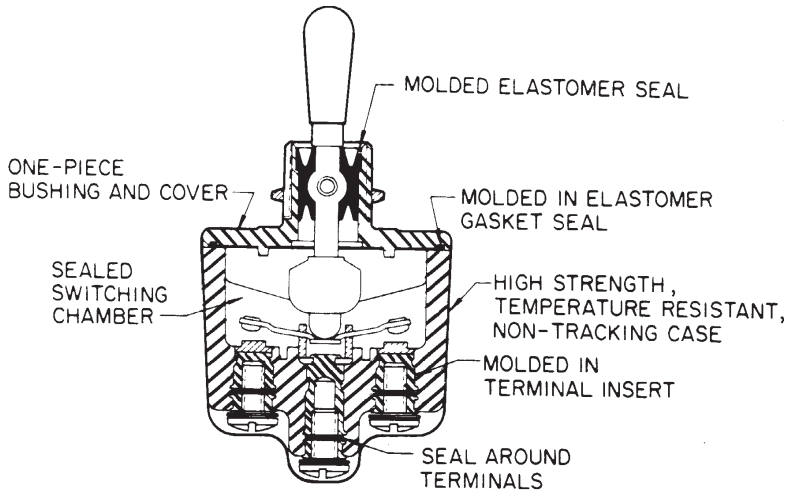
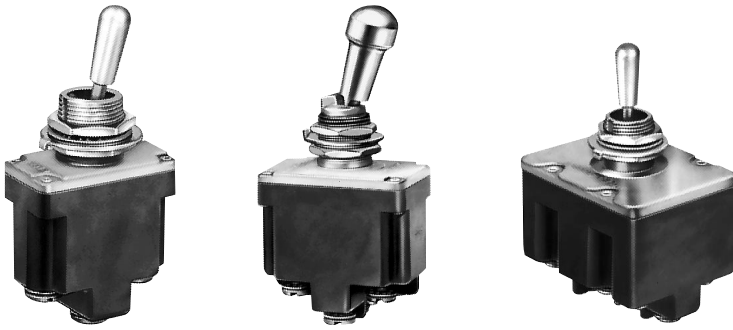
 <p>Locked In Three Positions</p>	 <p>Locked In Center and Extreme Position (Keyway Side)</p>	 <p>Locked Out Of Center Position</p>	 <p>Locked In Center Position</p>	 <p>Locked In Extreme Position (Opposite Keyway)</p>	 <p>Locked In Extreme Position (Keyway Side)</p>	 <p>Locked Out Of Center And Extreme Position (Keyway Side)</p>
 <p>Locked Out Of Center And Extreme Position (Opposite Keyway)</p>	 <p>Locked In Center And Extreme Position (Opposite Keyway)</p>	 <p>Locked Out Of Extreme Position (Keyway Side)</p>	 <p>Locked Out Of And Into Extreme Position (Opposite Keyway)</p>	 <p>Locked Out Of Extreme Position (Opposite Keyway)</p>	 <p>Locked Out Of And Into Extreme Position (Keyway Side)</p>	

Toggle/Rockers

# Manual Switches

## Toggle Switches

TL Series



### FEATURES

- Qualified to MIL-S-3950
- Environment-proof sealing
- 1, 2, and 4 pole circuitry.
- Standard and pull to unlock levers.
- 2 and 3 position, maintained, and momentary toggle action.
- Temperature range: -85°F to +160°F (-65°C to +71°C).
- UL recognized, CSA certified.
- CE approved

### CONSTRUCTION

TL's have high strength, temperature resistant, non-tracking case material and silver cadmium oxide contacts.

### ACTUATOR OPTIONS

Standard toggle lever operates on a direct action spring loaded toggle mechanism to provide excellent tactile feedback in both the momentary and maintained toggle positions. The toggle lever is approximately .68 in. (16 mm) long and has a non-glare matte nickel plated finish.

Pull-to-unlock toggle levers prevent accidental toggle movement. The knobbed toggle lever must be pulled out approximately .09 in. (2,3 mm) to change positions. Thirteen different locking configurations are available. This lever style also has a non-glare matte nickel finish.

Colored tab levers (not shown) can also be furnished. They have the same appearance as the tab lever shown in the TW photo on page 119. Call the 800 number.

### ELECTRICAL RATINGS

(In amperes)

Elec. Rating Code	28 VDC			115 VDC	250 VDC	115 VAC 60 & 400 Hz			230 VAC
	Ind.	Res.	Lamp	Res.	Res.	Ind.	Res.	Lamp	Res.
1	15	20	5	0.75	0.5	10	15	3	6
2	10	15	4	0.75	0.5	7	15	2	6
3	15	20	7	0.75	0.5	15	15	4	6
4	10	18	5	0.75	0.5	8	11	2	6
5	12	20	5	0.75	0.5	15	15	4	6
6	10	18	4	0.75	0.5	8	11	2	6

UL/CSA Rating Code	Electrical Rating
L192	10 amps-125, 250, 277 VAC; ¼ Hp-125 VAC; ½ Hp-250, 277 VAC 3 amps-125 VAC "L"
L191	15 amps-125, 250, 277 VAC; ½ Hp-125 VAC; 1 Hp-250, 277 VAC 5 amps-120 VAC "L"

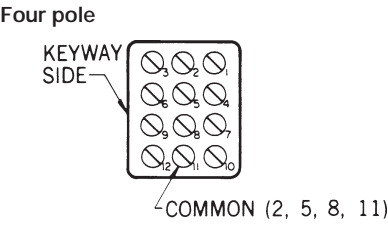
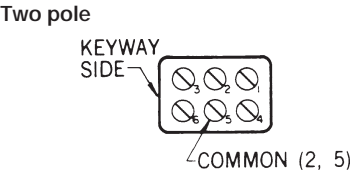
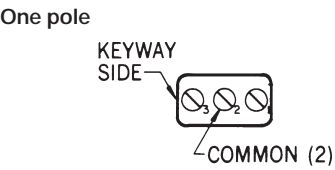
**Application Note:** Honeywell MICRO SWITCH does *not* recommend the use of silver cadmium oxide switch contacts in non-arcing loads. Non-arcing loads are generally loads less than 12 volts and/or 0.5 amp. TL switches use silver cadmium oxide contacts. For other options, contact the MICRO SWITCH Application Center at 1-800-537-6945.

# Manual Switches

## Toggle Switches

### TERMINAL CIRCUIT IDENTIFICATION

Terminal identifications are referred to in the order guides to indicate which circuits are made in each toggle position (i.e., 1-2 refers to circuit closure through terminals 1 and 2).



### TERMINALS

In addition to the screw terminal switches listed in the order guides, IWTS Integrated Wire Termination System versions (covered in MICRO SWITCH Catalog 80) and solder turret terminals are available. Contact the 800 number.

### SPECIAL CIRCUITRIES

Catalog listings with -10, -50, and -70 suffix numbers shown in the order guides have special "On-On-On" circuits, as illustrated. TLs with -12 suffix are the same as -50 except the keyway position is maintained, and in the center position circuits

2-3 and 4-5 are made; -72 is the same as -50 except that the opposite keyway position is momentary, and in the center position circuits 2-3 and 4-5 are made.

### -10 CIRCUITRY

No. of Poles	Keyway Side Maint. Position	Center Maint. Position	Opposite Keyway Maint. Position
2			
4			

### -50 CIRCUITRY

No. of Poles	Keyway Side Mom. Position	Center Maint. Position	Opposite Keyway Maint. Position
2			
4			

### -70 CIRCUITRY

No. of Poles	Keyway Side Mom. Position	Center Maint. Position	Opposite Keyway Mom. Position
2			
4			

### ACCESSORIES

Colored lever sleeves, decorative mounting hardware, and panel seal accessories are shown on page 135.




Toggle/Rockers

# Manual Switches

## Toggle Switches

TL Series

### 2-POSITION ORDER GUIDE














	No. of Poles	Circuit(s) Made With Toggle At:		Electrical Rating Code	UL/CSA Rating Code	Standard Toggle		Pull-to-Unlock Toggle	
		Keyway Position	Opposite Keyway			Catalog Listing	Military Number	Add Suffix to Standard Toggle Listing	Military Number **
	1	OFF OFF* 1-2* 1-2 1-2*	2-3 2-3 OFF 2-3 2-3	1 2 2 1 2	L191 L192 L192 L191 L192	1TL1-2 1TL1-4 1TL1-6 1TL1-3 1TL1-8	MS24523-22 MS24523-29 MS24523-30 MS24523-23 MS24523-26	D, F, G F F D, F, G F	MS24658-22 MS24658-29 MS24658-30 MS24658-23 MS24658-26
	2	OFF OFF* 1-2, 4-5* 1-2, 4-5 1-2, 4-5*	2-3, 5-6 2-3, 5-6 OFF 2-3, 5-6 2-3, 5-6	3 4 4 3 4	L191 L192 L192 L191 L192	2TL1-2 2TL1-4 2TL1-6 2TL1-3 2TL1-8	MS24524-22 MS24524-29 MS24524-30 MS24524-23 MS24524-26	D, F, G F F D, F, G F	MS24659-22 MS24659-29 MS24659-30 MS24659-23 MS24659-26
	4	OFF OFF* 1-2, 4-5 7-8, 10-11* 1-2, 4-5 7-8, 10-11 1-2, 4-5* 7-8, 10-11	2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12 OFF 2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12	5 6 6 5 6	L191 L192 L192 L191 L192	4TL1-2 4TL1-4 4TL1-6 4TL1-3 4TL1-8	MS24525-22 MS24525-29 MS24525-30 MS24525-23 MS24525-26	D, F, G F F D, F, G F	MS24660-22 MS24660-29 MS24660-30 MS24660-23 MS24660-26

\* These positions only are momentary. All others are maintained.  
\*\* Also add the appropriate suffix letter to the Military number.

### PULL-TO-UNLOCK OPTION

When ordering pull-to-unlock toggle listings, add the suffix letter shown in the chart below to the standard toggle listing and the MS number. For example, to order a 1TL1-1 pull-to-unlock toggle switch with the lever locked in the center position, add the letter **E**; i.e., 1TL1-1E, MS-24658-21E.

### LOCKING CONFIGURATIONS




 Locked In Three Positions	 Locked In Center and Extreme Position (Keyway Side)	 Locked Out Of Center Position	 Locked In Center Position	 Locked In Extreme Position (Opposite Keyway)	 Locked In Extreme Position (Keyway Side)	 Locked Out Of Center And Extreme Position (Keyway Side)
 Locked Out Of Center And Extreme Position (Opposite Keyway)	 Locked In Center And Extreme Position (Opposite Keyway)	 Locked Out Of Extreme Position (Keyway Side)	 Locked Out Of And Into Extreme Position (Opposite Keyway)	 Locked Out Of Extreme Position (Opposite Keyway)	 Locked Out Of And Into Extreme Position (Keyway Side)	

# Manual Switches

## Toggle Switches

TL Series

### 3-POSITION ORDER GUIDE

	No. of Poles	Circuit(s) Made With Toggle At:			Elec. Rating Code	UL/CSA Rating Code	Standard Toggle		Pull-to-Unlock Toggle	
		Keyway Position	Center Position	Opposite Keyway			Catalog Listing	Military Number***	Add Suffix to Standard Toggle Listing	Military Number***
	1	1-2	OFF	2-3	1	L191	1TL1-1	MS24523-21	ALL TYPES	MS24658-21
		1-2*	OFF	2-3	2	L192	1TL1-5	MS24523-31	E, F, K, L, M, N	MS24658-31
		1-2*	OFF	2-3*	2	L192	1TL1-7	MS24523-27	E, L, N	MS24658-27
		None**	OFF	2-3	1	L191	1TL1-21	MS24523-24	E, F, K, M	MS24658-24
		None**	1-2	2-3	1	L192	1TL1-31	MS24523-33	E, F, K, M	MS24658-33
		None**	1-2	2-3*	2	L192	1TL1-51	MS24523-32	E	MS24658-32
		1-2*	OFF	None**	2	L192	1TL1-61	MS24523-28	E	MS24658-28
	2	1-2, 4-5	OFF	2-3, 5-6	3	L191	2TL1-1	MS24524-21	ALL TYPES	MS24659-21
		1-2, 4-5*	OFF	2-3, 5-6	4	L192	2TL1-5	MS24524-31	E, F, K, L, M, N	MS24659-31
		1-2, 4-5*	OFF	2-3, 5-6*	4	L192	2TL1-7	MS24524-27	E, L, N	MS24659-27
		None**	OFF	2-3, 5-6	3	L191	2TL1-21	MS24524-24	E, F, K, M	MS24659-24
		None**	1-2, 4-5	2-3, 5-6	3	L191	2TL1-31	MS24524-33	E, F, K, M	MS24659-33
		None**	1-2, 4-5	2-3, 5-6*	4	L192	2TL1-51	MS24524-32	E	MS24659-32
		1-2, 4-5*	OFF	None**	4	L192	2TL1-61	MS24524-28	E	MS24659-28
		1-2, 4-5	1-2, 5-6	2-3, 5-6	3	L191	2TL1-10	MS27407-4	ALL TYPES	MS27408-4
		1-2, 4-5*	1-2, 5-6	2-3, 5-6	4	L192	2TL1-50	MS27407-5	E, F, K, L, M, N	MS27408-5
		1-2, 4-5*	1-2, 5-6	2-3, 5-6*	4	L192	2TL1-70	MS27407-6	E, L, N	MS27408-6
			4	1-2, 4-5 7-8, 10-11	OFF	2-3, 5-6 8-9, 11-12	5	L191	4TL1-1	MS24525-21
1-2, 4-5 7-8, 10-11*	OFF			2-3, 5-6 8-9, 11-12	6	L192	4TL1-5	MS24525-31	E, F, K, L, M, N	MS24660-31
1-2, 4-5 7-8, 10-11*	OFF			2-3, 5-6 8-9, 11-12*	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
None**	OFF			2-3, 5-6 8-9, 11-12	5	L191	4TL1-21	MS24525-24	E, F, K, M	MS24660-24
None**	1-2, 4-5 7-8, 10-11			2-3, 5-6 8-9, 11-12	5	L191	4TL1-31	MS24525-33	E, F, K, M	MS24660-33
None**	1-2, 4-5 7-8, 10-11			2-3, 5-6 8-9, 11-12*	6	L192	4TL1-51	MS24525-32	E	MS24660-32
1-2, 4-5 7-8, 10-11*	OFF			None**	6	L192	4TL1-61	MS24525-38	E	MS24660-28
1-2, 4-5 7-8, 10-11	2-3, 4-5			2-3, 5-6 8-9, 11-12	5	L191	4TL1-10	—	ALL TYPES	—
1-2, 4-5 7-8, 10-11*	2-3, 4-5 7-8, 11-12			2-3, 5-6 8-9, 11-12	6	L192	4TL1-50	MS27406-2	E, F, K, L, M, N	MS27409-2
1-2, 4-5 7-8, 10-11*	2-3, 4-5			2-3, 5-6 8-9, 11-12*	6	L192	4TL1-70	—	E, L, N	—
1-2, 4-5 7-8, 10-11	2-3, 4-5 7-8, 11-12			2-3, 5-6 8-9, 11-12	5	L191	4TL1-12	MS27406-1	ALL TYPES	MS27409-1
1-2, 4-5 7-8, 10-11*	2-3, 4-5 7-8, 11-12	2-3, 5-6 8-9, 11-12*	6	L192	4TL1-72	MS27406-3	E, L, N	MS27409-3		

\* These positions only are momentary. All others are maintained.

\*\* Toggle lever is blocked from these positions. Toggle becomes two position, with center being one extreme position.

\*\*\* Also add appropriate suffix letter to the Military Number.

### SOLDER TURRET TERMINAL VERSION



#### HOW TO ORDER

11TL, 12TL, and 14TL type switches with solder turret terminals are qualified to MIL-S-3950. They have the same circuitry and electrical ratings as their 1TL, 2TL, and 4TL counterparts. For example, 11TL1-2 is the same as 1TL1-2, except it has solder turret terminals instead of screw terminals. The complete MS drawing numbers are shown in data sheet 204.

Circuitry	Type	Std. Lever	Lever Lock
One Pole	11TL	MS27734	MS27737
Two Pole	612TL	MS27735	MS27738
Four Pole	14TL	MS27736	MS27739

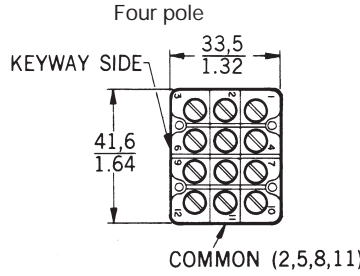
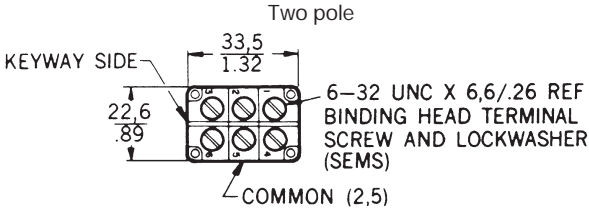
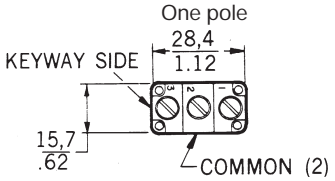
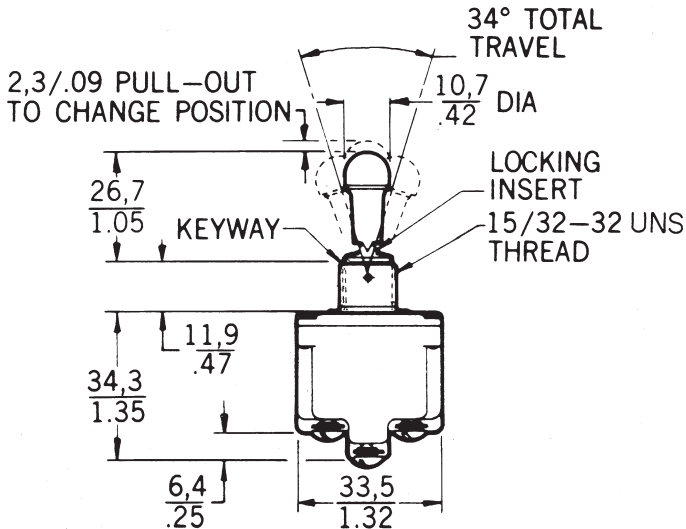
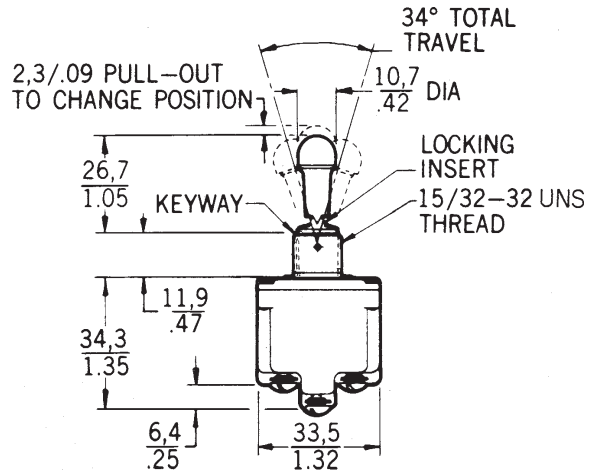
Toggle/Rockers

# Manual Switches

## Toggle Switches

TL Series

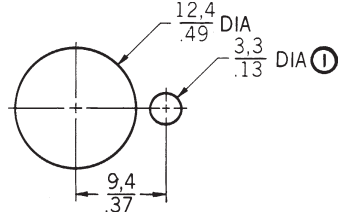
MOUNTING DIMENSIONS (For reference only)



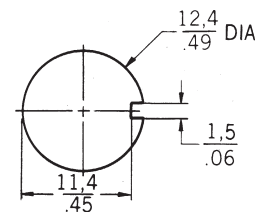
Note:  
Terminal screws, and mounting hardware (locking ring, lockwasher, and two hexnuts) are furnished unassembled.

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

Panel cutout



With locking ring



Without locking ring

Note:  
Ⓢ 1,4/.06 MIN DEEP TO ACCOMMODATE LOCKING RING. 15PA87 PANEL SEAL REQUIRES BLIND HOLE TO INSURE SEAL INTEGRITY

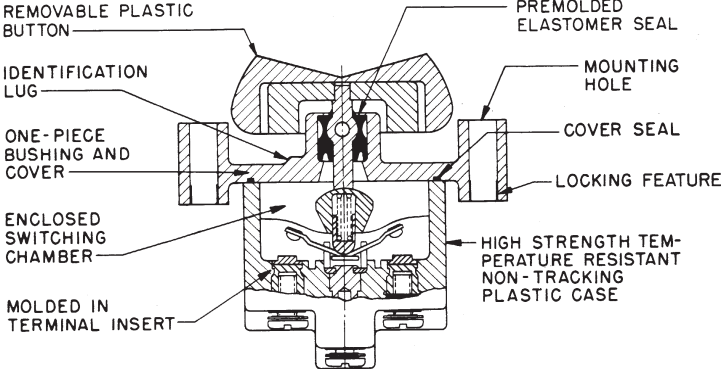
Bushing mounting torque is 10-15 in./lbs.  
Terminal screw mounting torque is 5 in./lbs. max.



# Manual Switches

## Rocker Button Switches

TP Series



UL/CSA Rating Code	Electrical Rating
L192	10 amps-125, 250, 277 VAC; 1/4 Hp-125 VAC; 1/2 Hp-250, 277 VAC 3 Amps-125 VAC "L"
L191	15 amps-125, 250, 277 VAC; 1/2 Hp-125 VAC; 1Hp-250, 277 VAC 5 amps-120 VAC "L"

**Application Note:** Honeywell MICRO SWITCH 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. TP switches use silver cadmium oxide contacts. For other options, contact the MICRO SWITCH Application Center at 1-800-537-6945.

**FEATURES**

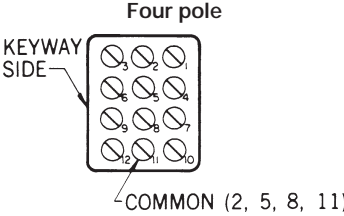
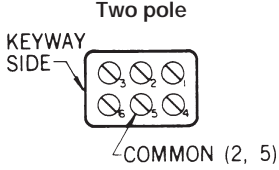
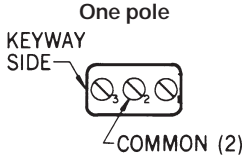
- 2 and 3 position pushbutton action
- Various button colors
- 1, 2, and 4 pole circuitry
- Flush panel and above panel mounting
- Temperature range is from -65°F to +160°F (-54°C to +71°C)
- UL recognized, CSA certified
- CE approved

**CONSTRUCTION**

Above panel mounting gives a distinct button appearance. Flush panel mounting presents a low button profile.

**TERMINAL CIRCUIT IDENTIFICATION**

Terminal identifications are referred to in the order guides to indicate which circuits are made in each toggle position (i.e., 1-2 indicates circuit closure through terminals 1 and 2).



Toggle/Rockers

# Manual Switches

## Rocker Button Switches



Typical two-pole flush panel translucent button switch



Typical one-pole above panel transparent button switch

### BUTTON OPTIONS

Buttons are removable and interchangeable. They measure .87" x 1.46" (22,1 x 37,1 mm).

**Transparent** (colorless plastic) buttons accept under-the-surface legend inserts for station and function identification. **Legend inserts are not furnished.** Insert legending can be done by your local supplier.

**Translucent** (white plastic) buttons have a clear appearance.

**Colored** (opaque plastic) buttons are excellent for color coding switch functions.

### SWITCHES WITHOUT BUTTONS

To order switches without buttons, convert catalog listings shown in the order guides. Substitute **TP7** for TP4 and TP16 above panel mounted switches; substitute **TP8** for TP201 and TP12 flush panel mounted switches. Order buttons separately from the chart below.

### BUTTON ORDER GUIDE

Color	Catalog Listing
Translucent	12PA6
Transparent	12PA4
White*	12PA5-W
Yellow*	12PA5-Y
Black*	12PA5-BK
Green*	12PA5-G
Red*	12PA5-R
Blue*	12PA5-BL

\* Opaque

### 2-POSITION ORDER GUIDE

Furnished with buttons.

No. of Poles	Circuits Made with Button at:		UL/CSA Rating Code	Elec. Rating Code	Catalog Listings			
	Ident. Lug Position	Opposite Ident. Lug			Flush Panel		Above Panel	
					Translucent Button	Transparent Button	Translucent Button	Transparent Button
1	OFF	2-3	L191	1	1TP201-2	1TP12-2	1TP216-2	1TP4-2
	OFF*	2-3	L192	2	1TP201-4	—	—	—
	1-2*	OFF	L192	2	1TP201-6	1TP12-6	—	1TP4-6
	1-2	2-3	L191	1	1TP201-3	1TP12-3	1TP216-3	1TP4-3
	1-2*	2-3	L192	2	1TP201-8	1TP12-8	1TP216-8	—
2	OFF	2-3, 5-6	L191	3	2TP201-2	2TP12-2	2TP216-2	2TP4-2
	1-2,4-5	2-3, 5-6	L191	3	2TP201-3	2TP12-3	2TP216-3	2TP4-3
	1-2,4-5*	2-3, 5-6	L192	4	2TP201-8	2TP12-8	2TP216-8	2TP4-8
4	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4TP201-2	4TP12-2	—	—
	OFF*	2-3, 5-6, 8-9, 11-12	L192	6	—	—	4TP216-4	—
	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	5	4TP201-3	4TP12-3	4TP216-3	4TP4-3
	1-2, 4-5, 7-8, 10-11*	2-3, 5-6, 8-9, 11-12	L192	6	—	—	4TP216-8	—

\* These positions only are momentary. All others are maintained.

# Manual Switches

## Rocker Button Switches

TP Series

### 3 - POSITION ORDER GUIDE

Furnished with buttons.

No. of Poles	Circuits Made with Button at:			UL/CSA Rating Code	Elec. Rating Code	Catalog Listings			
	Ident. Lug Position	Center Position	Opposite Lug Position			Flush Panel		Above Panel	
						Translucent Button	Transparent Button	Translucent Button	Transparent Button
1	1-2	OFF	2-3	L191	1	1TP201-1	1TP12-1	1TP216-1	1TP4-1
	1-2*	OFF	2-3	L192	2	1TP201-5	1TP12-5	1TP216-5	1TP4-5
	1-2*	OFF	2-3*	L192	2	1TP201-7	1TP12-7	1TP216-7	1TP4-7
	NONE**	OFF	2-3	L191	1	1TP201-21	1TP12-21	—	1TP4-21
	NONE**	1-2	2-3	L191	1	1TP201-31	1TP12-31	—	1TP4-31
	NONE**	1-2	2-3*	L192	2	1TP201-51	1TP12-51	1TP216-51	1TP4-51
	1-2*	OFF	NONE**	L192	2	1TP201-61	1TP12-61	1TP216-61	1TP4-61
2	1-2, 4-5	OFF	2-3, 5-6	L191	3	2TP201-1	2TP12-1	2TP216-1	2TP4-1
	1-2, 4-5*	OFF	2-3, 5-6	L192	4	2TP201-5	2TP12-5	2TP216-5	2TP4-5
	1-2, 4-5*	OFF	2-3, 5-6*	L192	4	2TP201-7	2TP12-7	2TP216-7	2TP4-7
	NONE**	OFF	2-3, 5-6	L191	3	2TP201-21	2TP12-21	2TP216-21	2TP4-21
	NONE**	1-2, 4-5	2-3, 5-6	L191	3	2TP201-31	2TP12-31	2TP216-31	2TP4-31
	NONE**	1-2, 4-5	2-3, 5-6*	L192	4	2TP201-512	2TP12-512	2TP216-512	2TP4-512
	1-2, 4-5*	OFF	NONE**	L192	4	2TP201-61	2TP12-61	2TP216-61	2TP4-61
	1-2, 4-5	1-2, 5-6	2-3, 5-6	L191	3	2TP201-10†	2TP12-10	2TP216-10	2TP4-10
	1-2, 4-5*	1-2, 5-6	2-3, 5-6	L192	4	2TP201-50†	2TP12-50	2TP216-50	2TP4-50
	1-2, 4-5*	1-2, 5-6	2-3, 5-6*	L192	4	2TP201-70†	2TP12-70	2TP216-70	2TP4-70
4	1-2, 4-5, 7-8, 10-11	OFF	2-3, 5-6 8-9, 11-12	L191	5	4TP201-1	4TP12-1	4TP216-1	4TP4-1
	1-2, 4-5 7-8, 10-11*	OFF	2-3, 5-6 8-9, 11-12	L192	6	4TP201-5	4TP12-5	—	4TP4-5
	1-2, 4-5, 7-8, 10-11*	OFF	2-3, 5-6 8-9, 11-12*	L192	6	4TP201-7	4TP12-7	4TP216-7	4TP4-7
	NONE**	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4TP201-21	4TP12-21	4TP216-21	4TP4-21
	NONE**	1-2, 4-5 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	5	4TP201-31	—	4TP216-31	4TP4-31
	NONE**	1-2, 4-5 7-8, 10-11	2-3, 5-6 8-9, 11-12*	L192	6	4TP201-51	—	4TP216-51	4TP4-51
	1-2, 4-5, 7-8, 10-11*	OFF	NONE**	L192	6	4TP201-61	4TP12-61	4TP216-61	4TP4-61
	1-2, 4-5, 7-8, 10-11	2-3, 4-5	2-3, 5-6, 8-9, 11-12	L191	5	4TP201-10†	4TP12-10	—	4TP4-10
	1-2, 4-5, 7-8, 10-11*	2-3, 4-5 7-8, 11-12	2-3, 5-6, 8-9, 11-12	L192	6	4TP201-50†	4TP12-50	4TP216-50	4TP4-50
1-2, 4-5, 7-8, 10-11*	2-3, 4-5	2-3, 5-6, 8-9, 11-12*	L192	6	4TP201-70†	4TP12-70	4TP216-70	4TP4-70	

\*These positions only are momentary. All others are maintained.

\*\*Operator is blocked from these positions. Switch becomes two position, with center being one extreme position.

† Special on-on-on circuitry. See page 123.

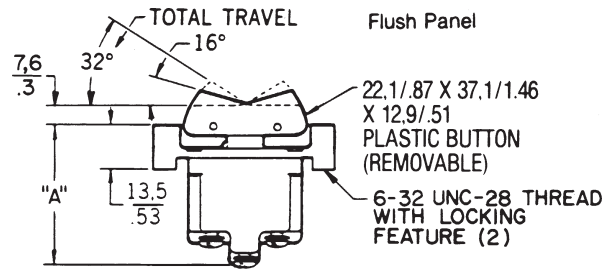
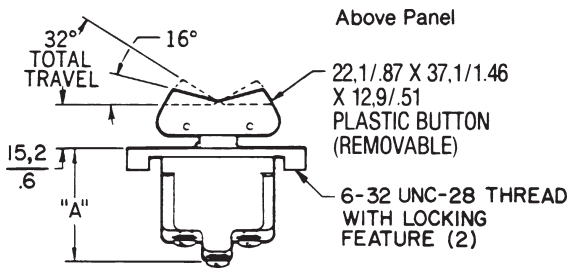
Toggle/Rockers

# Manual Switches

## Rocker Button Switches

TP Series

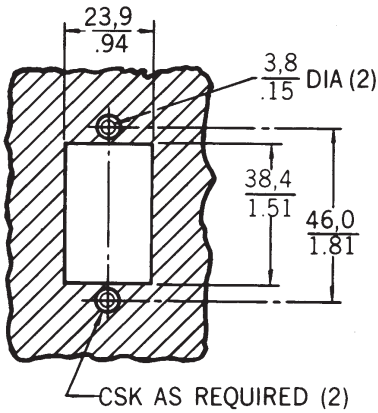
MOUNTING DIMENSIONS (For reference only)



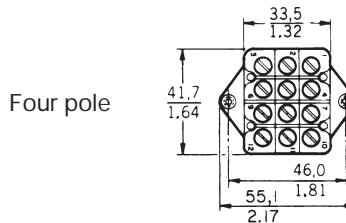
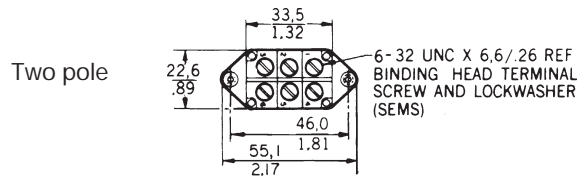
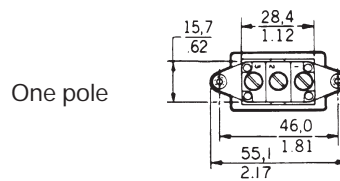
DIM. "A"	
1-POLE	29,5 / 1.16
2 & 4-POLE	34,4 / 1.35

DIM. "A"	
1-POLE	36,8 / 1.45
2 & 4-POLE	41,7 / 1.64

Panel cutout



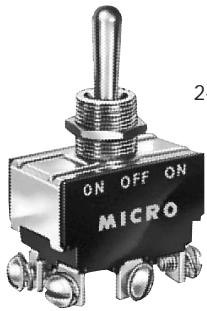
Key:  $\frac{0,0}{0.00} = \text{mm}$   
 $\frac{0,00}{0.00} = \text{inches}$



Flange mounting torque is 10-12 in./lbs.  
 Terminal screw mounting torque is 5 in./lbs. max.

# Manual Switches

## Toggle Switches



2-pole shown

### ELECTRICAL RATINGS

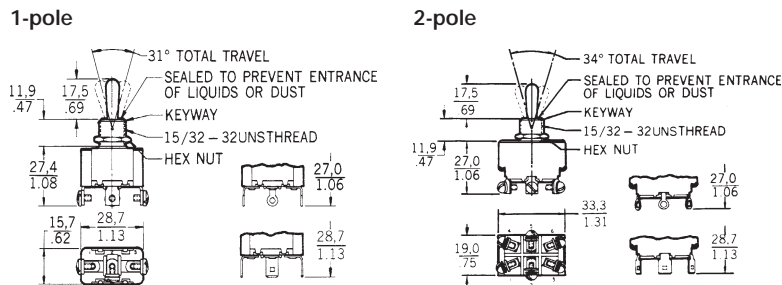
UL/CSA Rating Code	Electrical Rating
L192	10 Amps, 125, 250, 277 VAC 1/4 HP, 125 VAC 1/2 HP, 250, 277 VAC 3 Amps, 125 VAC "L"
L191	15 Amps, 125, 250, 277 VAC 1/2 HP, 125 VAC 1 HP, 250, 277 VAC 5 Amps, 125 VAC (L)

### FEATURES

- 2 or 3-position, momentary and maintained action.
- 1 and 2-pole circuitry.
- Rated up to 15 amps.
- Lever-to-bushing seal.
- Solder, screw, or quick-connect terminals.
- UL recognized, CSA certified.
- CE approved

Colored sleeves for levers (not shown) can also be furnished. See page 135

### MOUNTING DIMENSIONS (For reference only)



### TERMINAL CIRCUIT IDENTIFICATION

Terminal identifications are referred to in the Ordering Charts to indicate which circuits are made in each toggle position (i.e., 1-2 reference indicates circuit closure through terminals 1 and 2).

**Application Note:** Honeywell MICRO SWITCH 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. TS switches use silver cadmium oxide contacts. If you have questions, contact the MICRO SWITCH Application Center at 1-800-537-6945.

### 2-POSITION ORDER GUIDE

No. Of Poles	Circuit(s) Made With Toggle At:		UL/CSA Rating Code	Screw Terminals	Solder Terminals	Quick-Connect Terminals
	Keyway Position	Opposite Keyway				
1	OFF	2-3 ON	L191	11TS15-2	11TS115-2	11TS95-2
	2-1 ON	2-3 ON	L191	11TS15-3	11TS115-3	11TS95-3
	OFF*	2-3 ON	L192	11TS15-4	11TS115-4	11TS95-4
	2-1 ON*	OFF	L192	11TS15-6	11TS115-6	11TS95-6
	2-1 ON*	2-3 ON	L192	11TS15-8	11TS115-8	
2	OFF	2-3 & 5-6 ON	L191	12TS15-2	12TS115-2	12TS95-2
	2-1 & 5-4 ON	2-3 & 5-6 ON	L191	12TS15-3	12TS115-3	12TS95-3
	OFF*	2-3 & 5-6 ON	L192	12TS15-4		
	2-1 & 5-4 ON*	OFF	L192	12TS15-6		
	2-1 & 5-4 ON*	2-3 & 5-6 ON	L192	12TS15-8	12TS115-8	

### 3-POSITION ORDER GUIDE

No. Of Poles	Circuit(s) Made With Toggle At:			UL/CSA Rating Code	Screw Terminals	Solder Terminals	Quick-Connect Terminals
	Keyway Position	Center Position	Opposite Keyway				
1	2-1 ON	OFF	2-3 ON	L191	11TS15-1	11TS115-1	11TS95-1
	NONE	OFF	2-3 ON	L191			
	2-1 ON*	OFF	2-3 ON	L192	11TS15-5	11TS115-5	11TS95-5
	2-1 ON*	OFF	NONE	L192			
	2-1 ON*	OFF	2-3 ON*	L192	11TS15-7	11TS115-7	11TS95-7
2	2-1 & 5-4 ON	OFF	2-3 & 5-6 ON	L191	12TS15-1	12TS115-1	12TS95-1
	NONE	OFF	2-3 & 5-6 ON	L191			
	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON	L192	12TS15-5	12TS115-5	12TS95-5
	2-1 & 5-4 ON*	OFF	NONE	L192			
	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON*	L192	12TS15-7		12TS95-7
	2-1 & 5-4 ON	2-1 & 5-6 ON	2-3 & 5-6 ON	L191			12TS95-10

Toggle/Rockers

\* Marked toggle positions are momentary. All other positions are maintained.

# Manual Switches

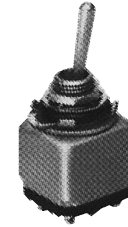
## Miniature Toggle Switches



1TW Standard unsealed toggle lever  
1/4" bushing



2TW101 Standard sealed toggle lever  
1/4" bushing



11TW Standard toggle lever  
15/32" bushing

12TW Pull-to-unlock toggle lever  
15/32" bushing

- Qualified to MIL-S-83781
- Save space and weight
- SPDT and DPDT circuitry
- Choice of 1/4" or 15/32" bushings
- 15/32" bushing has lever seal
- Pull-to-unlock option on 15/32" bushing

- UL Recognized
- Temperature range: -85°F to +160°F (-65°C to +71°C)
- Sealed bushing versions

Molded-in terminals are plated for soldering. There is positive return on momentary versions. All switches come with a lockwasher, a keying washer, and two hexnuts. Special "on-on-on" circuitries, similar to those shown for TL, are also available for TW.

### ELECTRICAL RATING

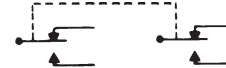
Volts	Amperes		
	Resistive	Inductive	Lamp
30 VDC	5	2	1
115 VAC	5	2	1
UL Code 117	5 amps @ 125 VAC		

### CIRCUITRY

1<sup>1</sup> Single Pole Double Throw



2<sup>1</sup> Two Single Pole Double Throw Circuits

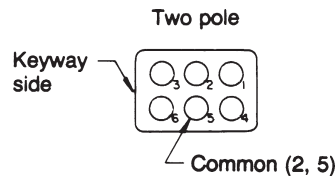
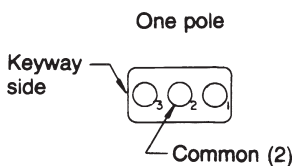


<sup>1</sup>Refer to order guides.

### TERMINAL CIRCUIT IDENTIFICATIONS

Terminal identifications are referred to in the Ordering Charts to indicate which circuits are made in each toggle position

(i.e., "1-2" reference indicates circuit closure through terminals 1 and 2).



# Manual Switches

## Miniature Toggle Switches

### 2-POSITION ORDER GUIDES

#### Switches with 15/32" Bushings

No. Poles	Circuits Made with Toggle at:		Sealed Standard Toggle		Sealed Pull-to-Unlock Toggle**	
	Keyway Position	Opposite Keyway	Catalog Listing	Military No.	Add Suffix (next page) to Listing	Military No.**
1	OFF	2-3 ON	11TW1-2	MS27718-22-1	D, F, G	MS27720-22-1
1	2-1 ON	2-3 ON	11TW1-3	MS27718-23-1	D, F, G	MS27720-23-1
1	2-1 ON*	2-3 ON	11TW1-8	MS27718-26-1	F	MS27720-26-1
2	OFF	2-3 & 5-6 ON	12TW1-2	MS27719-22-1	D, F, G	MS27721-22-1
2	2-1 & 5-4 ON	2-3 & 5-6 ON	12TW1-3	MS27719-23-1	D, F, G	MS27721-23-1
2	2-1 & 5-4 ON*	2-3 & 5-6 ON	12TW1-8	MS27719-26-1	F	MS27721-26-1

\* These positions are momentary. All others are maintained.

\*\* Also add appropriate suffix letter to the Military Number.

#### Switches with 1/4" Bushings

No. Poles	Circuits Made with Toggle at:		Unsealed Standard Toggle		Sealed Standard Toggle
	Keyway Position	Opposite Keyway	Catalog Listing	Military No.	Catalog Listing
1	OFF	2-3 ON	1TW1-2	MS27716-22-1	1TW101-2
1	2-1 ON	2-3 ON	1TW1-3	MS27716-23-1	1TW101-3
1	2-1 ON*	2-3 ON	1TW1-8	MS27716-26-1	1TW101-8
2	OFF	2-3 & 5-6 ON	2TW1-2	MS27717-22-1	2TW101-2
2	2-1 & 5-4 ON	2-3 & 5-6 ON	2TW1-3	MS27717-23-1	2TW101-3
2	2-1 & 5-4 ON*	2-3 & 5-6 ON	2TW1-8	MS27717-26-1	2TW101-8

\* These positions are momentary. All others are maintained.

### 3-POSITION ORDER GUIDES

#### Switches with 15/32" Bushings

No. Poles	Circuits Made with Toggle at:			Sealed Standard Toggle		Sealed Pull-to-Unlock Toggle	
	Keyway Position	Center Position	Opposite Keyway	Catalog Listing	Military No.	Add Suffix (next page) to Listing	Military No.**
1	2-1 ON	OFF	2-3 ON	11TW1-1	MS27718-21-1	ALL	MS27720-21-1
1	2-1 ON*	OFF	2-3 ON	11TW1-5	MS27718-31-1	E, F, K, L, M, N	MS27720-31-1
1	2-1 ON*	OFF	2-3 ON*	11TW1-7	MS27718-27-1	E, L, N	MS27720-27-1
2	2-1 & 5-4 ON	OFF	2-3 & 5-6 ON	12TW1-1	MS27719-21-1	ALL	MS27721-21-1
2	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON	12TW1-5	MS27719-31-1	E, F, K, L, M, N	MS27721-31-1
2	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON*	12TW1-7	MS27719-27-1	E, L, N	MS27721-27-1

\* These positions only are momentary. All others are maintained.

\*\* Also add appropriate suffix letter to the Military Number.

#### Switches with 1/4" Bushings

No. Poles	Circuits Made with Toggle at:			Unsealed Standard Toggle		Sealed Standard Toggle
	Keyway Position	Center Position	Opposite Keyway	Catalog	Military No.	Catalog Listing
1	2-1 ON	OFF	2-3 ON	1TW1-1	MS27716-21-1	1TW101-1
1	2-1 ON*	OFF	2-3 ON	1TW1-5	MS27716-31-1	1TW101-5
1	2-1 ON*	OFF	2-3 ON*	1TW1-7	MS27716-27-1	1TW101-7
2	2-1 & 5-4 ON	OFF	2-3 & 5-6 ON	2TW1-1	MS27717-21-1	2TW101-1
2	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON	2TW1-5	MS27717-31-1	2TW101-5
2	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON*	2TW1-7	MS27717-27-1	2TW101-7

\* These positions are momentary. All others are maintained.














Toggle/Rockers

# Manual Switches

## Miniature Toggle Switches

### LOCKING CONFIGURATION SUFFIX

When ordering pull-to-unlock toggle listings, add the suffix letter shown in this chart to the standard toggle catalog listing and the Military Approval number.

<b>A</b>  Locked In Three Positions	<b>B</b>  Locked In Center and Extreme Position (Keyway Side)	<b>D</b>  Locked Out Of Center Position	<b>E</b>  Locked In Center Position	<b>F</b>  Locked In Extreme Position (Opposite Keyway)	<b>G</b>  Locked In Extreme Position (Keyway Side)	<b>H</b>  Locked Out Of Center And Extreme Position (Keyway Side)
<b>J</b>  Locked Out Of Center And Extreme Position (Opposite Keyway)	<b>K</b>  Locked In Center And Extreme Position (Opposite Keyway)	<b>L</b>  Locked Out Of Extreme Position (Keyway Side)	<b>M</b>  Locked Out Of And Into Extreme Position (Opposite Keyway)	<b>N</b>  Locked Out Of Extreme Position (Opposite Keyway)	<b>P</b>  Locked Out Of And Into Extreme Position (Keyway Side)	



### WITH IWTS TERMINATION

- 15/32" bushing has lever seal
- One or two pole circuitry
- Accepts #20 wire using M39029/1-101 contact pins
- Connections resist shock, vibration, and high pulling force

### 2 - POSITION ORDER GUIDE — IWTS TERMINATION

No. Poles	Circuits Made with Toggle at:		Standard Toggle	Pull-to-Unlock Toggle
	Keyway Position	Opposite Keyway	Catalog Listing	Add Suffix to Standard Listing
1 1	2-1 ON 2-1 ON*	2-3 ON 2-3 ON	111TW1-3 111TW1-8	D, F, G F
2 2	2-1 & 5-4 ON 2-1 & 5-4 ON*	2-3 & 5-6 ON 2-3 & 5-6 ON	112TW1-3 112TW1-8	D, F, G F

### 3 - POSITION ORDER GUIDE — IWTS TERMINATION

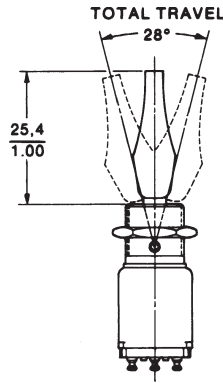
No. Poles	Circuits Made with Toggle at:			Standard Toggle	Pull-to-Unlock Toggle
	Keyway Position	Center Position	Opposite Keyway	Catalog Listing	Add Suffix to Standard Listing
1 1 1	2-1 ON 2-1 ON* 2-1 ON*	OFF OFF OFF	2-3 ON 2-3 ON 2-3 ON*	111TW1-1 111TW1-5 111TW1-7	ALL E, F, K, L, M, N E, L, N
2 2 2	2-1 & 5-4 ON 2-1 & 5-4 ON* 2-1 & 5-4 ON*	OFF OFF OFF	2-3 & 5-6 ON 2-3 & 5-6 ON 2-3 & 5-6 ON*	112TW1-1 112TW1-5 112TW1-7	ALL E, F, K, L, M, N E, L, N

\* These positions only are momentary. All others are maintained.



# Manual Switches

## Miniature Toggle Switches



### WITH COLORED TAB LEVERS

- Available in seven colors
- Affords attractive front-of-panel appearance for graphic display and functional identify
- Levers made to withstand temperatures up to 160°F (71°C)
- Switches furnished with decorative knurled nut, a lockwasher, a keying washer, and a hex nut
- 15/32" bushing has lever seal
- Solder terminals (available with IWTS termination)

### ORDER GUIDE

To order, combine the basic (function) listing from Table 1 with the desired lever color suffix from Table 2. Colored tab levers are not available with 1/4 in. bushing.

TABLE 1 — TOGGLE POSITION AND CONTACT ARRANGEMENT

Positions	No. Poles	Circuits Made with Toggle at:			Basic Listing Add color suffix from Table 2.
		Keyway Position	Center Position	Opposite Keyway	
2	1	OFF	NONE	2-3 ON	11TW19-2 -
2	1	2-1 ON	NONE	2-3 ON	11TW19-3 -
2	1	2-1 ON*	NONE	2-3 ON	11TW19-8 -
2	2	OFF	NONE	2-3 & 5-6 ON	12TW19-2 -
2	2	2-1 & 5-4	NONE	2-3 & 5-6 ON	12TW19-3 -
2	2	2-1 & 5-4*	NONE	2-3 & 5-6 ON	12TW19-8 -
3	1	2-1 ON	OFF	2-3 ON	11TW19-1 -
3	1	2-1 ON*	OFF	2-3 ON	11TW19-5 -
3	1	2-1 ON*	OFF	2-3 ON*	11TW19-7 -
3	2	2-1 & 5-4 ON	OFF	2-3 & 5-6 ON	12TW19-1 -
3	2	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON	12TW19-5 -
3	2	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON*	12TW19-7 -

\* These positions only are momentary. All others are maintained.

TABLE 2 — TAB LEVER COLORS

Tab Lever Color	White	Black	Blue	Red	Green	Orange	Light Gray
Color suffix	A001	A002	A003	A004	A005	A006	A007

### TW SWITCHES WITH SPECIAL CIRCUITRIES

All 2-pole 3-position TW switches are available with special "on-on-on" -10, -50, -70 circuitry options as shown below.

2-Pole 3-Position Switches			Sealed Standard Toggle		Unsealed Std. Toggle	Sealed Tab Lever
Circuits Made With Toggle At:			15/32" bushing	1/4" bushing	1/4" bushing	15/32" bushing
Keyway Position	Center Position	Opposite Keyway	Catalog Listing	Catalog Listing	Catalog Listing	Catalog Listing Add color suffix from Table 2
2-1 & 5-4 ON	2-1 & 5-6 ON	2-3 & 5-6 ON	12TW1-10	2TW101-10	2TW1-10	12TW19-10 -
2-1 & 5-4 ON*	2-1 & 5-6 ON	2-3 & 5-6 ON	12TW1-50	2TW101-50	2TW1-50	12TW19-50 -
2-1 & 5-4 ON*	2-1 & 5-6 ON	2-3 & 5-6 ON*	12TW1-70	2TW101-70	2TW1-70	12TW19-70 -

\* These positions are momentary. All others are maintained.

Toggle/Rockers

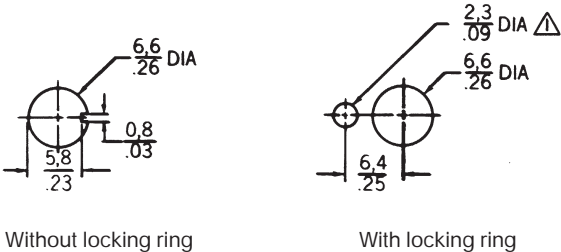
# Manual Switches

## Miniature Toggle Switches

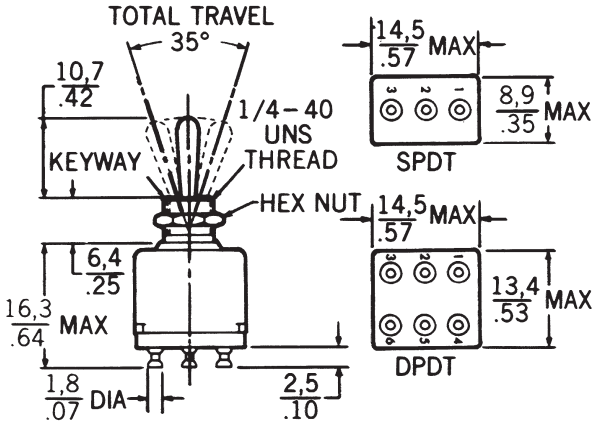
TW Series

### MOUNTING DIMENSIONS (For reference only)

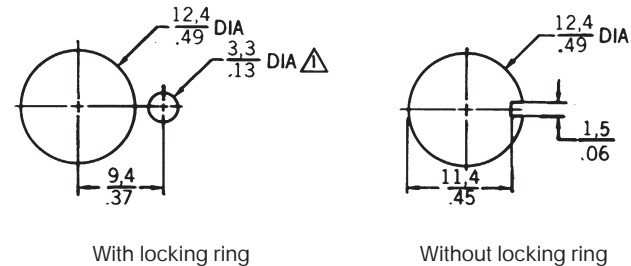
#### Mounting detail for 1/4" bushing switches



#### Dimensions for 1/4" bushing switches



#### Mounting detail for 15/32" bushing switches

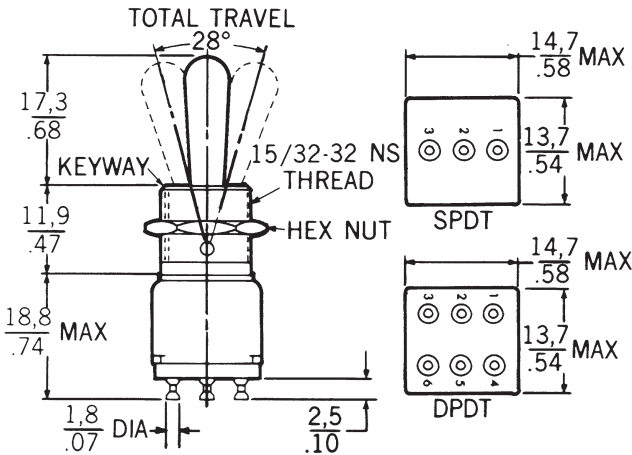


Note:  $\Delta$  1,1/.05 MIN. DEEP TO ACCOMMODATE LOCKING RING.  
FOR SWITCHES USING PANEL SEAL, DO NOT ALLOW THRU HOLE MOUNTING.

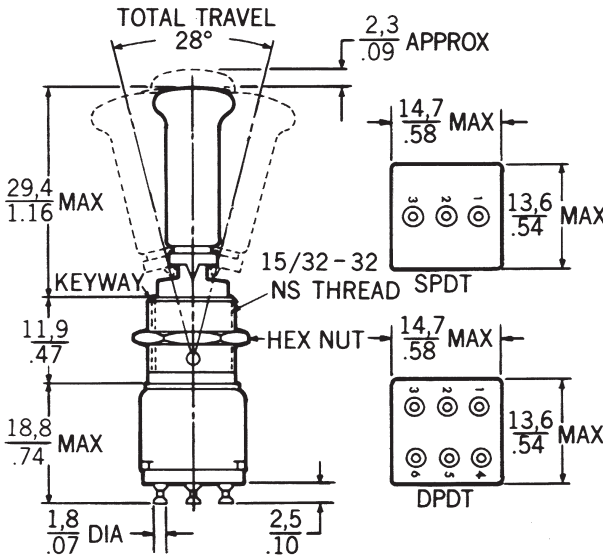
Key: 0,0 = mm  
0.00 = inches

#### Dimensions for 15/32" switches

##### Standard toggle lever



##### Pull-to-unlock toggle lever

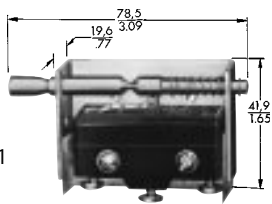


Bushing mounting torque is 10-15 in./lbs.

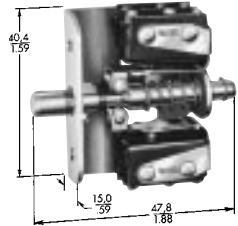
# Manual Switches

## Door Switches

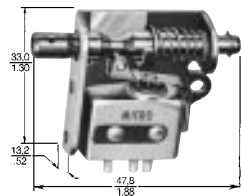
# AC Series



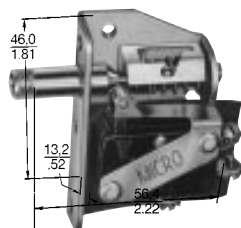
Style 1



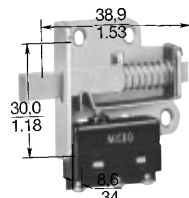
Style 2



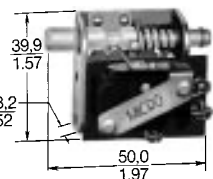
Style 3



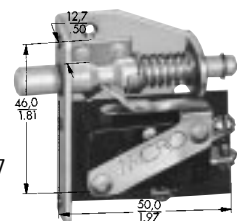
Style 4



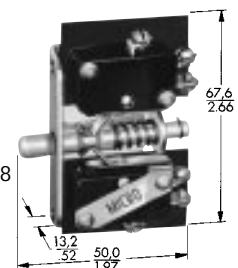
Style 5



Style 6



Style 7



Style 8

### FEATURES

- Automatically cut power when service door or drawer is opened, helping protect personnel and equipment.
- Enables circuit testing with power On by manually pulling rod actuator to maintained-On position. (Closing door or drawer resets switch.)

**CHARACTERISTICS:**  
 F.P. — Free Position;  
 O.P. — Operating Position;  
 D.P. — Depressed Position.

### ELECTRICAL RATINGS

A	15 amps, 125, 250 or 480 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.
B	5 amps, 125 or 250 VAC; 30 Vdc ind., 3 amps (sea level) and 2.5 amps (50,000 ft.); res., 5 amps (sea level and 50,000 ft.); max. inrush 25 amps.
C	15 amps, 125 or 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC; 1/3 hp, 125 or 250 VAC.

### ORDER GUIDES WITH STEEL ROD ACTUATORS

Style No.	Description	Basic Switch	Elec. Rating	Catalog Listing	F.P. max. mm in.	O.P. min. mm in.	D.P. max. mm in.
1	15 amps, SPDT.	BZ	A	1AC2	11,1 .438	6,35 .250	3,18 .125
2	5 amps, Four SPDT ckts.	SM(4)	B	8AC1	9,53 .375	5,16 .203	3,18 .125
3	Three 6-foot leads. Sealed basic switches. 5 amps, SPDT.	SE	B	9AC4	9,53 .375	5,16 .203	3,18 .125
3	Two 3-foot leads. Sealed basic switches. 5 amps, SPST-N.O.	SE	B	9AC12-3	9,53 .375	5,16 .203	3,18 .125
4	Can be reset without momentary ckt. break. 15 amps, SPDT.	V3	C	13AC1	15,9 .625	12,3 .485	6,68 .263
5	Miniature size. 5 amps, SPDT.	SM	B	17AC1-T 17AC18-T (MS16106-4)	9,53 .375	5,59 .220	4,45 .175
6	Tapped hole in end of actuator rod. 15 amps, SPDT.	V3	C	2AC59 (MS16106-1)	9,53 .375	5,16 .203	3,18 .125

### WITH HIGH STRENGTH THERMOPLASTIC ROD ACTUATORS\*

2	5 amps, Four SPDT ckts.	SM(4)	B	8AC9 (MS16106-3)	9,53 .375	5,16 .203	3,18 .125
6	15 amps. SPDT.	V3	C	22AC1	9,53 .375	5,16 .203	3,18 .125
6	Tapped hole in end of actuator rod. 15 amps, SPDT.	V3	C	22AC2	9,53 .375	5,16 .203	3,18 .125
7	15 amps. SPDT.	V3	C	23AC1	9,53 .375	5,16 .203	3,18 .125
7	Tapped hole in end of actuator rod. 15 amps, SPDT.	V3	C	23AC2	9,53 .375	5,16 .203	3,18 .125
8	15 amps. Two SPDT ckts.	V3(2)	C	24AC1	9,53 .375	4,75 .187	3,18 .125
8	Tapped hole in end of actuator rod. 15 amps. Two SPDT ckts.	V3(2)	C	24AC2 4AC54** (MS16106-2) 4AC55 (MS16106-5)	9,53 .275	4,75 .187	3,18 .125

\* Not for use above 85°C (+185°F). Use steel actuators at higher temperatures. For additional catalog listings, contact your nearest MICRO SWITCH Sales Office.

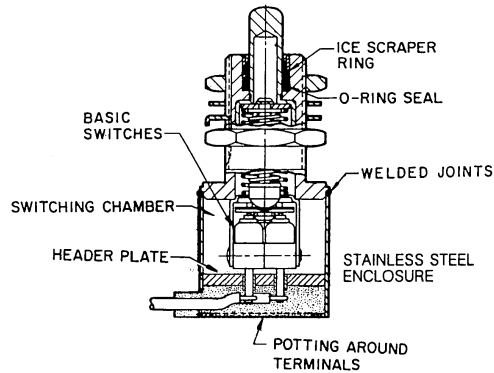
\*\* Both switches operate on pull stroke, only one switch operates on push (reset) stroke.

Manuals

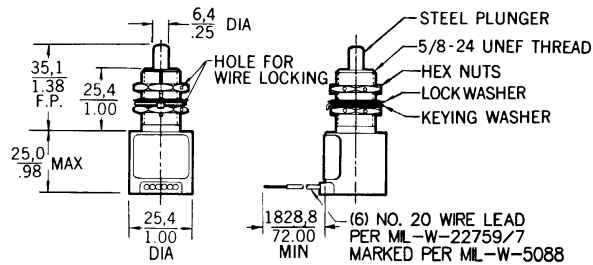
# Position Sensors

## 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)

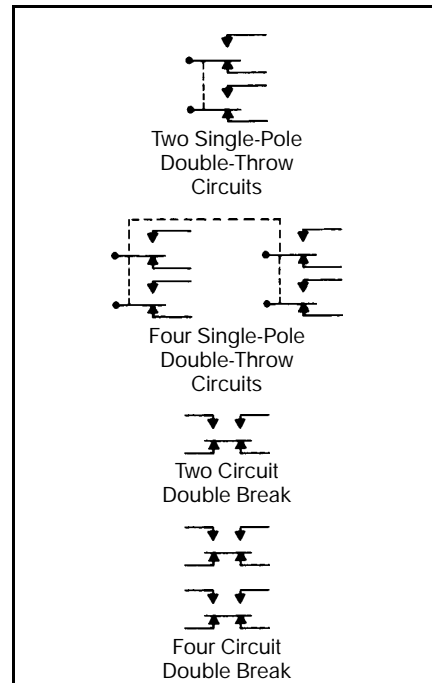
Rating <sup>2</sup> Code	Voltage	Sea Level				50,000 Feet			
		Inrush	Motor	Res.	Ind.	Inrush	Motor	Res.	Ind.
A	28 VDC	24	4	4	2	24	4 <sup>3</sup>	4 <sup>1</sup>	2
B	28 VDC	36	6	10	3	36	6 <sup>3</sup>	10	3
C	28 VDC	30	5	15	10	30	5 <sup>3</sup>	15	10
D	28 VDC	24	4	5	3	N/A			
E	28 VDC	N/A		1	.5	N/A		1	.5
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
C	125 VAC @ 400 Hz	36	6	10	6
	125/250 VAC @ 60 Hz	20	3	5	5
	460 VAC @ 60 Hz	20	3	3	3
F	125 VAC @ 400 Hz	30	5	10	6
	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

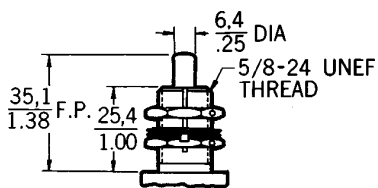
Plunger actuator switches mount through  $\frac{5}{8}$  inch or  $\frac{15}{32}$  inch diameter holes. Lock washer, keyed washer, and wire lock hexagon mounting nuts lock the switches in their mounting holes.

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

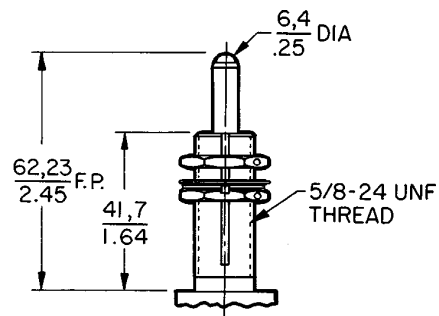
#### Plunger Actuators

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



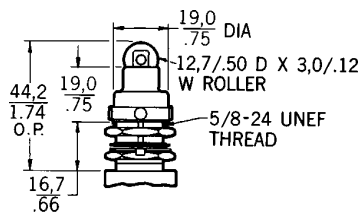
#### Ball Bearing Plunger Actuator

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



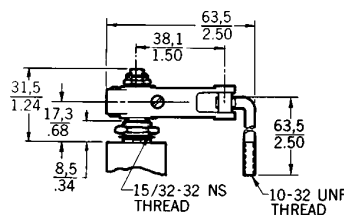
#### Roller Plunger Actuators

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



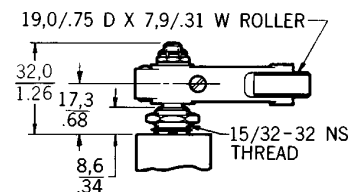
#### Rotary Linkage Lever Actuator

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  $360^\circ$ . The actuator has no spring return, but is controlled directly by the movement of the actuating device.



#### Rotary Roller Lever Actuator

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



Key:  $0,0 = \text{mm}$   
 $0,00 = \text{inches}$

**DIMENSIONS SHOWN ARE FOR REFERENCE ONLY**

# Position Sensors

## Environment-Sealed Limit Switches

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
Two Single-Pole Double-Throw Circuits	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



1EN43-R



2EN1-6



41EN1-6



21EN9-6



22EN9-6



42EN1-6



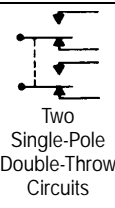
31EN1-6



32EN1-6

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>			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" 13"	32" 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" 20"	25" 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

## Environment-Sealed Limit Switches

EN Series



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

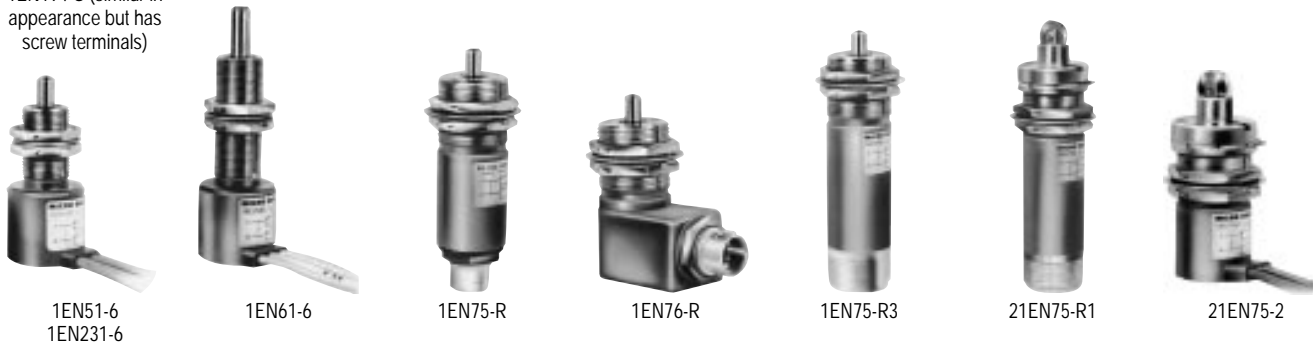
Notes:  
<sup>1</sup> Electrical ratings are on page 25.  
<sup>2</sup> Combine housing diameter and height with actuator dimension on page 26 for overall size.  
<sup>3</sup> See page 33 for replacement mounting hardware packet catalog listings.  
 N = Newtons



# 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.

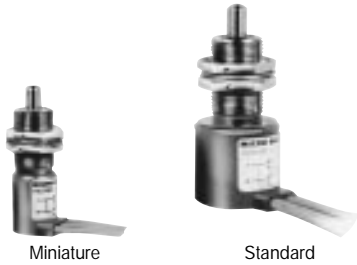
**High impact shock**  
Catalog listing 1EN75-R3 (M8805/65-001) has been qualified to MIL-S-8805, including high impact shock class H. Other switches rated for high impact shock applications incorporate the same plunger mechanism and internal switch design as used in the 1EN75-R3 and are expected to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

- Terminations of these listings are:
- 1EN75-R DM-9601-7P-1D Deutch receptacle
  - 1EN75-R3 GS02-16S-1P-003 Cannon receptacle
  - 1EN76-R DM-9601-7P-1D Deutch receptacle
  - 21EN75-R1 GS02-16S-1P-003 Cannon 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)

ELECTRICAL RATINGS

Refer to page 25.

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.

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:

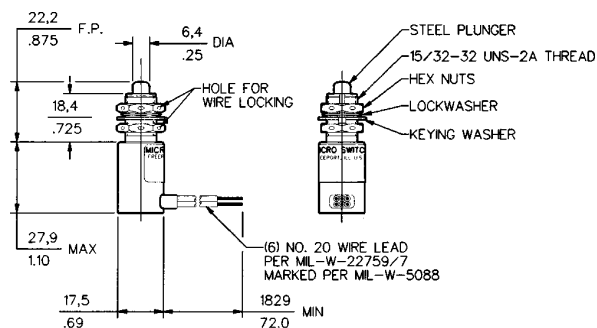
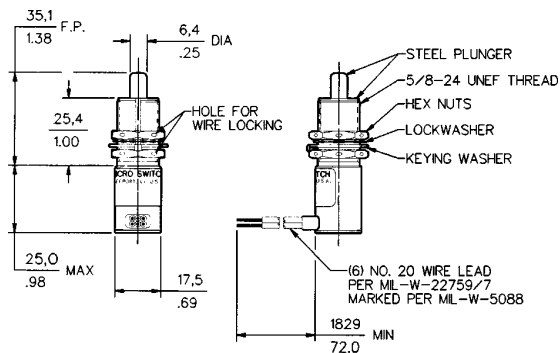
<sup>1</sup>D.A. = double amplitude or displacement.



402EN1-6



602EN1-6



Position Sensors

# Position Sensors

EN Series

## Environment-Sealed Limit Switches



442EN1-6



404EN1-6



444EN1-6



622EN1-6



604EN1-6



602EN602-6

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

### EN MINIATURE SWITCHES ORDER GUIDE

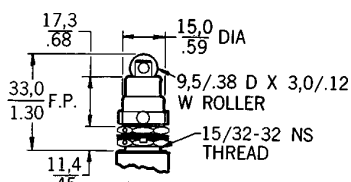
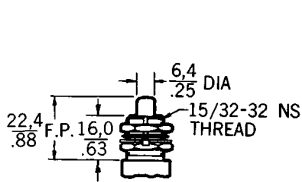
Circuitry	Actuator	Elec. Rating Code	Catalog Listing	Characteristics					Housing Dimensions <sup>1</sup>		Wgt. g oz.	Repl. Mtg. Hdw. Pkt <sup>3</sup>
				O.F. N lbs.	R.F. min. N lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	Height mm inches	Dia. mm inches		
Two Single-Pole Double-Throw 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

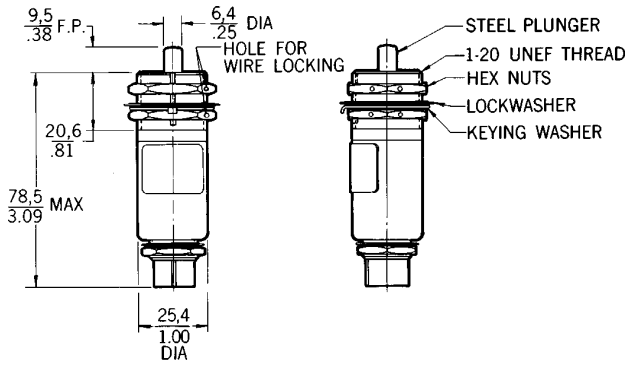
EN Series

## Environment-Sealed Limit Switches

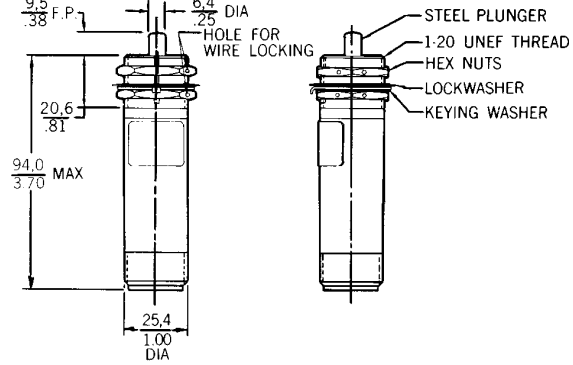
EN MOUNTING DIMENSIONS (For reference only)

Standard size EN switches

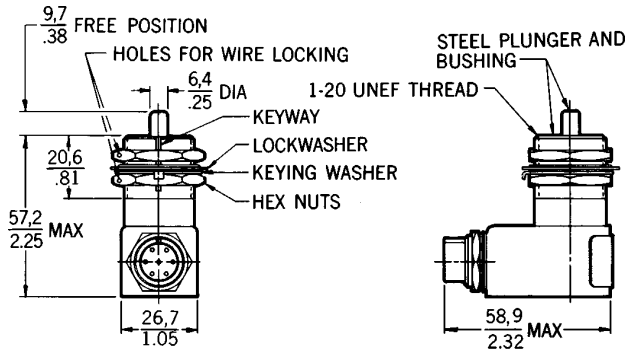
1EN75-R



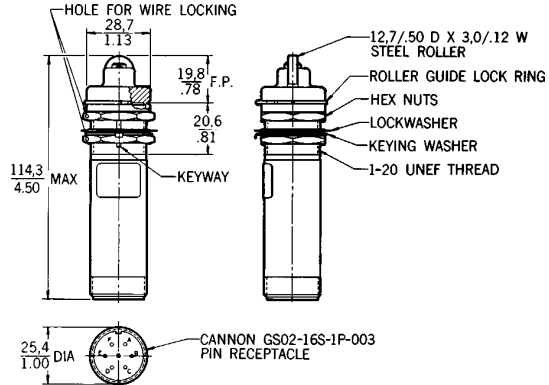
1EN75-R3



1EN76-R

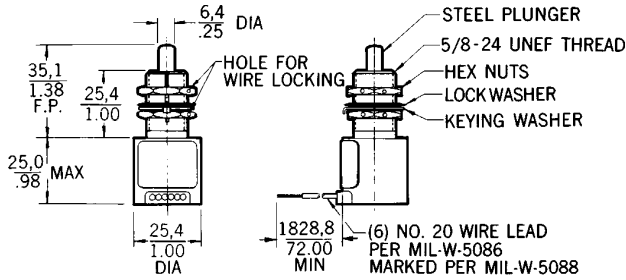


21EN75-R1

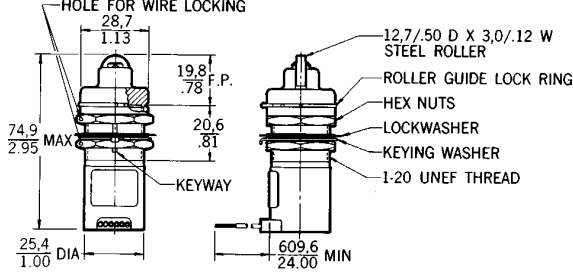


1EN51-6

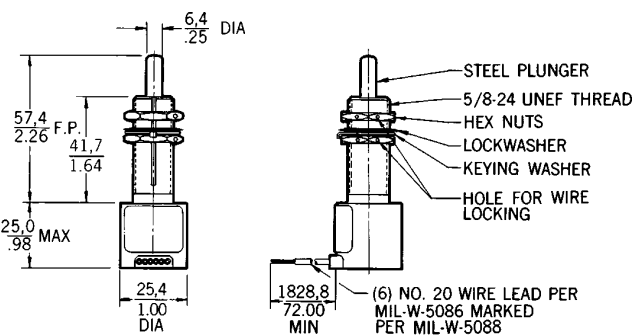
1EN231-6



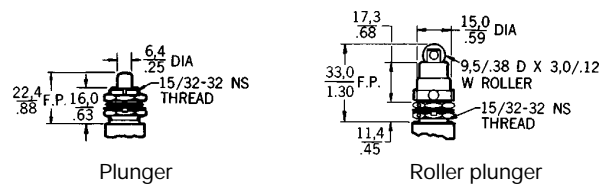
21EN75-2



1EN61-6



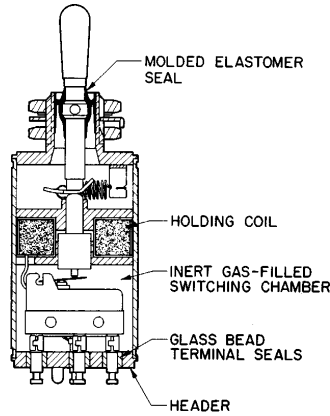
600EN actuators



Key: 0,0 = mm  
0.00 = inches

# Manual Switches

## Magnetically Held Toggle Switches



**FEATURES**

- Most listings qualified to MIL-S-5594
- Environment-proof sealing
- 2 and 3 position magnetically maintained toggle action
- Standard, tab, and pull-to-unlock levers
- Turret, leadwire, and screw terminals
- Temperature range: -85°F to +160°F (-65°C to +71°C)

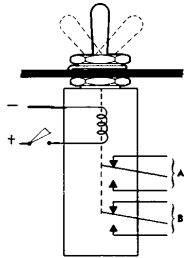
**PRINCIPLE OF OPERATION**

A holding coil in ET toggle switches replaces mechanical holding mechanisms to maintain the toggle in an operate position. The toggle is released by breaking the coil circuit.

er will be held (maintained) in the operate position. De-energizing the coil causes the lever to snap back to the unoperated position. The lever can also be released manually (overridden).

When the hold in coil circuit is open, the ET functions as a momentary contact switch. When the coil is energized (through remote contacts), the toggle lev-

Note: The solenoid has a hold in capacity only. It will not pull the toggle lever into an operating position from an unoperated position.



**Two position.** The illustration above shows the operating sequence for an ET with one SPDT circuit. (1) circuit closed manually; (2) energized solenoid holds switch circuit closed; and (3) remote con-

trol breaks solenoid circuit, releases the toggle, and opens the switch circuit. (In ETs with two SPDT circuits, both circuits transfer when the lever is operated.)

**Three position.** ETs with two SPDT circuits have a magnetic hold in capability in both directions from center. When the lever is in the center position, the circuitry is as shown in the illustration above. When the lever is moved to one extreme position, switch (A) circuit is transferred and switch (B) circuit is unchanged. In the other extreme position, switch (B) circuit is transferred while switch (A) circuit is unchanged.

**ELECTRICAL RATINGS**

Rating Code	Voltage	Amperage					
		Sea Level (Sealed)			65,000 ft		
		Res.	Ind.	Motor	Res.	Ind.	Motor
A	28 DC	4	2.5	4	4	2	4
B	28 DC	4	3	4	4	2.5	4
C	28 DC	7	2	—	5	1.5	—

# Manual Switches

## Magnetically Held Toggle Switches

### Toggles



Standard



Pull-to-unlock



Push-to-unlock



Tab

### TOGGLE TYPES

Standard — Tapered matte finish stainless steel.

Pull-to-unlock — Prevents accidental actuation; must be pulled out to change positions.

Push-to-unlock — Guards against accidental operation. The toggle must be depressed approximately .100 inch before it can be moved to either extreme position. Energizing the coil causes the extreme positions to be electrically maintained until the coil circuit is broken.

Tab — Paddle-shaped clear anodized aluminum tab.

### Terminals



Turret



Leadwire



Screw

### TERMINAL TYPES

Turret — Plated for easy solder connection of up to #14 wire.

Leadwire — No. 20 wire per MIL-W-5086, marked per MIL-W-5088. Standard length of six feet. Leadwire ends are stripped. Other material and lengths can be furnished. Contact your nearest MICRO SWITCH Sales Office for further information.

Screw—Four 48UNF x .188 (ref.) long round head screws with lockwashers. Separated by molded phenolic barriers.

### CIRCUIT OPERATION

Circuitry	Two-Position Toggle Circuit Made With Toggle At:		Turret Terminals Three-Position Toggle Circuit Made With Toggle At:			Leaded Terminals Three-Position Toggle Circuit Made With Toggle At:		
	Keyway* Position	Opposite Keyway	Keyway* Position	Center Position	Opposite Keyway*	Keyway* Position	Center Position	Opposite Keyway*
SPDT	1-3	1-2	—	—	—	—	—	—
DPDT	1-3, 4-6	1-2, 4-5	1-3, 4-5	1-2, 4-5	1-2, 4-6	1-2, 4-5	1-3, 4-5	1-3, 4-6

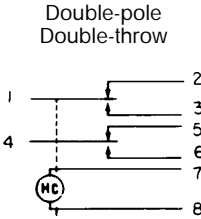
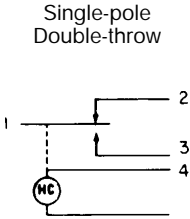
\* These positions are magnetically held when coil is energized, and momentary when coil is not energized.

### CIRCUIT OPERATION

Screw Terminals Three-Position Toggle Circuit Made With Toggle At:		
Keyway* Position	Center Position	Opposite Keyway*
1-2 MADE	1-2 OPEN	1-2 OPEN
3-4 OPEN	3-4 OPEN	3-4 MADE

\* These positions are magnetically held when coil is energized, and momentary when coil is not energized.

### CIRCUITRY



# Manual Switches

## Magnetically Held Toggle Switches

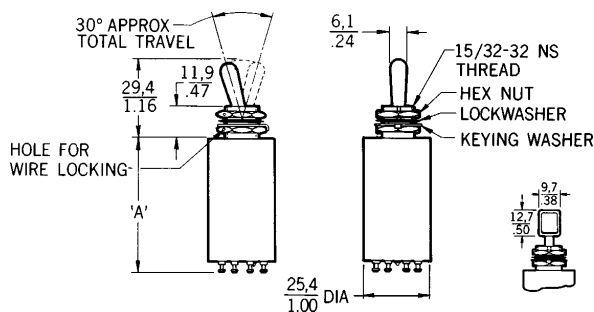
ET Series

### ET ORDER GUIDE

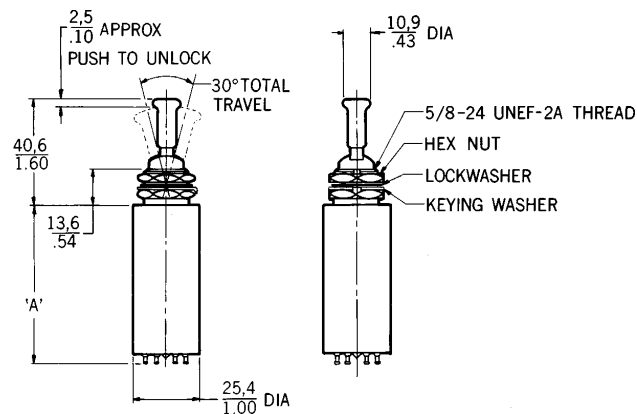
Circuitry	No. of Toggle Positions	Lever Type	Terminals	Elec. Rating Code Page 72	Max. Weight		Max. Dimension A		Catalog Listing
					grams	ounces	mm	inches	
SPDT	2	Standard	Leadwire (90° from Keyway)	B	241	8.5	51,6	2.03	25ET61-6 (M5594/1-1)
	2	Standard	Solder Turret	B	113	4.0	47,5	1.87	25ET61-T (M5594/1-2)
	2	Standard	Screw	B	113	4.0	61,2	2.41	25ET61-S (M5594/1-3)
	2	Tab Lever	Leadwire in line with Keyway	B	241	8.5	51,6	2.03	25ET62-6 (M5594/1-4)
	2	Standard	Leadwire (180° from Keyway)	B	241	8.5	51,6	2.03	25ET63-6 (M5594/1-5)
DPDT	2	Standard	Solder Turret	A	113	4.0	47,5	1.87	26ET61-T (M5594/2-1)
	2	Standard	Solder Turret	A	113	4.0	47,5	1.87	26ET65-T (M5594/2-2)
	3	Standard	Solder Turret	C	113	4.0	58,7	2.28	27ET61-T (M5594/3-1)
	3	Pull-to-unlock	Solder Turret	C	113	4.0	58,7	2.28	27ET61-T-E (M5594/6-1E)
	3	Push-to-unlock	Solder Turret	C	113	4.0	58,7	2.28	27ET51-T
	3	Pull-to-unlock	Solder Turret	C	113	4.0	58,7	2.28	27ET61-T-M (M5594/6-1M)

### MOUNTING DIMENSIONS (For reference only)

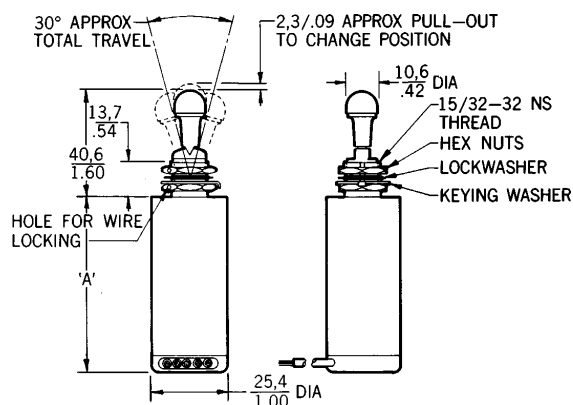
#### Standard and tab toggle levers



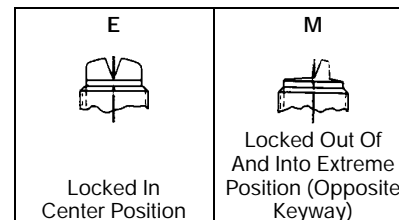
#### Push-to-unlock toggle lever



#### Pull-to-unlock toggle lever



#### LOCKING CONFIGURATION



Key: 0,0 = mm  
0.00 = inches

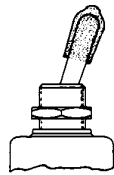


# Manual Switches

## Toggle Accessories

### TOGGLE LEVER SLEEVES

Colored plastic lever sleeves are ordered by adding suffix letters which denote the desired color to the basic catalog listing.



### ORDER GUIDE

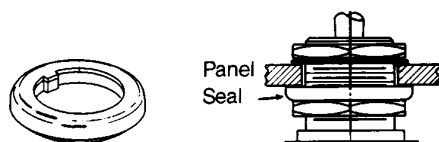
Toggle Switch Type		Basic Catalog Listing	Color Suffix					
			Blue	Black	White	Green	Yellow	Red
AT with 1/4" bushing	Short lever	15PA90-1	BL	BK	W	G	Y	R
	Long lever	15PA90-3			W			R
AT, TL, TK, TS, TW, ET with 15/32" bushing and standard lever		15PA90-4	BL	BK	W	G	Y	R

Example: 15PA90-1R  
Red sleeve fits 1/4 in. bushing AT's with short levers.

### DECORATIVE MOUNTING NUT ORDER GUIDE

Style	Description	Bushing Size	Catalog Listing
 A	Knurled Nut (Bright Nickel)	1/4"	19PA5-1
		15/32"	19PA6-1
	(Black Finish)	15/32"	19PA6-4
 B	Knurled Capnut (Bright Nickel)	15/32"	19PA6-2
 C	Hex Nut (Black Finish)	1/4"	19PA5-3
		15/32"	19PA6-3
 D	Tapered Nut (Chrome Finish)	15/32"	19PA6-5
 E	Hex Nut (Chrome Finish)	1/4"	19PA104-TW

### PANEL SEAL



For use with 15/32 in. bushing toggle switches, this corrosion resistant steel cupwasher has a silicone elastomer lining and keying tab for sealing the bushing keying slot. Use in panels up to .125 in./3.18 mm thick.

Catalog Listing	Military No.
15PA87	—
15PA195-TL	M5423/16-01
15PA258	M5423/16-01

### LEVER/PANEL SEAL



For use with standard lever toggle switches with 15/32 in. bushings. Consists of a silicone elastomer seal boot and panel seal bonded to a hex nut.

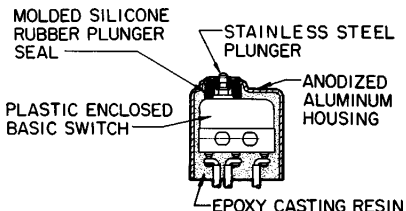
Catalog Listing	10PA4
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Manuals

# Position Sensors

# SE and XE Series

## 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
 Fig. 1	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
 Fig. 2	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

## Environment-Sealed Basic Switches

SE Series

### 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



### XE SWITCHES ORDER GUIDE

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

	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)
 Fig. 9	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
 Fig. 10	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
 Fig. 11	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
 Fig. 12	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

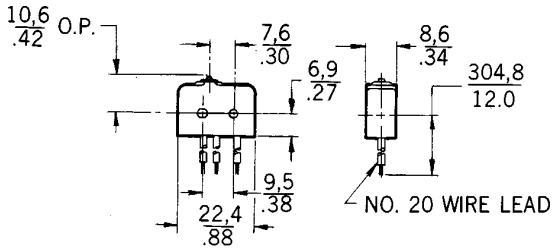
# Position Sensors

## Environment-Sealed Basic Switches

SE Series

### SE MOUNTING DIMENSIONS (For reference only)

SE switches



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

Fig. 1

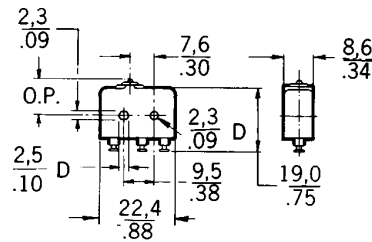


Fig. 2

SE auxiliary actuators

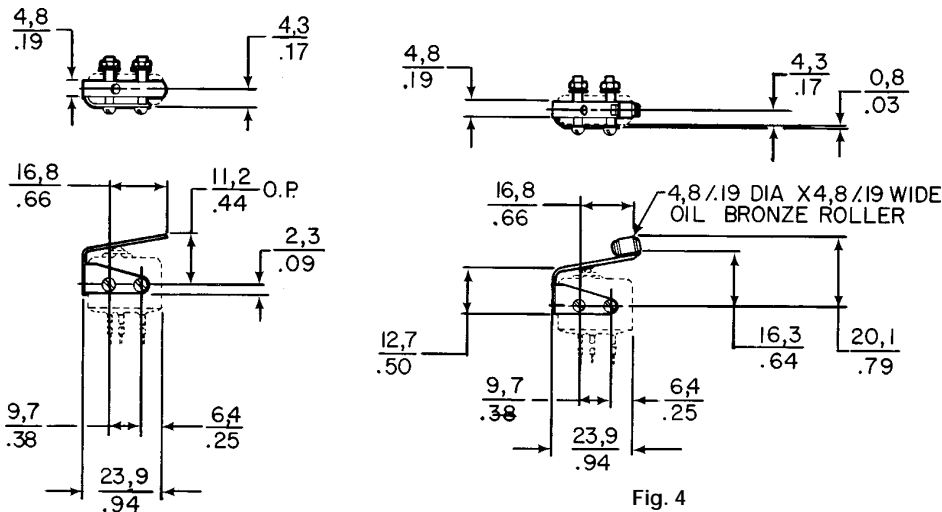


Fig. 3

Fig. 4

4,8 / .19 DIA X 4,8 / .19 WIDE OIL BRONZE ROLLER

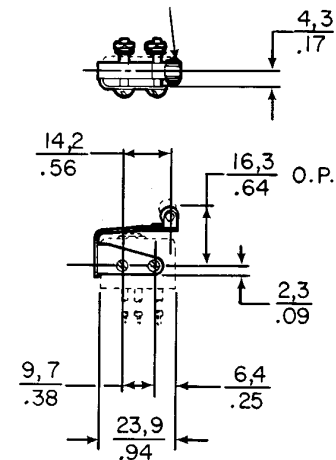


Fig. 5

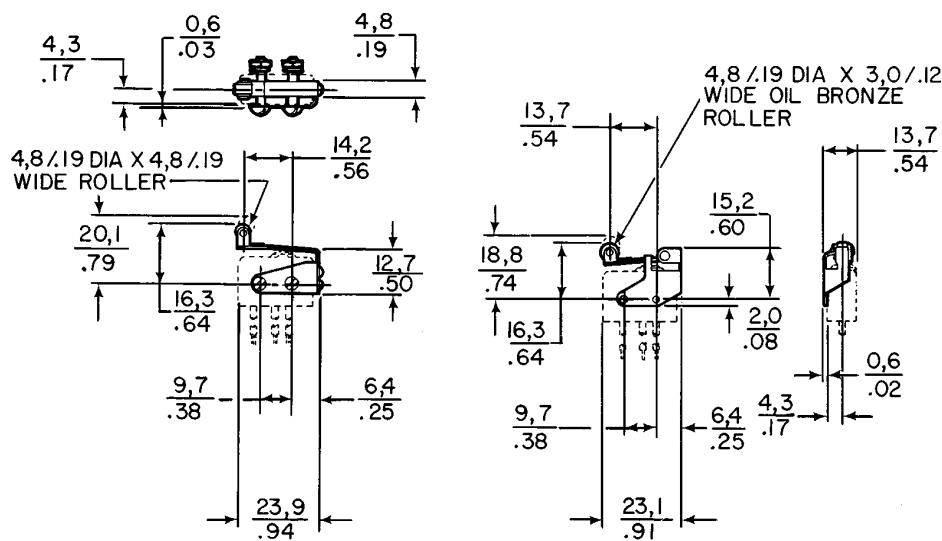


Fig. 6

Fig. 7

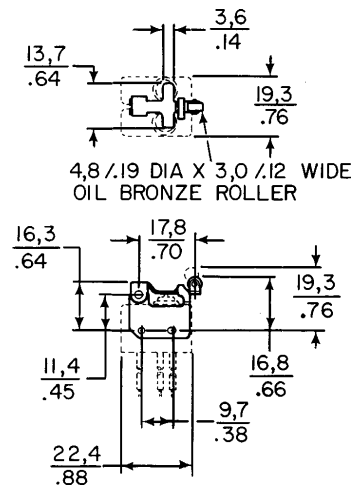


Fig. 8

Key: 0,0 = mm  
0.00 = inches

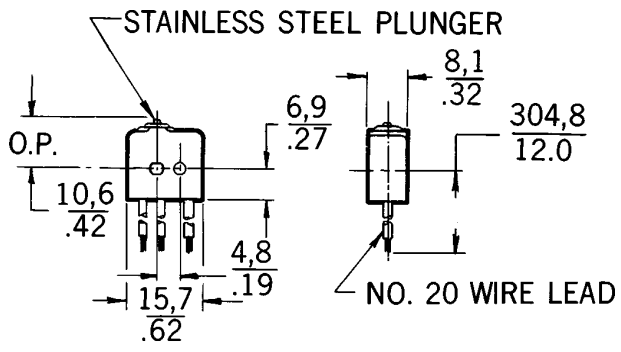
# Position Sensors

## Environment-Sealed Basic Switches

XE Series

XE MOUNTING DIMENSIONS (For reference only)

XE switches



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

Fig. 9

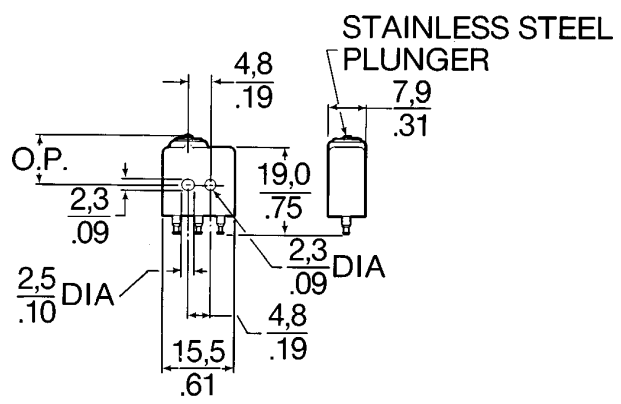


Fig. 10

XE auxiliary actuators

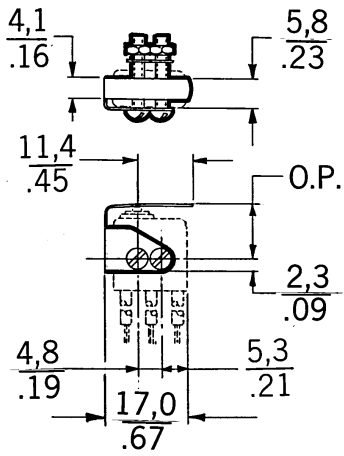


Fig. 11

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

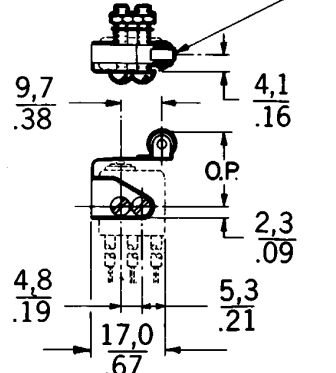


Fig. 12

Key: 0,0 = mm  
0.00 = inches