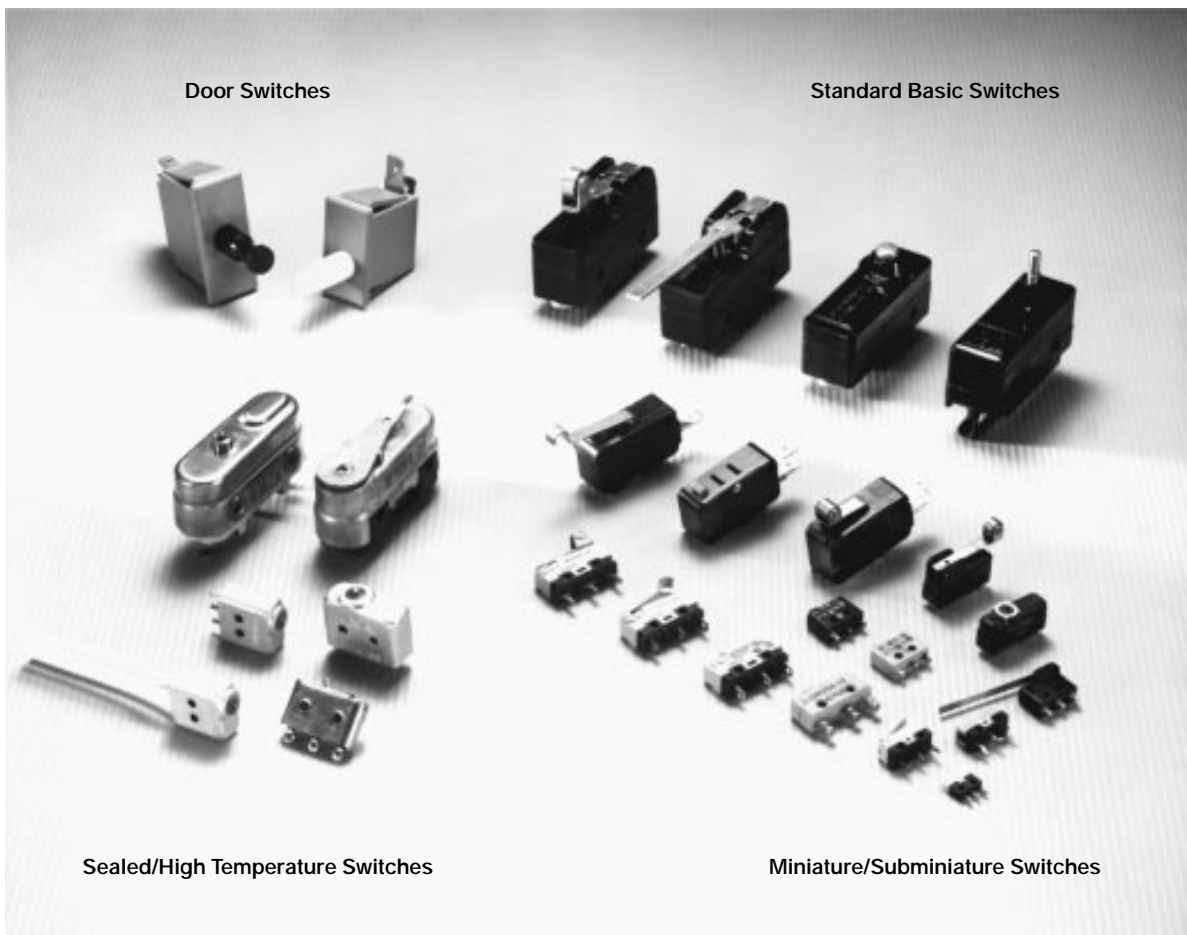


Basic Switches



Selection

SUBMINIATURE/MINIATURE BASIC SWITCHES

The U Series of subminiature basic switches are our newest line. The US is the smallest snap-action switch available. The UX and UM are versatile, low cost, full featured products with ample electrical capacity in a compact package. SM subminiature basic switches are a versatile collection of small size and ample electrical capacities, including 11 amp power load handling and ¼ hp motor load. SX subminiature basic switches are smaller than SM switches, yet are big in performance and selection. They provide up to 7 amp power load capacity. V3 miniature basic switches put a 25 amp power load capacity and a choice of 11 other electrical ratings into a relatively small package with many choices of actuators, contact materials, and terminal designs. V7 miniature basic switches have electrical ratings up to 15 amps. Both commercial and European versions are UL recognized and CSA certified. The latter is also designed to meet all leading European approval agency requirements. TB miniature basic small double-break units can control 2, 3 or 4 isolated circuits.

STANDARD BASIC SWITCHES

Power load switching and motor handling capacity are among the attractions of thumb-size BZ/BA standard basic switches. Double-pole double-throw switching is added by DT switches. Where there's a need for reliable switching of high capacity systems involving DC motors and solenoids, MT magnetic blow-out switches do the job. The 3MN has double-break switching. 6AS assemblies have two tandem mounted standard basic switches under a common actuator.

SEALED AND HIGH TEMPERATURE BASIC SWITCHES

Specially adapted basic switches include: SE/XE environment-proof switches which protect subminiature SM/SX basic switches within a sealed housing; HM hermetically sealed switches are interchangeable in operating point with the SM switches; HS hermetically sealed switches which parallel the size and mounting scheme of the standard basic switches; and HT high temperature switches for use up to +1000°F.

DOOR SWITCHES

AC, WW and DM switches automatically cut power when a service door or drawer is opened.

For application help: call 1-800-537-6945.

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Basic Switches

Subminiature/Miniature

ELECTRICAL DATA AND UL CODES

MINIATURE/SUBMINIATURE BASIC SWITCHES

Most of the switches in this section are UL recognized and CSA certified. The current and voltage values shown are based on test conditions specified by these agencies. Electrical life of the switch is influenced by each application condition as well as by voltage and current.

Circuitry	Electrical Data
Single-pole double-throw	A 5 amps res., 3 amps ind., (sea level), 4 amps res., 2 amps ind., (50,000 feet), 28 vdc 5 amps res. or ind. 115 vac, 60 Hz. UL/CSA rating: 5 amps, 250 vac.
Single-pole double-throw	B 7 amps res., 4 amps ind., (sea level), 7 amps res., 2.5 amps ind., (50,000 feet), 28 vdc. UL/CSA rating: 7 amps, 250 vac.
Single-pole double-throw	C 3.5 amps res., 2 amps ind., (sea level), 3.5 amps res., 1.5 amps ind., (50,000 feet), 28 vdc. UL rating: 7 amps, 250 vac.
Single-pole double-throw	D 1 amp res., 0.5 amp ind., (sea level and 50,000 feet), 28 vdc. UL/CSA rating: 1 amp, 125 vac.
Single-pole double-throw	E 3 amps res., 2 amps ind., (sea level), 28 vdc. UL rating: 3 amps, 250 vac.
Single-pole double-throw	F 7 amps res., 4 amps ind., 2.5 amps lamp load, (sea level), 4 amps res., 2.5 amps ind., 2.5 amps lamp load, (50,000 feet), 28 vdc. 7 amps res., 7 amps ind., 2 amps lamp load, 115 vac, 60 Hz (sea level).
Single-pole double-throw	G 2 amps res., lamp ind., (sea level) 28 vdc.
Single-pole double-throw	H .010 amp res. and ind., (sea level). 28 vdc. UL/CSA rating: 1 amp, 125 vac.
Single-pole double-throw	I 7 amps res., 4 amps ind., (sea level), 28 vdc.
Single-pole double-throw	J 5 amps res., 3 amps ind., (sea level), 5 amps res., 2.5 amps ind., (50,000 feet), 28 vdc. UL rating: 5 amps, 250 vac.
Single-pole double-throw	K UL rating: 5 amps, 125 or 250 vac.
Single-pole double-throw	L 1 amp res., 1/2 amp ind., (sea level) 28 vdc.
Single-pole double-throw	M UL rating: 11 amps and 1/4 hp, 125 or 250 vac.
Single-pole double-throw	N 1 amp res., 0.5 amp ind., 30 vdc. UL rating: 1 amp, 125 vac.
Single-pole double-throw	P 1 amp res., 30 vdc. UL rating: .1 amp, 125 vac.
Single-pole double-throw	R 5 amps res., 3 amps ind., 2.4 amps lamp load (sea level), 5 amps res., 2.5 amps ind., 2.4 amps lamp load, (50,000 feet), 28 vdc. 5 amps res., 5 amps ind., 1.5 amps lamp load, 115 vac. 60 Hz (sea level)

Circuitry	Electrical Data
Single-pole double-throw	S UL rating: 4 amps, 250 vac.
Single-pole double-throw	T UL/CSA rating: 11 amps and 1/3 hp, 125, 250, or 277 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc; 4 amps, 125 vac "L" (lamp load).
Single-pole double-throw	TT UL/CSA rating: 10 amps and 1/3 hp, 125 or 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc; 4 amps, 125 vac "L" (lamp load).
Single-pole double-throw unless otherwise noted in order guide	UU 10 amps res., 10 amps ind., (sea level), 6 amps ind. (50,000 feet), 6 amps motor load, 30 vdc. U UL/CSA rating: 15.1 amps and 1/2 hp, 125 or 250 vac. 1/2 amp, 125 vdc; 1/4 amp, 250 vdc; 5 amps, 120 vac "L" (lamp load).
Single-pole double-throw	VV UL/CSA rating: 3 amps-125, 250, 277 vac; 1/10 hp-250 vac
Single-pole double-throw	V UL/CSA rating: 10 amps and 1/4 hp, 125 or 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc; 3 amps, 125 vac "L" (lamp load).
Single-pole double-throw	W 10 amps, 250 vac or 28 vdc; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc.
Single-pole double-throw	X UL rating: 1 amp, 125 vac.
Single-pole double-throw	Y 10 amps and 1/3 hp, 125 or 250 vac; 4 amps, 125 vac "L" (lamp load).
Single-pole double-throw	YY UL/CSA rating: 5 amps-125, 250, 277 vac 1/10 hp-250 vac
Two-circuit double-break	Z 10 amps, 125 or 250 vac, or 30 vdc. UL/CSA rating: 10 amps, 125 or 250 vac; 1/2 hp, 125 vac.
Four-circuit double-break	
Single-pole double-throw	ZZ UL rating: 5 amps and 1/10 hp. 125 or 250 vac.
Single-pole double-throw	AA UL rating: 20 amps, 277 vac. 1 hp, 125 vac; 2 hp, 250 vac.
Single-pole double-throw	BB UL rating: 25 amps, 277 vac. 1 hp, 125 vac; 2 hp, 250 vac.

Basic Switches

Standard

ELECTRICAL DATA AND UL CODES STANDARD BASIC SWITCHES

Most of the switches in this section are UL recognized and CSA certified. The current and voltage values shown are based on test conditions specified by these agencies. Electrical life of the switch is influenced by each application condition as well as by voltage and current. For application assistance contact the 800 number.

Circuitry	Electrical Data and UL Codes
Single-pole double-throw unless otherwise noted in order guide	A 15 amps, 125, 250 or 480 vac; 1/8 hp, 125 vac; 1/4 hp, 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L96
Single-pole double-throw unless otherwise noted in order guide	B 5 amps, 125, 250 or 480 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L35
Single-pole double-throw unless otherwise noted in order guide	C 10 amps, 125, 250 or 480 vac; UL Code L8
Single-pole double-throw unless otherwise noted in order guide	D 15 amps, 125, 250 or 480 vac; 1/8 hp, 125 vac; 1/4 hp, 250 vac. UL Code L103
Single-pole double-throw unless otherwise noted in order guide	E 15 amps, 125, 250 or 480 vac; 1/4 hp, 125 vac, 1/2 hp, 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L67
Single-pole double-throw unless otherwise noted in order guide	F 22 amps, 125, 250 or 480 vac; 1/2 hp, 125 vac, 1 hp, 250 vac. UL Code L161
Single-pole double-throw unless otherwise noted in order guide	G 20 amps, 125, 250 or 480 vac; 10 amps, 125 vac "L" (tungsten lamp load); 1 hp, 125 vac; 2 hp, 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L23
Single-pole double-throw unless otherwise noted in order guide	H Motor Control 25 amps, 125, 250 or 480 vac; 1 hp, 125 vac; 2 hp, 250 vac; Pilot Duty—750 VA, 125, 250, or 277 vac.
Single-pole double-throw unless otherwise noted in order guide	I 10 amps, 125, 250 or 480 vac; 1/8 hp, 125 vac; 1/4 hp, 250 vac; UL Code L95

Circuitry	Electrical Data and UL Codes
Double-pole double-throw	J 10 amps, 125 or 250 vac; 0.3 amp, 125 vdc; 0.15 amp, 250 vdc. UL Code L59
Single-pole double-throw unless otherwise noted in order guide	K Rating established with switch non-polarized 10 amps, 125 vac or vdc; 1/4 hp, 125 vac or vdc. UL Code L 168 Non-polarized: 10 amps res. or 1/4 hp, 125 vdc; 3 amps max. res. 250 vdc. Polarized*: 10 amps res. or 1/2 hp, 125 vdc; 3 amps max. res., 250 vdc.
*To polarize, connect negative side of line to common terminal. To achieve the same effect, mount switch with brass screws, using a non-magnetic barrier (at least 1/4" thick) between the switch and mounting surface.	
Two-circuit double-break	M 25 amps, 125, 250 or 480 vac; 3/4 hp, 125 vac; 1 1/4 hp, 250 vac. 1 amp, 125 vdc; 1/2 amp, 250 vdc. UL Code L58
Single-pole double-throw	P 1 amp, 125 VAC UL Code L22
Single-pole double-throw	R 10 amps, 125 or 250 vac; 1/3 hp, 125 vac; 3/4 hp, 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L115
Single-pole double-throw	S 10 amps, 125 or 250 vac; 1/3 hp, 125 or 250 vac. UL Code L93
Two-circuit double-break	T 15 amps, 125, 250 or 480 vac; 1 amp, 125 vdc; 1/2 amp, 250 vdc; 1/4 hp, 125 vac; 1/2 hp, 250 vac UL Code L73
Single-pole double-throw	U 5 amps, 250 vac. UL Code L4
Two-circuit double-break	V Motor Control 15 amps, 120, 240, 480 or 600 vac; 1/2 hp, 120 vac; 1 hp, 240 vac; 0.8 amp, 115 vdc; 0.4 amp, 230 vdc.
Single-pole single-throw (N.C.)	W 20 amps, 125, 250 or 277 vac; 3/4 hp, 125 vac; 1/2 hp, 250 vac UL Code L178B
Single-pole double-throw	X 15 amps, 125, 250 or 480 vac; 2 amps, 600 vac; 1/8 hp, 125 vac; 1/4 hp, 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L74
Single-pole double-throw	Y 20 amps, 125, 250 or 480 vac; 3/4 hp, 125 vac; 1 1/2 hp, 250 vac; UL Code L17

Basic Switches

Operating Characteristics

ELECTROMECHANICAL SWITCHES

Definitions below explain the meaning of operating characteristics. Characteristics shown in tables throughout catalog were chosen as most significant. They are taken at normal room temperature and humidity. These may vary as temperature and humidity conditions differ. Sketches show how characteristics are measured for in-line plunger actuation.

Linear dimensions for in-line actuation are from top of plunger to a reference line, usually the center of the mounting holes.

Differential Travel (D.T.)—Plunger or actuator travel from point where contacts “snap-over” to point where they “snap-back.”

Free Position (F.P.)—Position of switch plunger or actuator when no external force is applied (other than gravity).

Full Overtravel Force—Force required to attain full overtravel of actuator.

Operating Position (O.P.)—Position of switch plunger or actuator at which point contacts snap from normal to operated position. Note that in the case of flexible or adjustable actuators, the operating position is measured from the end of the lever or its maximum length. Location of operating position measurement shown on mounting dimension drawings.

Operating Force (O.F.)—Amount of force applied to switch plunger or actuator to cause contact “snap-over.” Note in the case of adjustable actuators, the force is measured from the maximum length position of the lever.

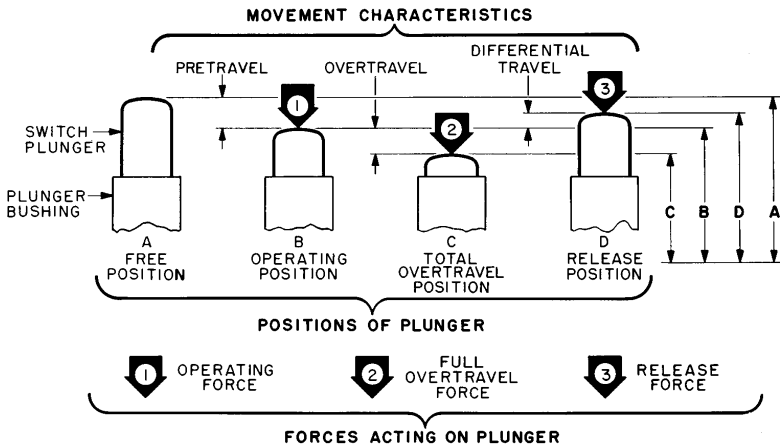
Overtravel (O.T.)—Plunger or actuator travel safely available beyond operating position.

Pretravel (P.T.)—Distance or angle traveled in moving plunger or actuator from free position to operating position.

Release Force (R.F.)—Amount of force still applied to switch plunger or actuator at moment contacts snap from operated position to unoperated position.

Total Travel (T.T.)—Distance from actuator free position to overtravel limit position.

IN-LINE PLUNGER ACTUATION



Basic Switches

Operating Characteristics

FULL LOAD AND LOCKED ROTOR CURRENTS FOR SINGLE PHASE AND DC MOTORS

HP	Alternating Current				Direct Current			
	115 Volts		230 Volts		115 Volts		230 Volts	
	Full Load	Locked Rotor	Full Load	Locked Rotor	Full Load	Locked Rotor	Full Load	Locked Rotor
2	24.0	144.0	12.0	72.0	17.0	170.0	8.5	85.0
1½	20.0	120.0	10.0	60.0	13.2	132.0	6.6	66.0
1	16.0	96.0	8.0	48.0	9.6	96.0	4.8	48.0
¾	13.8	82.8	6.9	41.4	7.4	74.0	3.7	37.0
½	9.8	58.8	4.9	29.4	5.4	54.0	2.7	27.0
⅓	7.2	43.2	3.6	21.6	3.8	38.0	1.9	19.0
¼	5.8	34.8	2.9	17.4	3.0	30.0	1.5	15.0
⅙	4.4	26.4	2.2	13.2	2.4	24.0	1.2	12.0
⅛	3.8	22.8	1.9	11.4	2.2	22.0	1.1	11.0
1/10	3.0	18.0	1.5	9.0	2.0	20.0	1.0	10.0
1/20	1.5	9.0	—	—	—	—	—	—

Basic Switches

B Type Switches Performance Information

ELECTRICAL DATA CHART

Catalog Listing (contact gap)	Voltage	Amperes									
		Current Carrying Capacity Max. ¹	Resistive	Inrush		Motor		Lamp		Inductive ²	
				N.C. Ckt.	N.O. Ckt.	N.C. Ckt.	N.O. Ckt.	N.C. Ckt.	N.O. Ckt.	Sea Level	50,000 Feet
BZ-3YT* .036 in. 0,91 mm	VDC										
	8	5	10	30	15	5	2.5	3	1.5	10	10
	14	5	10	30	15	5	2.5	3	1.5	10	10
	30	5	10	30	15	5	2.5	3	1.5	10	5
	125	5	1	10	10	2	2	1	1	0.6	0.4
250	5	0.6	6	6	1.2	1.2	0.6	0.6	0.4	0.3	
BZ-3YT* .036 in. 0,91 mm	VAC										
	120	5	5	30	15	5	2.5	3	1.5	5	5
	240	5	5	30	15	5	2.5	3	1.5	5	5
277	5	5	30	15	5	2.5	3	1.5	5	5	
BM-2R .020 in. 0,50 mm	VDC										
	8	22	15	30	15	5	2.5	3	1.5	8	7
	14	22	15	30	15	5	2.5	3	1.5	5	5
	30	22	2	30	15	5	2.5	3	1.5	1	1
	125	22	0.4	4	4	0.8	0.4	0.4	0.4	.03	.02
230	22	0.2	2	2	0.4	0.2	0.2	0.2	.02	.01	
BM-2R .020 in. 0,50 mm	VAC										
	125	22	22	35	20	5.8	3.4	3.5	2.0	22	22
	250	22	22	35	20	5.8	3.4	3.5	2.0	22	22
	277	22	22	35	20	5.8	3.4	3.5	2.0	22	22
460	22	22	35	20	5.8	3.4	3.5	2.0	22	22	
BA-2R .020 in. 0,50 mm	VDC										
	8	20	20	30	15	5	2.5	3	1.5	15	15
	14	20	20	30	15	5	2.5	3	1.5	10	8
	30	20	5	30	15	5	2.5	3	1.5	5	2
	125	20	0.5	4	4	0.8	0.4	0.4	0.4	.05	.03
230	20	0.25	2	2	0.4	0.2	0.2	0.2	.03	.02	
BA-2R .020 in. 0,50 mm	VAC										
	120	20	20	75	75	12.5	12.5	7.5	7.5	20	20
	240	20	20	75	75	12.5	12.5	7.5	7.5	20	20
	277	20	20	75	75	12.5	12.5	7.5	7.5	20	20
460	20	20	75	75	12.5	12.5	7.5	7.5	20	20	
BE-2R .020 in. 0,50 mm	VDC										
	8	25	25	30	15	5	2.5	3	1.5	15	15
	14	25	25	30	15	5	2.5	3	1.5	10	8
	30	25	5	30	15	5	2.5	3	1.5	5	2
	125	25	0.5	4	4	0.8	0.8	0.4	0.4	.05	.03
250	25	0.25	2	2	0.4	0.4	0.2	0.2	.03	.02	
BE-2R .020 in. 0,50 mm	VAC										
	120	25	25	96	96	16	16	10	10	25	
	240	25	25	96	96	16	16	10	10	25	
	277	25	25	96	96	16	16	10	10	25	
460	25	25	96	96	16	16	10	10	25		
BZ-R .006 in. 0,15 mm	VAC										
	125	15	15	30	15	5	2.5	3	1.5	15	15
	250	15	15	30	15	5	2.5	3	1.5	15	15
277	15	15	30	15	5	2.5	3	1.5	15	15	
BZ-1R .010 in. 0,25 mm	VDC										
	8	15	15	30	15	5	2.5	3	1.5	8	7
	14	15	15	30	15	5	2.5	3	1.5	5	5
	30	15	2	30	15	5	2.5	3	1.5	1	1
	125	15	0.4	4	4	0.8	0.8	0.4	0.4	0.03	0.01
230	15	0.2	2	2	0.4	0.4	0.2	0.2	0.02	0.01	
BZ-1R .010 in. 0,25 mm	VAC										
	125	15	15	30	15	5	2.5	3	1.5	15	15
	250	15	15	30	15	5	2.5	3	1.5	15	15
	277	15	15	30	15	5	2.5	3	1.5	15	15
460	15	15	30	15	5	2.5	3	1.5	15	15	

* Ampere levels for BZ-3YT applicable **only** if common terminal is not used and switch is used as a shorting bar switch.

Basic Switches

B Type Switches Performance Information

ELECTRICAL DATA CHART, cont.

Catalog Listing (contact gap)	Voltage	Amperes									
		Current Carrying Capacity Max. ¹	Resistive	Inrush		Motor		Lamp		Inductive ²	
				N.C. Ckt.	N.O. Ckt.	N.C. Ckt.	N.O. Ckt.	N.C. Ckt.	N.O. Ckt.	Sea Level	50,000 Feet
BZ-2R .020 in. 0.50 mm	VDC										
	8	15	15	30	15	5	2.5	3	1.5	15	15
	14	15	15	30	15	5	2.5	3	1.5	10	8
	30	15	6	30	15	5	2.5	3	1.5	5	2
	125	15	0.4	4	4	0.8	0.8	0.4	0.4	0.05	0.03
230	15	0.2	2	2	0.4	0.4	0.2	0.2	0.03	0.02	
BZ-2R .020 in. 0.50 mm	VAC										
	125	15	15	30	15	5	2.5	3	1.5	15	15
	250	15	15	30	15	5	2.5	3	1.5	15	15
	277	15	15	30	15	5	2.5	3	1.5	15	15
	460	15	15	30	15	5	2.5	3	1.5	15	15
BZ-3R .036 in. 0.91 mm	VDC										
	8	15	15	30	15	5	2.5	3	1.5	15	15
	14	15	15	30	15	5	2.5	3	1.5	15	15
	30	15	10	30	15	5	2.5	3	1.5	10	5
	125	15	0.6	6	6	1.2	1.2	0.6	0.6	0.1	0.05
250	15	0.3	3	3	0.6	0.6	0.3	0.3	0.05	0.03	
BZ-3R .036 in. 0.91 mm	VAC										
	125	15	15	30	15	5	2.5	3	1.5	15	15
	250	15	15	30	15	5	2.5	3	1.5	15	15
	277	15	15	30	15	5	2.5	3	1.5	15	15
	460	15	15	30	15	4	2.5	3	1.5	15	15
BZ-7R .070 in. 1.78 mm	VDC										
	8	30	15	15	5	2.5	3	1.5	15	15	—
	14	15	15	30	15	5	2.5	3	1.5	15	15
	30	15	15	30	15	5	2.5	3	1.5	10	7.5
	125	15	0.75	7.5	7.5	1.5	1.5	0.75	0.75	0.4	0.2
250	15	0.3	3	3	0.6	0.6	0.3	0.3	0.2	0.1	
BZ-7R .070 in. 1.78 mm	VAC										
	120	15	15	30	15	5	2.5	3	1.5	15	15
	240	15	15	30	15	5	2.5	3	1.5	15	15
	277	15	15	30	15	5	2.5	3	1.5	15	15
	460	15	15	30	15	5	2.5	3	1.5	15	15

1 For a 86 – F (30 – C) max. temperature rise at terminals, not opening or closing the load (at sea level).

2 Data established with a 75% power factor on AC loads.

TEST CONDITIONS

Switch contact life is affected by electrical conditions and other factors, such as: temperature, humidity, airborne contamination, vibration, amount and rate of plunger travel, and cycling

rate. Our Evaluation Laboratory tests are conducted using procedures and practices common to UL and Military Specifications. The following conditions generally apply.

- Temperature: Room Ambient (70 – F, 21 – C).
- Humidity: Room Ambient (50%).
- AC Cycle Rate: 60 operations/minute.
- DC Cycle Rate: 20 operations/minute.
- On-off Time: Equal and compatible with above cycling rates.
- Power Factor (AC): Approximately 75%.
- Inductance (DC): MIL-I-81023 Inductor.
- Circuit Loading: One throw only on a SPDT switch during any test procedure. Both throws are evaluated separately.
- Travel Plunger: Full switch travel is used.
- Actuation: Linear motion.
- Overtravel Force: 1 to 3 lbs. from spring-loaded actuators.

MICRO SWITCH believes that with the following voltage and current values and under the test conditions set forth below switch life of 100,000 closures, 95% survival can be expected. It is a starting point for user evaluation and provides guidelines on the switches identified. Because of the numerous electrical conditions listed, not every current and voltage level has actually been tested on every switch and certain figures have

been extrapolated. For specific switch selection, customers should evaluate switches under actual application conditions or by simulating all application conditions and requirements. The information set forth cannot substitute for the customer's own product evaluation. It should never be published by a customer as a rating on their product.



Basic Switches

Definitions of Terms

Actuator – Mechanism of the switch or switch enclosure which operates the contacts.

Auxiliary Actuator – A mechanism, sold separately, to provide basic switches with easier means of operation and adjustment and adapt switches to different operating motions by supplying supplemental overtravel.

Basic Switch – A self-contained switching unit. It can be used alone, gang-mounted, built into assemblies or enclosed in metal housings.

Bifurcated Contacts – A movable contact, generally gold plated, which is forked to provide two contact mating surfaces in a parallel, for more reliable contact.

Break – To open an electrical circuit.

Break Distance – The minimum open gap distance between stationary and movable objects.

Characteristics – This term is used by MICRO SWITCH in a restricted sense and refers only to switch operating characteristics such as pretravel, operating force, etc.

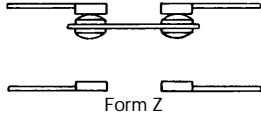
Circuit – The contact arrangement with switch actuator and contacts in their normal position.

Dead break – Exists in all mechanical switches. Definition: When the switch plunger is being depressed, dead break is non-contact immediately before the plunger reaches the operating point. When the switch plunger is being released, dead break is non-contact immediately before the plunger reaches the release point. Dead break is expressed in distance of plunger travel during which the non-contact occurs. Manufacturing specifications for most BZ/BA basic switches allow a maximum dead break of 0.00005 in. (0,001 mm) measured at the switch plunger. Switches are evaluated while moving the plunger with the switch installed in a 10 VDC, 0.100 ampere circuit. This specification does not apply to switches that have been in service or have not received proper handling or storage. For applications sensitive to dead break, call Freeport for information on applicable electrical and mechanical conditions.

Dead make – When the switch plunger is being depressed, dead make is non-contact immediately after the plunger reaches the release point. Dead make is expressed as the distance of plunger travel during which the non-contact occurs.

Non contact is a failure of open contacts to close (that is, the switch resistance exceeds the specified value) within the specified range of plunger positions. If a plunger position is specified with respect to time, a non-contact is a contact miss.

Double Break Contacts – (Twin break). This breaks the circuit in two places. Referred to as form Z circuitry also.



Double-Pole Double-Throw (DPDT) – Switches which make and break two separate circuits. This circuit provides a normally open and normally closed contact for each pole.

Enclosed Switch – A basic switch unit (contact block) enclosed in a durable metal housing. The enclosure protects the switching unit, provides mounting means, and fitting for conduit connection.

Environment-Proof Switch – A switch which is completely sealed to ensure constant operating characteristics. Sealing normally includes an "O" ring on actuator shaft and fused glass-to-metal terminal seals or complete potting and an elastomer plunger-case seal.

Explosion-Proof Switch – A UL listed switch capable of withstanding an internal explosion of a specified gas without igniting surrounding gases.

Hermetically Sealed Switch – A switch completely sealed to provide constant operating characteristics. All junctures made with metal-to-metal or glass-to-metal fusion.

Magnetic Blow-Out Switch – Contains a small permanent magnet which provides a means of switching high d-c loads. The magnet deflects arc to quench it.

Maintained Contact Switch – Designed for applications requiring sustained contact after plunger has been released, but with provision for resetting.

Make – To close or establish an electrical circuit.

Momentary Switch – A switch with contacts that return from operated condition to normal condition when actuating force is removed. Unless otherwise stated, all switches in this catalog are momentary.

Mounting Dimensions – All dimensions on the mounting dimension drawings in this catalog are subject to change without notice. Request current drawings from the nearest MICRO SWITCH Sales Office or write to Freeport.

Normally Closed Contacts (N.C.) – Provide a normally closed circuit when actuator is in free position.

Normally Open Contacts (N.O.) – Provide a normally open circuit when actuator is in free position.

Precision Snap-Acting Switch – An electromechanical switch having predetermined and accurately controlled characteristics, and having a spring loaded quick make and break contact action.

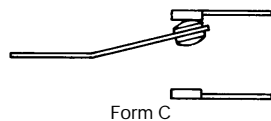
Projection Contacts – A design in which one or more truncated projections are arranged on the stationary contacts. When closed on the smooth, spherical surface of the opposing contact this configuration tends to break thru oxides and other film contaminants to avoid the particulate contaminants. Used with silver contacts, this design can be a useful substitute for the more expensive gold or gold alloy contact material.

Pulse Switch – Provides a single pulse of current for each cycle of operation.

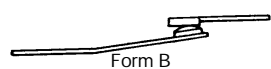
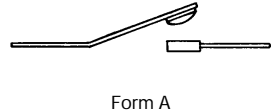
Quick Connect Terminal – A plug-in type terminal designed for quick switch wiring.

Repeatability – Ability of a switch to repeat its characteristics precisely from one operation to the next operation.

Single-Pole Double-Throw (SPDT) – Switch which may either make or break a circuit, depending on how it is wired. Also referred to as form C circuitry.



Single-Pole Single-Throw (SPST) – Switch with only one moving and one stationary contact. Available either normally open (N.O.) also referred to as form A circuitry; or normally closed (N.C.) also referred to as form B circuitry.



Terminal Enclosure – A housing that fits over switch terminals to protect against electrical shock and accidental shorting, and facilitate wiring.

Two Circuit Switch – In one position, moving contacts complete one circuit, in the other position, contacts complete another separate circuit.

Basic Switches

Subminiature

US Series



FEATURES

- MICRO SWITCH'S smallest snap-action switch
- Choice of low energy or power duty electrical ratings
- Variety of integral actuators
- Temperature Range: -25° to $+80^{\circ}\text{C}$ (-13° to $+176^{\circ}\text{F}$)
- Weight: 0.2 grams (.007 oz.) – PC terminal type
0.3 grams (.011 oz.) – solder terminal type
- Form C single-pole double-throw (SPDT) circuitry

ELECTRICAL RATINGS

Voltage	Resistive Load Gold Contacts US10 Type	Silver Contacts US20 Type
30 VDC 125 VAC	0.1 A 0.1 A	0.5 A 0.1 A

ORDER GUIDE SOLDER TERMINALS

Contact Type	Actuator	O.F. max. grams oz.	Solder	R.F. min. g ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
Gold, 0.1 Amp 	A pin plunger	100 3.527	US10D10A00	10 .353	0,3 .012	0,1 .004	0,1 .004	5,4 ± 0,15 .213 ± .006
	C flat lever	25 .88	US10D10C00	2,0 .071	2,4 .094	0,4 .016	0,7 .028	6,4 ± 0,6 .252 ± .024
	E simulated roller lever	30 1.058	US10D10E00	2,0 .071	2,2 .087	0,3 .012	0,7 .028	6,7 ± 0,5 .264 ± .020
Silver, 0.5 Amp 	A pin plunger	100 3.527	US20D10A00	10 .353	0,3 .012	0,1 .004	0,1 .004	5,4 ± 0,15 .213 ± .006
	C flat lever	25 .88	US20D10C00	2,0 .071	2,4 .094	0,4 .016	0,7 .028	6,4 ± 0,6 .252 ± .024
	E simulated roller lever	30 1.058	US20D10E00	2,0 .071	2,2 .087	0,3 .012	0,7 .028	6,7 ± 0,5 .264 ± .020

ORDER GUIDE PC STRAIGHT TERMINALS

Contact Type	Actuator	O.F. max. grams oz.	PC Straight Cross-Line	R.F. min. g ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
Gold, 0.1 Amp 	A pin plunger	100 3.527	US10D20A00	10 .353	0,3 .012	0,1 .004	0,1 .004	4,8 ± 0,15 .189 ± .006
	C flat lever	25 .88	US10D20C00	1,0 .035	2,4 .094	0,4 .016	0,7 .028	5,8 ± 0,7 .228 ± .028
	E simulated roller lever	30 1.058	US10D20E00	1,0 .035	2,2 .087	0,3 .012	0,7 .028	6,1 ± 0,7 .240 ± .028
Silver, 0.5 Amp 	A pin plunger	100 3.527	US20D20A00	10 .353	0,3 .012	0,1 .004	0,1 .004	4,8 ± 0,15 .189 ± .006
	C flat lever	25 .88	US20D20C00	1,0 .035	2,4 .094	0,4 .016	0,7 .028	5,8 ± 0,7 .228 ± .028
	E simulated roller lever	30 1.058	US20D20E00	1,0 .035	2,2 .087	0,3 .012	0,7 .028	6,1 ± 0,7 .240 ± .028

OTHER TERMINATION TYPES ARE AVAILABLE

For PC right angle, change 2nd set of numbers to 50 (Example: US10D50A00)

For PC left angle, change 2nd set of numbers to 60 (Example: US10D60A00)

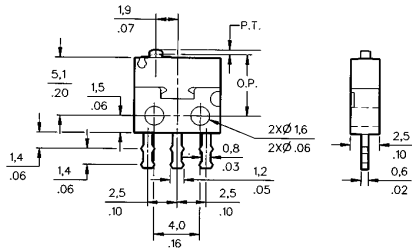
Basic Switches

Subminiature

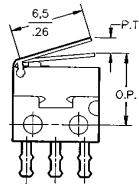
MOUNTING DIMENSIONS $\frac{\text{mm}}{\text{in.}}$ (for reference only)

Solder Terminal Switches (with mounting holes)

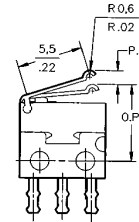
Pin plunger (Type A)



Flat lever (Type C)

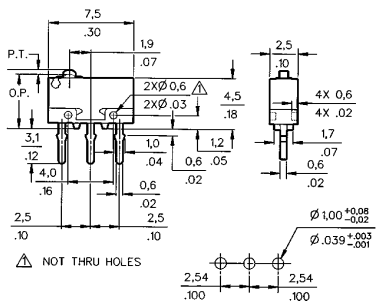


Simulated roller (Type E)

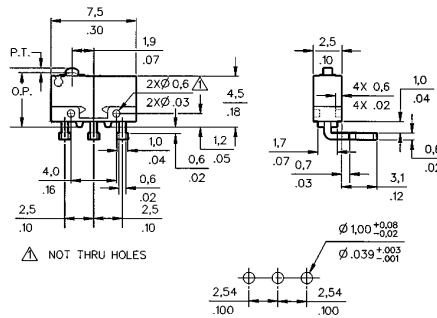


PC Board Terminals Switches

Pin plunger (Type A)

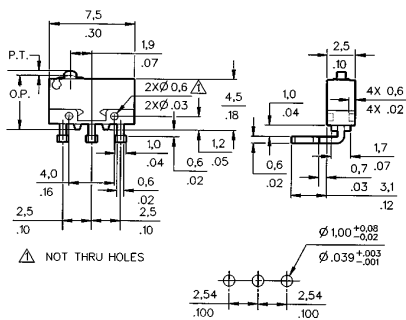


Right angle terminal (Type 50)

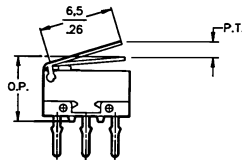


Miniature/
Subminiature

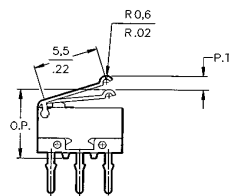
Left angle terminal (Type 60)



Flat lever (Type C)



Simulated roller (Type E)



Mounting screw size is m 1,4.
Maximum tightening torque is 1 kg-cm.

Basic Switches

Subminiature



FEATURES

- Compact size – helps minimize equipment size
- Choice of low energy or power duty electrical ratings
- Variety of integral actuators
- Temperature Range: -25° to +85°C (-13 to 185°F)
- Weight: 0.5 grams (.018 oz.)
- UL/CSA marking designations
- Form C single-pole double-throw (SPDT) circuitry

ELECTRICAL RATINGS (in amps)

Voltage	Silver Contacts		Gold Contacts
	UX40 Type	UX30 Type	UX10 Type
125 VAC*	3 A	1 A	0.1 A
30 VDC	2 A	1 A	0.1 A
6 VDC	-	-	5 mA
12 VDC	-	-	2 mA
24 VDC	-	-	1 mA

*UL/CSA rating. UL File No. E12252. UL Standard 1054. CSA file LR23413M167

ORDER GUIDE

Rating	Actuator	O.F. max. grams oz.	Terminals		R.F. min. g ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
			Solder	PC Straight Self- Supporting					
Gold, 0.1 Amp 125 VAC 	A pin plunger	75 2.65	UX10C10A01	UX10C30A01	10 .353	0,5 .020	0,25 .010	0,12 .005	5,5 ± 0,2 .217 ± .008
		150 5.3	UX10E10A01	UX10E30A01	20 .705	0,5 .020	0,25 .010	0,12 .005	5,5 ± 0,2 .217 ± .008
	C flat lever	25 .88	UX10C10C01	UX10C30C01	2,5 .088	2,1 .083	0,55 .022	0,50 .020	6,8 ± 1,0 .268 ± .039
		50 1.76	UX10E10C01	UX10E30C01	5,0 .176	2,1 .083	0,55 .022	0,50 .020	6,8 ± 1,0 .268 ± .039
	E roller lever simulated	27 .95	UX10C10E01	UX10C30E01	2,0 .071	2,1 .083	0,50 .020	0,50 .020	9,5 ± 1,0 .374 ± .039
		55 1.94	UX10E10E01	UX10E30E01	4,0 .141	2,1 .083	0,50 .020	0,50 .020	9,5 ± 1,0 .374 ± .039
Silver, 1 Amp 125 VAC 	A pin plunger	75 2.65	UX30C10A01	UX30C30A01	10 .353	0,5 .020	0,25 .010	0,12 .005	5,5 ± 0,2 .217 ± .008
	C flat lever	25 .88	UX30C10C01	UX30C30C01	2,5 .088	2,1 .083	0,55 .022	0,50 .020	6,8 ± 1,0 .268 ± .039
	E roller lever simulated	27 .95	UX30C10E01	UX30C30E01	2,0 .071	2,1 .083	0,50 .020	0,50 .020	9,5 ± 1,0 .374 ± .039
Silver, 3 Amp 125 VAC 	A pin plunger	150 5.3	UX40E10A01	UX40E30A01	20 .705	0,5 .020	0,25 .010	0,12 .005	5,5 ± 0,2 .217 ± .008
	C flat lever	50 1.76	UX40E10C01	UX40E30C01	5,0 .176	2,1 .083	0,55 .022	0,50 .020	6,8 ± 1,0 .268 ± .039
	E roller lever simulated	55 1.94	UX40E10E01	UX40E30E01	4,0 .141	2,1 .083	0,50 .020	0,50 .020	9,5 ± 1,0 .374 ± .039

OTHER TERMINATION TYPES ARE AVAILABLE

For PC right angle, change 2nd set of numbers to 50 (Example: UX10C**50**A01)

For PC left angle, change 2nd set of numbers to 60 (Example: UX10C**60**A01)

Basic Switches

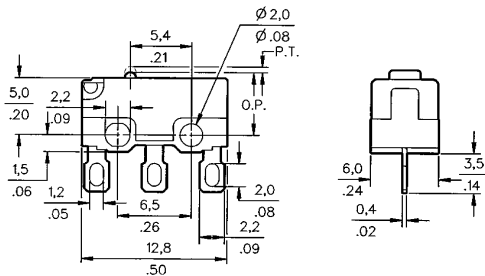
Subminiature

UX Series

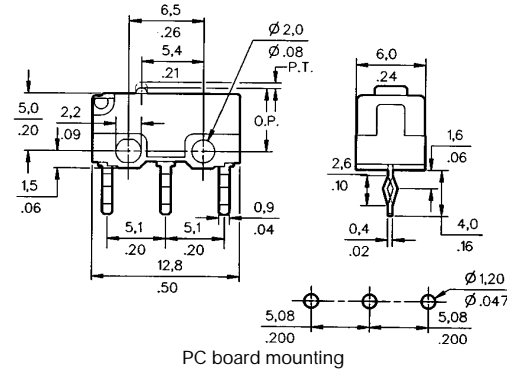
MOUNTING DIMENSIONS (for reference only) $\frac{\text{mm}}{\text{in.}}$

Pin plunger (Type A)

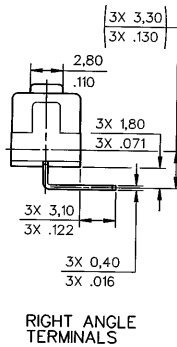
Solder terminals – Type 10



PC board terminals – Type 30

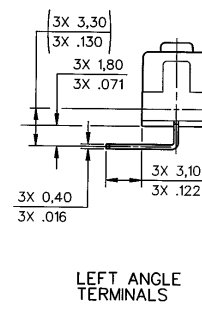


Type 50

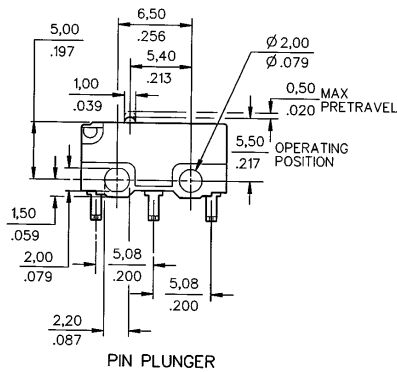


RIGHT ANGLE TERMINALS

Type 60



LEFT ANGLE TERMINALS



PIN PLUNGER

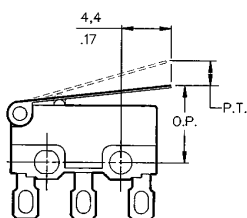
Miniature/
Subminiature

LEVER ACTUATORS

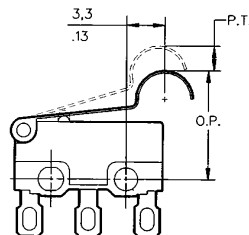
UX Series switches with lever actuators can be operated by cams or slides. They require lower operating forces than pin plunger switches.

Flat levers are .520 in. (13,2 mm) long and simulated roller levers are .480 in. (12,2 mm) long.

Flat lever (Type C)



Simulated Roller Lever (Type E)

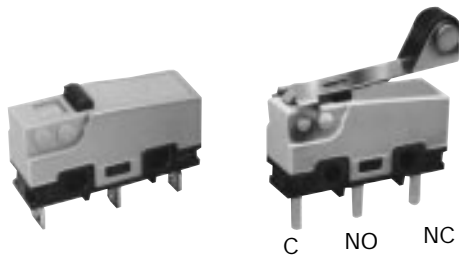


Mounting screw size is 2 mm.
Maximum tightening torque is 1 kg-cm.

Basic Switches

Subminiature

UM Series



FEATURES



- Choice of low energy or power duty electrical ratings
- Variety of integral actuators
- Temperature Range: -25° to +85°C (-13° to 185°F)
- Weight: 2 grams (.07 oz.)
- UL/CSA/VDE/SEMKO marking designations
- Form C single-pole double-throw (SPDT) circuitry

ELECTRICAL RATINGS (in amps)

Voltage	UM50E Silver Contacts		UM40B/D Silver Contacts		UM10A/B/D/E Gold Contacts
	Resistive	Inductive	Resistive	Inductive	Resistive
125 VAC	5	3	3	2	0.1
250 VAC	5	3	3	2	0.1
30 VDC	5	3*	3	2*	0.1

*Time constant for DC inductive loads: less than 7 msec.
UL File No. E12252, CSA File LR23413M167

ORDER GUIDE 0.1 AMP TYPE GOLD CONTACTS




Rating	Actuator Length	O.F. max. grams oz.	Terminals		R.F. min. g ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
			Solder	.110 QC					
 0.1 Amp 250 VAC	A pin plunger	25 .88	UM10A10A01	UM10A70A01	2 .071	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
		50 1.76	UM10B10A01	UM10B70A01	7,5 .265	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
		100 3.57	UM10D10A01	UM10D70A01	15 .529	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
		150 5.3	UM10E10A01	UM10E70A01	20 .705	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
	B flat lever 18mm	10 .35	UM10A10B01	UM10A70B01	0,4 .014	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
		20 .7	UM10B10B01	UM10B70B01	1,7 .060	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
		40 1.4	UM10D10B01	UM10D70B01	3,5 .123	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
		60 2.1	UM10E10B01	UM10E70B01	4,0 .141	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
	C flat lever 20mm	8 .28	UM10A10C01	UM10A70C01	0,35 .012	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
		16 .56	UM10B10C01	UM10B70C01	1,5 .053	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
		35 1.23	UM10D10C01	UM10D70C01	3,0 .106	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
		55 2	UM10E10C01	UM10E70C01	3,5 .123	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
	D flat lever 26mm	12 .4	UM10B10D01	UM10B70D01	1,2 .042	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
		25 .88	UM10D10D01	UM10D70D01	2,5 .088	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
		45 1.6	UM10E10D01	UM10E70D01	3,0 .106	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047

Basic Switches

Subminiature

UM Series

ORDER GUIDE 0.1 AMP TYPE GOLD CONTACTS cont.








Rating	Actuator Length	O.F. max. grams oz.	Terminals		R.F. min. g ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
			Solder	.110 QC					
0.1 Amp 250 VAC 	J flat lever 60mm	6 .2	UM10B10J01	UM10B70J01	0,5 .018	8,5 .335	2,2 .087	2,5 .098	8,8 ± 2,4 .346 ± .094
		15 .52	UM10D10J01	UM10D70J01	1,0 .035	8,5 .335	2,2 .087	2,5 .098	8,8 ± 2,4 .346 ± .094
		20 .7	UM10E10J01	UM10E70J01	1,0 .035	8,5 .335	2,2 .087	2,5 .098	8,8 ± 2,4 .346 ± .094
0.1 Amp 250 VAC 	E simulated roller lever, radius 2,5mm, 19mm	16 .56	UM10B10E01	UM10B70E01	1,5 .053	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
		35 1.23	UM10D10E01	UM10D70E01	3,0 .106	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
		55 2	UM10E10E01	UM10E70E01	3,5 .123	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
	H simulated roller lever, radius 1,3mm, 19mm	16 .56	UM10B10H01	UM10B70H01	1,5 .053	2,8 .110	1,2 .047	0,8 .031	10,7 ± 0,8 .421 ± .031
		35 1.23	UM10D10H01	UM10D70H01	3,0 .106	2,8 .110	1,2 .047	0,8 .031	10,7 ± 0,8 .421 ± .031
		55 2	UM10E10H01	UM10E70H01	3,5 .123	2,8 .110	1,2 .047	0,8 .031	10,7 ± 0,8 .421 ± .031
0.1 Amp 250 VAC 	F roller lever 18,00mm	20 .7	UM10B10F01	UM10B70F01	1,7 .060	2,5 .098	0,8 .031	0,5 .020	14,50 ± 0,8 .571 ± .031
		40 1.4	UM10D10F01	UM10D70F01	3,5 .123	2,5 .098	0,8 .031	0,5 .020	14,50 ± 0,8 .571 ± .031
		60 2.1	UM10E10F01	UM10E70F01	4,0 .141	2,5 .098	0,8 .031	0,5 .020	14,50 ± 0,8 .571 ± .031

Miniature/
Subminiature

OTHER TERMINATION TYPES ARE AVAILABLE

- For PC Straight cross-line, change 2nd set of numbers to 20 (Example: UM10A20A01)
- For PC Straight international, change 2nd set of numbers to 40 (Example: UM10A40A01)
- For PC Straight right angle, change 2nd set of numbers to 50 (Example: UM10A50A01)
- For PC Straight left angle, change 2nd set of numbers to 60 (Example: UM10A60A01)

ORDER GUIDE 3 AND 5 AMP TYPE SILVER CONTACTS

Rating	Actuator Length	O.F. max. grams oz.	Terminals		R.F. min. g ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
			Solder	.110 QC					
3 Amp 250 VAC 	A pin plunger	50 1.76	UM40B10A01	UM40B70A01	7,5 .265	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
		100 3.527	UM40D10A01	UM40D70A01	15,0 .529	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
3 Amp 250 VAC 	B flat lever 18mm	20 .7	UM40B10B01	UM40B70B01	1,7 .060	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
		40 1.4	UM40D10B01	UM40D70B01	3,5 .123	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
	C flat lever 20mm	16 .56	UM40B10C01	UM40B70C01	1,5 .053	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
		35 1.23	UM40D10C01	UM40D70C01	3,0 .106	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
	D flat lever 26mm	12 .4	UM40B10D01	UM40B70D01	1,2 .042	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
		25 .88	UM40D10D01	UM40D70D01	2,5 .088	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
	J flat lever 60mm	6 .2	UM40B10J01	UM40B70J01	0,5 .018	8,5 .335	2,2 .087	2,5 .098	8,8 ± 2,4 .346 ± .094
		15 .52	UM40D10J01	UM40D70J01	1,0 .035	8,5 .335	2,2 .087	2,5 .098	8,8 ± 2,4 .346 ± .094
3 Amp 250 VAC 	E simulated roller lever, radius 2,5mm 19mm	16 .56	UM40B10E01	UM40B70E01	1,5 .053	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
		35 1.23	UM40D10E01	UM40D70E01	3,0 .106	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
	H simulated roller lever, radius 1,3mm 19,15mm	16 .56	UM40B10H01	UM40B70H01	1,5 .053	2,8 .110	1,2 .047	0,8 .021	10,7 ± 0,8 .421 ± .031
		35 1.23	UM40D10H01	UM40D70H01	3,0 .106	2,8 .110	1,2 .047	0,8 .031	10,7 ± 0,8 .421 ± .031
	F roller lever 18mm	20 .7	UM40B10F01	UM40B70F01	1,7 .060	2,5 .098	0,8 .031	0,5 .020	14,50 ± 0,8 .571 ± .031
		40 1.4	UM40D10F01	UM40D70F01	3,5 .123	2,5 .098	0,8 .031	0,5 .020	14,50 ± 0,8 .571 ± .031
5 Amp 250 VAC 	A pin plunger	150 5.3	UM50E10A01	UM50E70A01	20 .705	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
	B flat lever 18mm	60 2.1	UM50E10B01	UM50E70B01	4,0 .141	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
	C flat lever 20mm	55 2	UM50E10C01	UM50E70C01	3,5 .123	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
	D flat lever 26mm	45 1.6	UM50E10D01	UM50E70D01	3,0 .106	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
	J flat lever 60mm		UM50E10J01	UM50E70J01	1,0 .035	8,5 .335	2,2 .087	2,5 .098	8,8 ± 2,4 .346 ± .094
	E simulated roller lever, radius 2,5mm 19mm	55 2	UM50E10E01	UM50E70E01	3,5 .123	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
	H simulated roller lever, radius 1,3mm 19mm	55 2	UM50E10H01	UM50E70H01	3,5 .123	2,8 .110	1,2 .047	0,8 .031	10,7 ± 0,8 .421 ± .031
	F roller lever 18mm	60 2.1	UM50E10F01	UM50E70F01	4,0 .141	2,5 .098	0,8 .031	0,5 .020	14,50 ± 0,8 .571 ± .031

OTHER TERMINATION TYPES ARE AVAILABLE

For PC Straight cross-line, change 2nd set of numbers to 20 (Example: UM40B20A01)
 For PC Straight international, change 2nd set of numbers to 40 (Example: UM40B40A01)
 For PC Straight right angle, change 2nd set of numbers to 50 (Example: UM40B50A01)
 For PC Straight left angle, change 2nd set of numbers to 60 (Example: UM40B60A01)

Basic Switches

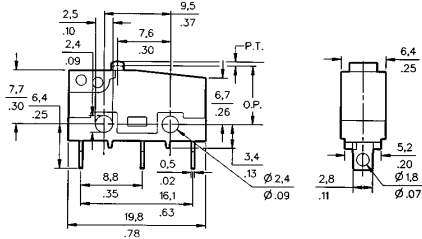
Subminiature

UM Series

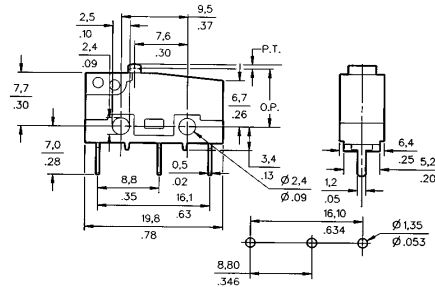
MOUNTING DIMENSIONS (for reference only) $\frac{\text{mm}}{\text{in.}}$

Pin Plunger Type A

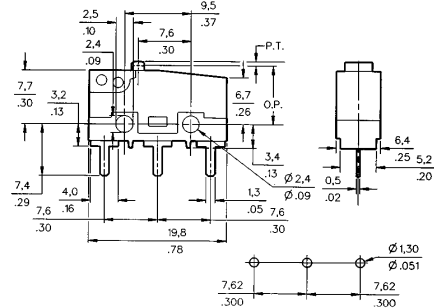
Solder Cross-line Terminals – Type 10



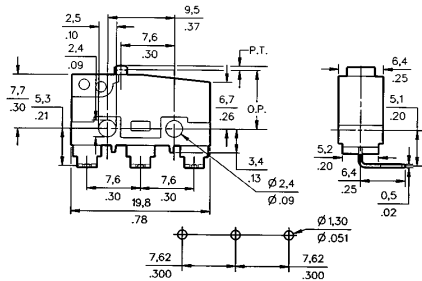
PC Straight Cross-Line – Type 20



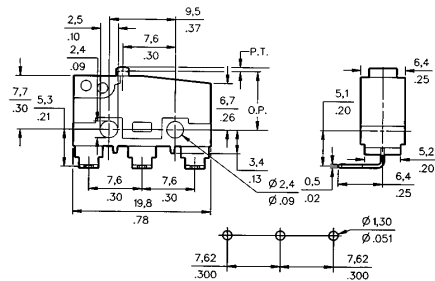
PC Straight In-line – Type 40



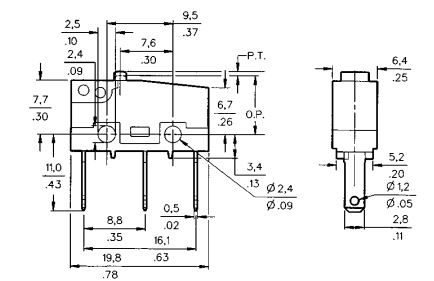
PC Right Angle In-line – Type 50



PC Left Angle In-line – Type 60



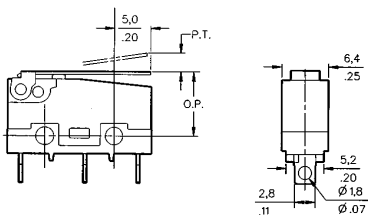
QC Quick Connect – Type 70



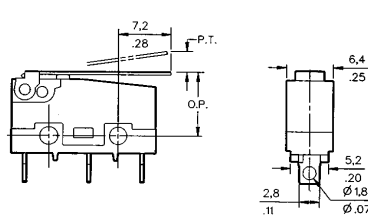
Miniature/
Subminiature

Lever Actuators 4mm (.158) wide

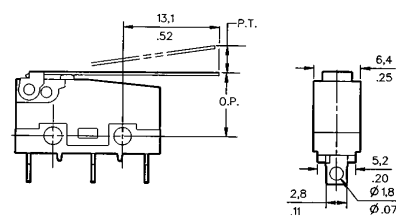
18mm Flat Lever Type B



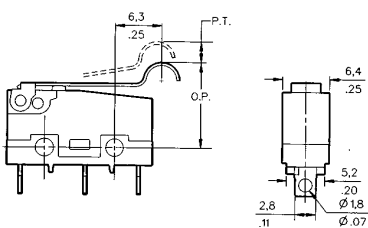
20mm Flat Lever Type C



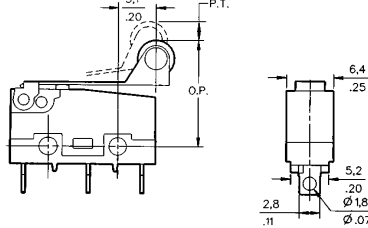
26mm Flat Lever Type D
60mm Type J



19mm Simulated Roller Type E/H
Type H has 1,3mm radius
Type E has 2,5mm radius



18mm Roller Lever Type F
5mm (.197 in.) dia. x 3,2mm (.126 in.)
thick roller



Mounting screw size is m 2,3.
Maximum tightening torque is 3 kg-cm.

Basic Switches

Sealed Subminiature

UM Series



IP50-SEALED



IP67-SEALED



FEATURES

- Silver or gold contacts
- Variety of integral actuator styles including pin plunger, flat lever, roller lever, and simulated roller lever
- IP50 or IP67 type sealing
- Choice of quick-connect, printed circuit board, solder or leadwire termination
- Form C single-pole double-throw
- Temperature range: -40° to 85°C (-40° to 185°F)
- Weight, approx.: .07 oz. (2g.) for IP50-sealed switches; and .14 oz. (4g.) for IP67-sealed switches, not including leadwires
- UL, CSA, VDE, and SEMKO marking designations

ELECTRICAL RATINGS (in amps)

Voltage	Silver Contacts		Gold Contacts
	Resistive	Inductive	Resistive
125 VAC	2.0	2.0	0.1A
250 VAC	2.0	2.0	0.1A
30 VDC	2.0	2.0	0.1A
125 VDC	0.4	0.05	—

UL File No. E12252, CSA File LR23413M167

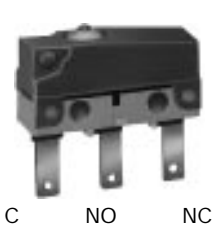
IP50-sealed UM switches are the same size as non-sealed UM switches on pages 12-15. There is an elastomer seal on the switch plunger and a cover-to-case seal. They provide a degree of protection against the entry of dust.

IP67-sealed UM switches have the plunger seal and cover-to-case seal. In addition, their AWG #20 leadwires are molded in epoxy resin. They provide a degree of protection against water entry during temporary immersion.

Basic Switches

IP50-Sealed Subminiature

UM Series



ORDER GUIDE IP50 SEALED 0.1-AMP GOLD CONTACTS

Actuators	O.F. max. grams oz.	Termination		R.F. min. grams ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
		Solder	.110 QC					
A pin plunger	150 5.3	UM10E11AS1	UM10E71AS1	20 .705	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
B flat lever	60 2.1	UM10E11BS1	UM10E71BS1	4,0 .141	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
C flat lever	55 1.9	UM10E11CS1	UM10E71CS1	3,5 .123	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
D flat lever	45 1.6	UM10E11DS1	UM10E71DS1	3,0 .106	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
E simulated roller lever	55 1.9	UM10E11ES1	UM10E71ES1	3,5 .123	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
F roller lever	60 2.1	UM10E11FS1	UM10E71FS1	4,0 .141	2,5 .098	0,8 .031	0,5 .020	14,5 ± 0,8 .571 ± .031

Miniature/
Subminiature

ORDER GUIDE IP50 SEALED 2.0-AMP SILVER CONTACTS

Actuators	O.F. max. grams oz.	Termination		R.F. min. grams ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
		Solder	.110 QC					
A pin plunger	150 5.3	UM35E11AS1	UM35E71AS1	20 .705	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
B flat lever	60 2.1	UM35E11BS1	UM35E71BS1	4,0 .141	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
C flat lever	55 1.9	UM35E11CS1	UM35E71CS1	3,5 .123	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
D flat lever	45 1.6	UM35E11DS1	UM35E71DS1	3,0 .106	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
E simulated roller lever	55 1.9	UM35E11ES1	UM35E71ES1	3,5 .123	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
F roller lever	60 2.1	UM35E11FS1	UM35E71FS1	4,0 .141	2,5 .098	0,8 .031	0,5 .020	14,5 ± 0,8 .571 ± .031

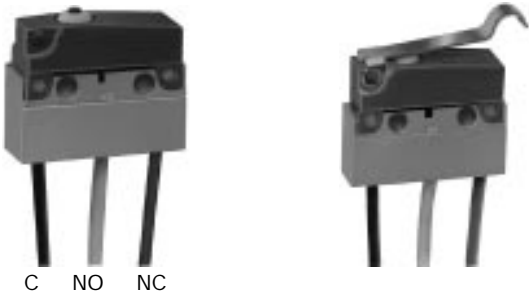
TO SPECIFY PC TERMINALS:

In the order guides above, change the 2nd set of numbers to 21. **Example:** UM10E11AS1 converts to UM10E21AS1 with PC terminals

Basic Switches

IP67-Sealed Subminiature

UM Series



ORDER GUIDE IP67 SEALED 0.1-AMP GOLD AND 2.0-AMP SILVER CONTACTS

Actuators	O.F. max. grams oz.	Leadwire Termination		R.F. min. grams ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P mm inches
		Gold Contacts	Silver Contacts					
A pin plunger	150 5.3	UM10E90AS1	UM35E90AS1	20 .705	0,6 .024	0,4 .016	0,1 .004	8,4 ± 0,3 .331 ± .012
B flat lever	60 2.1	UM10E90BS1	UM35E90BS1	4,0 .141	2,5 .098	0,8 .031	0,5 .020	8,8 ± 0,8 .346 ± .031
C flat lever	55 1.9	UM10E90CS1	UM35E90CS1	3,5 .123	2,8 .110	1,2 .047	0,8 .031	8,8 ± 0,8 .346 ± .031
D flat lever	45 1.6	UM10E90DS1	UM35E90DS1	3,0 .106	3,5 .138	1,6 .063	1,0 .039	8,8 ± 1,2 .346 ± .047
E simulated roller lever	55 1.9	UM10E90ES1	UM35E90ES1	3,5 .123	2,8 .110	1,2 .047	0,8 .031	11,65 ± 0,8 .459 ± .031
F roller lever	60 2.1	UM10E90FS1	UM35E90FS1	4,0 .141	2,5 .098	0,8 .031	0,5 .020	14,5 ± 0,8 .571 ± .031

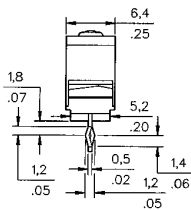
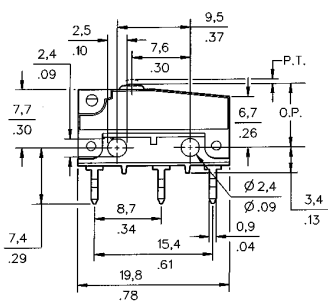
MOUNTING DIMENSIONS (For reference only)

mm
in.

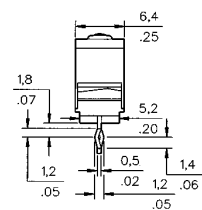
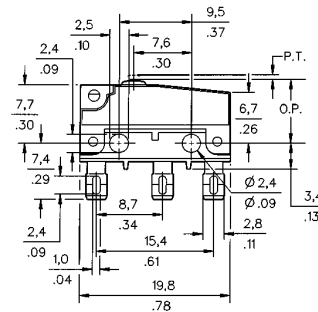
Mounting screw size is m 2,3
Maximum torque is 3 kg/cm.

Pin Plunger Type A

PC Terminals



Solder In-line Terminals



Basic Switches

IP50-Sealed Subminiature

UM Series

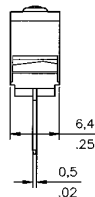
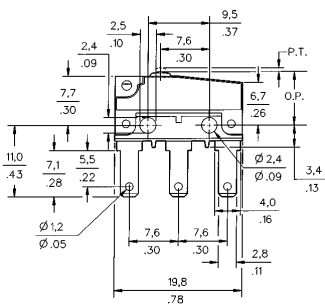
MOUNTING DIMENSIONS (For reference only)

mm
in.

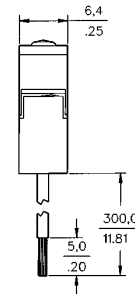
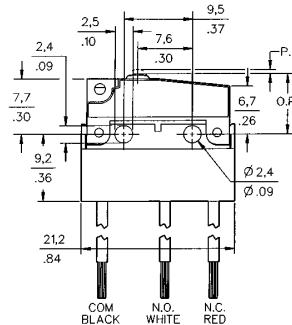
Mounting screw size is m 2,3
Maximum torque is 3 kg/cm.

Pin Plunger Type A

QC In-line Terminals

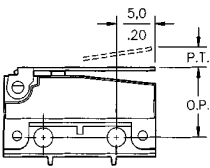


Leadwires

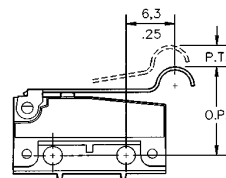


Lever Actuators 4 mm/.158 in. wide

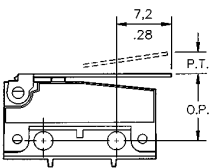
18 mm Flat Lever Type B



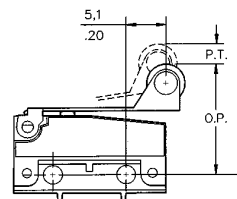
19 mm Simulated Roller Lever Type E 2,5 mm radius



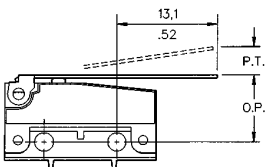
20 mm Flat Lever Type C



18 mm Roller Lever Type F 5 mm/.197 in. dia. x 3,2 mm/.126 in. Thick Roller



26 mm Flat Lever Type D

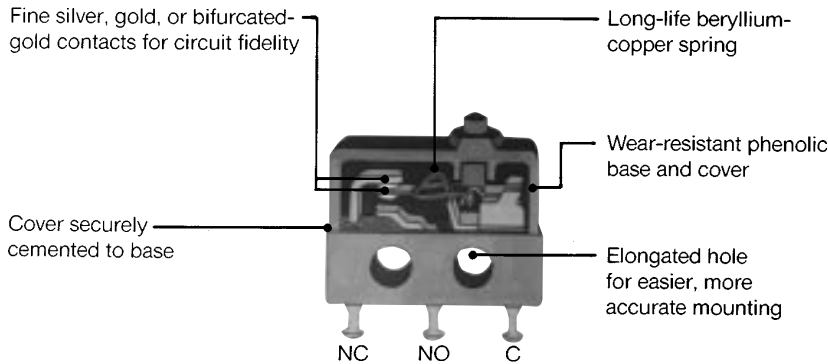


Miniature/
Subminiature

Basic Switches

Subminiature

CUT-A-WAY 1SX SUBMINIATURE BASIC SWITCH



FEATURES

- Low operating force to 3 oz. (85 grams) maximum
- Sensitive differential travel as low as .001 inch maximum
- Power load switching capability up to 7 amperes—silver contacts
- Optional gold contacts for low energy applications
- Optional bifurcated gold contacts for maximum reliability
- Long mechanical life up to 10,000,000 cycles—95% survival for 11SX series 1,000,000 cycles—95% survival for 1SX series
- Temperature tolerance -65° to $+250^{\circ}\text{F}$ (-54 to 121°C) on standard construction
- High temperature designs for up to $+400^{\circ}\text{F}$ (204°C) for 100 hours
- Variety of integral and auxiliary actuators
- Choice of several terminal styles
- MIL-S-8805 qualified products available
- UL recognized File #E12252, CSA certified file # LR41372

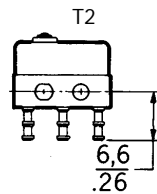
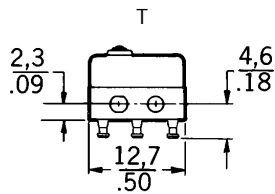
AVAILABLE TERMINALS

SX switches are available with several types of terminations. The T and T2 terminals provide easy solder lead wire attachment. The H58 terminal offers the simplicity of quick-connect and mate with AMP .058-inch receptacles. Pin terminals allow easy attachment to printed circuit boards.

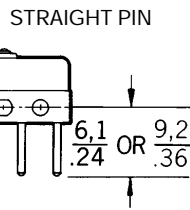
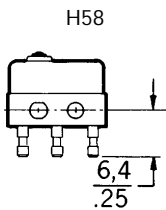
GENERAL INFORMATION

SX subminiature basic switches are small size precision snap-action switches from MICRO SWITCH. These switches are ideal where savings in space and weight are important. Unless otherwise noted, all listings have silver contacts.

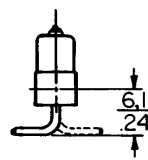
Miniature/
Subminiature



Mounting torque Round head 2-56 UNC 438 screws—2 inch pounds max.



H391, H392
90° FORMED PIN



Mate with Amp Inc. Part No. 640024-1 Std.

Dimensions shown are for reference only

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

This section covers only **40** of our most popular SX Series catalog listings. If you don't find what you're looking for, it's likely one of the approximately **200** other active SX listings will meet your needs. Contact the 800 number.

Basic Switches

Subminiature

SX Series

ORDER GUIDE by ascending electrical capability

PIN PLUNGER

Catalog Listing	Recommended for	Electrical Data and UL Code Page 20	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P.* mm inches
11SX91-T	Logic level loads 5VDC, 2mA; SPNO	At Left	1,39 5	0,28 1	0,51 .020	0,1 .004	0,1 .004	8,13 .320
12SX2-T	Best reliability (Bifurcated gold contacts)	.010 Amp H	0,7 to 1,39 2.5 to 5	0,28 1	0,51 .020	0,1 .004	0,051 .002	8,13 .320
3SX1-T	Applications requiring gold contacts (1SX type)	1 Amp D	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
12SX1-T	Best reliability with higher current rating (Bifurcated gold contacts)	1 Amp D	1,39 5	0,28 1	0,51 .020	0,1 .004	0,076 .003	8,13 .320
12SX3-T	Lowest differential travel with bifurcated gold contacts	1 Amp H	1,39 5	0,28 1	0,51 .020	0,1 .004	0,025 .001	8,13 .320
13SX21-T	Applications requiring gold contacts. 11SX type.	1 Amp D	1,39 5	0,28 1	0,51 .020	0,1 .004	0,051 .002	8,13 .320
23SX39-T (MS24547-2)	MIL-S-8805 applications requiring gold contacts +180°F (82°C) max. use	1 Amp D	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
23SX39-T2 (MS24547-5)	As above, with T2 terminals	1 Amp D	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
93SX39-T M8805/109-03	.156" wide, with gold contacts +180°F (82°C)	1 Amp D	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
411SX21-T M8805/106-01	+400°F (204°C) for 100 hours	G	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .220
413SX21-T M8805/106-02	+400°F (204°C) for 100 hours	L	1,39 5	0,28 1	0,51 .020	0,1 .004	0,051 .002	8,13 .220
11SX1-T	Lowest differential travel	3 Amps E	0,97 3.5	0,21 0.75	0,51 .020	0,1 .004	0,025 .001	8,13 .320
11SX21-T	Most applications	5 Amps A	0,7 to 1,39 2.5 to 5	0,28 1	0,51 .020	0,1 .004	0,051 .002	8,13 .320
11SX22-T	For use in sealed enclosures.	5 Amps A	1,39 5	0,28 1	0,51 .020	0,1 .004	0,076 .003	8,13 .320
17SX21-T	Best stability under varying humidity. 11SX type.	5 Amps A	1,39 5	0,28 1	0,51 .020	0,1 .004	0,051 .002	8,13 .320
1SX1-T	Up to 7 amps load handling	7 Amps B	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
1SX12-T	Low differential travel	7 Amps C	1,39 5	0,28 1	0,51 .020	0,1 .004	0,051 .002	8,13 .320
1SX48-T	Added overtravel	7 Amps B	1,39 5	0,28 1	0,51 .020	0,25 .010	0,13 .005	8,13 .320
2SX1-T	Lower force	7 Amps B	0,83 3	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
4SX1-T	Operating in temperature to +400°F (204°C) for 100 hours	7 Amps I	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
21SX1-T	Best stability under varying humidity (1SX type)	7 Amps B	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
21SX39-T (MS24547-1)	MIL-S-8805 application requirements +180°F (82°C)	7 Amps F	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
21SX39-T2 (MS24547-4)	MIL-S-8805 application requirements +180°F (82°C)	7 Amps F	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320
91SX39-T M8805/109-01	.156" wide version of standard SX +180°F (82°C)	7 Amps F	1,39 5	0,28 1	0,51 .020	0,1 .004	0,13 .005	8,13 .320

*±0,38 mm
±.015 in.



Dim. Dwg. Fig. 1
(Except Fig. 2
for 91SX39-T
and 93SX34-T)

Basic Switches

Subminiature

SX Series

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

ORDER GUIDE

INTEGRAL LEVERS



Dim. Dwg. Fig. 3

Catalog Listing	Description	Electrical Data And UL Code Page 20	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches
311SX1-T	.135 inch (3,43 mm) straight lever	5 Amps A	0,49 1.76	0,09 .32	1,65 .065	0,36 .014	0,51 .020	8,43±1,14 .332±.045
313SX1-T	As above with gold contacts	1 Amp D	0,49 1.76	0,09 .32	1,65 .065	0,36 .014	0,51 .020	8,43±1,14 .332±.045



Dim. Dwg. Fig. 3

311SX2-T	.505 inch (12,8 mm) straight lever	5 Amps A	0,31 1.1	0,05 .18	2,92 .115	0,64 .025	0,89 .035	8,26±1,91 .325±.075
313SX2-T	As above with gold contacts	1 Amp D	0,31 1.1	0,05 .18	2,92 .115	0,64 .025	0,89 .035	8,26±1,91 .325±.075



Dim. Dwg. Fig. 4

311SX3-T	.965 inch (24,5 mm) straight lever	5 Amps A	0,20 .71	0,03 .11	4,70 .185	0,61 .024	1,52 .060	7,75±2,92 .305±.115
313SX3-T	As above with gold contacts	1 Amp D	0,20 .71	0,03 .11	4,70 .185	0,61 .024	1,52 .060	7,75±2,92 .305±.115



Dim. Dwg. Fig. 5

311SX4-T	.042 inch (1,1 mm) simulated roller lever	5 Amps A	0,58 2.1	0,11 .39	1,27 .050	0,25 .010	0,38 .015	14,15±0,91 .557±.036
313SX4-T	As above with gold contacts	1 Amp D	0,58 2.1	0,11 .39	1,27 .050	0,25 .010	0,38 .015	14,15±0,91 .557±.036



Dim. Dwg. Fig. 6

311SX5-T	.459 inch (11,7 mm) simulated roller lever	5 Amps A	0,31 1.1	0,05 .18	2,67 .105	0,56 .022	0,89 .035	14,86±1,65 .585±.065
313SX5-T	As above, with gold contacts	1 Amp D	0,31 1.1	0,05 .18	2,67 .105	0,56 .022	0,89 .035	14,86±1,65 .585±.065

Miniature/
Subminiature

Basic Switches

Subminiature

SX

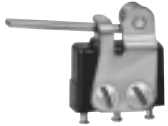
Characteristics: O.F. – Operating Force; R.F. – Release Force; P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel; O.P. – Operating Position; F.P. – Free Position.

*All characteristics are taken with actuator assembled on Catalog Listing 1SX1-T as shown.

ORDER GUIDE

AUXILIARY ACTUATORS

Switches are not included with actuators.



Dim. Dwg. Fig. 7

Catalog Listing	Description	Actuator Length "A" mm inches	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. mm inches	O.T. mm inches	D.T. max. mm inches	O.P.†† mm inches	F.P. mm inches
JX-20	Straight lever	18,3 .72	0,28 1 approx.	0,04 .14	—	0,76 .030 approx.	0,76 .030 approx.	10,8 .425 approx.	12,3 .485 approx.
JX-219	Straight lever (For higher temp.)	18,3 .72	0,28 1	0,04 .14	—	0,76 .030 approx.	0,76 .030 approx.	10,8 .425 approx.	12,3 .485 approx.



Dim. Dwg. Fig. 8

JX-25	Roller lever	16,5 .65	0,42 1.5	0,04 1.4	—	0,51 .020	0,76 .030	14,9=1,14 .585=.045	168 .660 max.
JX-220	Roller lever (For higher temp.)	16,5 .65	0,42 1.5	0,04 .14	—	0,51 .020	0,76 .030	14,9=1,14 .585=.045	16,8 .660 max.



Dim. Dwg. Fig. 9

JX-40	Straight leaf	9,4 .37†	1,95 7	0,56 2	.225 approx.	0,38 .015	0,64 .025	7,5 .295	12,3 .485 ref.
JX-95	Straight leaf (For higher temp.)	9,4 .37†	1,95 7	0,56 2	.225 approx.	0,38 .015	0,64 .025	7,5 .295	12,3 .485 ref.
JX-41**	Reverse leaf	9,4 .37†	1,67 6	0,28 1	.110 approx.	0,38 .015	0,64 .025	7,5 .295	9,4 .370 ref.



Dim. Dwg. Fig. 9

JX-45	Roller leaf	6,1 .24†	1,95 7	0,28 1	.225 approx.	0,38 .015	0,64 .025	12,2 .480	16,5 .650 ref.
JX-96	Roller leaf (For higher temp.)	6,1 .24†	1,95 7	0,28 1	.225 approx.	0,38 .015	0,64 .025	12,2 .480	16,5 .650 ref.
JX-51**	Reverse roller leaf	7,6 .30†	1,67 6	0,56 2	.110 approx.	0,38 .015	0,64 .025	12,8 .505	14,7 .580 ref.



Dim. Dwg. Fig. 10

JX-4	Tandem leaf	7,9 .31	4,17 15	0,83 3	.065 approx.	0,20 .008	0,76 .030	7,6 .300	9,40 .370 ref.
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**Switch is mounted with plunger end reversed from JX-40.

†"A" measurement is from center of mounting hole nearest tip of lever to the point indicated on drawing.

NOTE: Above actuators should be used at temperatures below +300°F (149°C); except listings JX-95, JX-96, JX-219 and JX-220 are for use with the 4SX1-T to 400°F. (204°C).

Except where stated †† ±0,76 mm ±.030 in.

Basic Switches

Subminiature

SX Series

MOUNTING DIMENSIONS (for reference only)

PIN PLUNGER

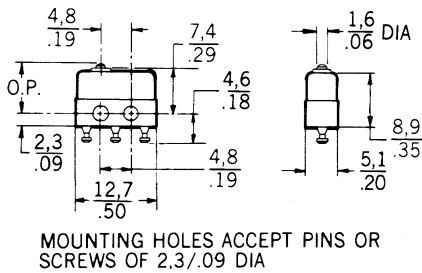


Fig. 1

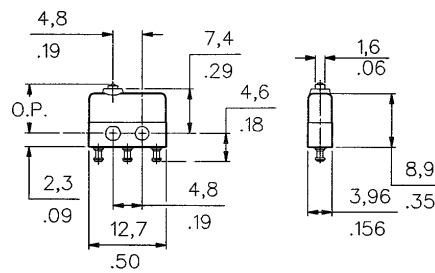


Fig. 2

INTEGRAL LEVERS

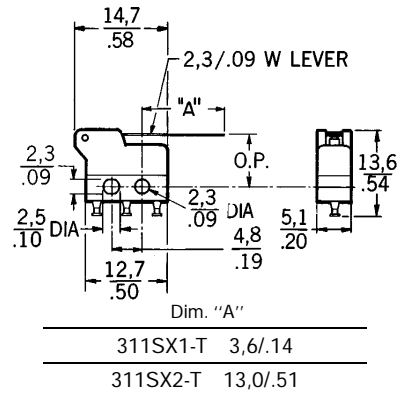


Fig. 3

INTEGRAL LEVERS

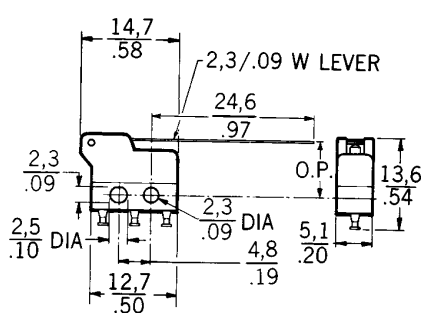


Fig. 4

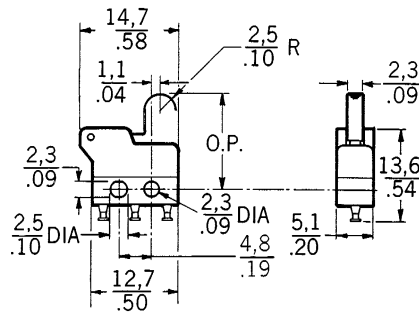


Fig. 5

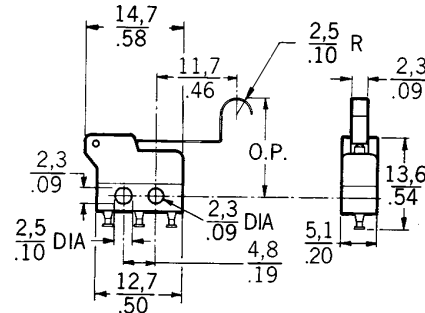


Fig. 6

Interchangeable with 1SX-1T switch with JX-25 actuator.

Miniature/
Subminiature

AUXILIARY ACTUATORS

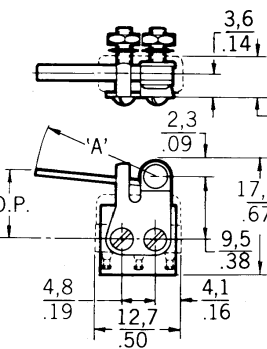


Fig. 7

Switches are not included with actuator.

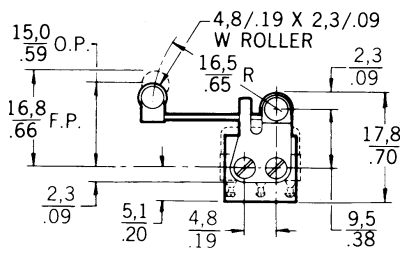


Fig. 8

Mounting holes accept pins or screws of .087 diameter (2,21 mm).

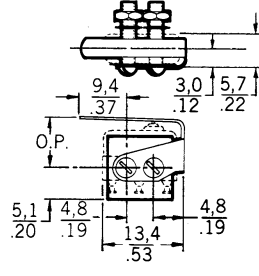


Fig. 9

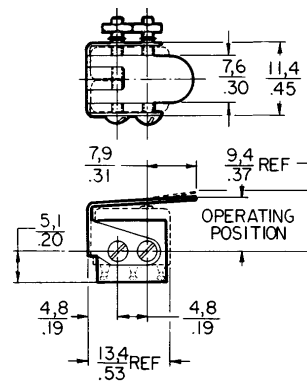


Fig. 10

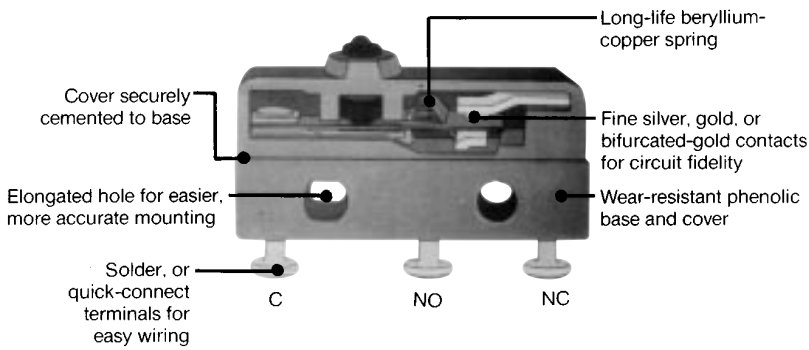
Key: 0,0 = mm
0.00 = inches

Basic Switches

Subminiature

SM Series

CUT-A-WAY SM SUBMINIATURE BASIC SWITCH



AVAILABLE TERMINALS

Various terminals are available for most listings. These include: the T and T2 for wrap-around soldering of leadwires; solder terminals for solder connections; H58 terminals and H4 series terminals provide easy quick-connect installation; H2 type, round wire wrap or PC terminals; H6 rectangular wire wrap terminals are also available. Other quick-connect terminals of the Series H types are available. Contact the 800 number for ordering information.

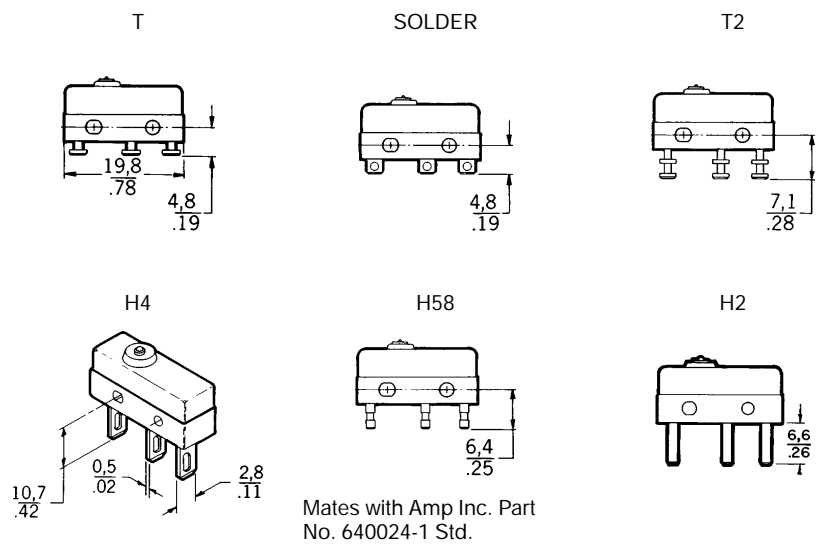
GENERAL INFORMATION

SM subminiature switches are slightly larger than the SX switches. These switches combine small size and light weight with ample electrical capacity, precision operation and long life. Unless otherwise noted, all listings have silver contacts.

FEATURES

- Low operating force to 2 ounces maximum
- Sensitive differential travel as low as .001 inch (0,025 mm) maximum
- Power load switching capability available to 11 amps (VAC) – silver contacts
- Motor load handling capacity to 1/4 hp (VAC)
- Optional gold contacts for low energy applications
- Optional bifurcated gold contacts for maximum reliability
- Long mechanical life
 - 11SM Series 10,000,000 operations
 - 1SM/41SM Series 80,000 operations
 - Bifurcated contacts 1,000,000 operations
- All at 95% survival
- Standard temperature range –65° to +185°F (–54 to 85°C)
- High temperature construction available for use to +400°F (204°C) for 100 hours
- Variety of integral and auxiliary actuators
- Choice of several terminal styles
- Military Standard construction available with three listings on the MIL-S-8805 qualified products list
- UL recognized File #E12252, CSA certified File #LR41372

Mounting Torque:
2.3 inch pounds max.



Dimensions shown are for reference only

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

This section covers only **38** of our most popular SM Series catalog listings. If you don't find what you're looking for, it's likely one of the approximately **500** other active SM listings will meet your needs. Contact the 800 number.

Basic Switches

Subminiature

SM Series

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

ORDER GUIDE by ascending electrical capability

PIN PLUNGERS



Dim. Dwg. Fig. 1

Catalog Listing	Recommended For	Electrical Data And UL Code Page 20	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
11SM1077-T	Gold alloy contacts	.1 Amp P	0,83-1,39 3-5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330
12SM604-T	Bifurcated gold contacts, reduced rating	.1 Amp P	0,83-1,39 3-5	0,28 1	0,51 .020	0,076 .003	0,1 .004	8,38 .330
11SM23-T	Application requiring gold contacts	1 Amp N	0,83-1,39 3-5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330
12SM4-T	Best reliability (Bifurcated gold contacts)	1 Amp N	0,83-1,39 3-5	0,28 1	0,51 .020	0,076 .003	0,1 .004	8,38 .330
11SM701-T	Lower force	4 Amps S	0,56 2	0,14 .5	0,51 .020	0,13 .005	0,051 .002	8,38 .330
11SM1-T	Most applications	5 Amps J	0,83-1,39 3-5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330
11SM3-T	Operating in temperatures to +250°F (121°C)	5 Amps J	0,83-1,39 3-5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330
11SM244-T	Operating in temperatures to +400°F (204°C) 100 hrs.	5 Amps *	0,83-1,39 3-5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330
11SM401-T	Less differential travel	5 Amps K	0,97 3.5 max.	0,28 1	0,51 .020	0,13 .005	0,025 .001	8,38 .330
21SM284-T2 (MS25085-2)	MIL-S-8805 application requirements	5 Amps R	0,83-1,39 3-5	0,28 1	0,76 .030	0,13 .005	0,1 .004	8,38 .330
21SM284 (MS25085-1)	MIL-S-8805 application requirements, solder terminals	5 Amps R	0,83-1,39 3-5	0,28 1	0,76 .030	0,13 .005	0,1 .004	8,38 .330
22SM1-T	Best stability under varying humidity	5 Amps J	0,83-1,39 3-5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330
41SM1-T	Up to 11 ampere 1/4 hp (AC) load handling	11 Amps M	0,83-1,39 3-5	0,28 1	0,76 .030	0,13 .005	0,1 .004	8,38 .330

*For electrical data call 1-800-537-6945

411SM1	Sealed plunger construction	5 Amps K	0,83-2,09 3-7.5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330
411SM23	As above with gold contacts	1 Amp N	0,83-2,09 3-7.5	0,28 1	0,51 .020	0,13 .005	0,1 .004	8,38 .330

Except where stated * ±0,38mm
±.015 in.

Miniature/
Subminiature

Basic Switches

Subminiature

SM Series

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

ORDER GUIDE

INTEGRAL LEVERS



Dim. Dwg. Fig. 4

Catalog Listing	Description	Electrical Data And UL Code Page 20	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
311SM1-T	.285 inch (7,24mm) straight lever	5 Amps J	0,39 1.4	0,07 .25	2,16 .085	0,51 .020	0,48 .019	8,64±1,5 .340±.060
311SM23-T	As above with gold contacts	1 Amp N	0,39 1.4	0,07 .25	2,16 .085	0,51 .020	0,48 .019	8,64±1,5 .340±.060
311SM701-T	.285 inch (7,24mm) straight lever. Lower force	4 Amps S	0,16 .57	0,03 .11	2,16 .085	0,51 .020	0,36 .014	8,64±1,5 .340±.060

311SM2-T	.565 inch (14,35mm) straight lever	5 Amps J	0,31 1.1	0,05 .18	3,05 .120	0,66 .026	0,69 .027	8,51±2 .335±.080
311SM43-T	As above with gold contacts	1 Amp N	0,31 1.1	0,05 .18	3,05 .120	0,66 .026	0,69 .027	8,51±2 .335±.080
311SM702-T	.565 inch (14,35mm) straight lever. Lower force	4 Amps S	0,11 .4	0,02 .07	3,05 .120	0,66 .026	0,38 .015	8,51±2 .335±.080

311SM3-T	1.765 inch (44,8mm) straight lever	5 Amps J	0,15 .53	0,02 .07	7,87 .310	1,45 .057	2,8 .110	7,11±4,3 .280±.170
311SM17-H58	As above with gold contacts	1 Amp N	0,15 .53	0,02 .07	7,87 .310	1,45 .057	2,8 .110	7,11±4,3 .280±.170
311SM703-T	1.765 inch (44,8mm) straight lever. Lower force	4 Amps S	0,06 .2	0,01 .04	7,87 .310	1,45 .057	1,78 .070	7,11±4,3 .280±.170

311SM4-T	.251 inch (6,38mm) simulated roller lever	5 Amps J	0,39 1.4	0,07 .25	2,16 .085	0,46 .018	0,48 .019	11,7±1,5 .460±.060
311SM25-T	As above with gold contacts	1 Amp N	0,39 1.4	0,07 .25	2,16 .085	0,46 .018	0,48 .019	11,7±1,5 .460±.060
311SM704-T	.251 inch (6,38mm) simulated roller lever. Lower force	4 Amps S	0,16 .57	0,03 .11	2,16 .085	0,46 .018	0,33 .013	11,7±1,5 .460±.060

311SM5-T	.535 inch (13,6mm) simulated roller lever	5 Amps J	0,31 1.1	0,05 .18	3,05 .120	0,66 .026	0,69 .027	11,56±2 .455±.080
311SM705-T	.535 inch (13,6mm) simulated roller lever. Lower force	4 Amps S	0,11 .4	0,02 .07	3,05 .120	0,66 .026	0,38 .015	11,56±2 .455±.080

311SM6-T	.251 inch (6,38mm) roller lever	5 Amps J	0,39 1.4	0,07 .25	2,16 .085	0,46 .018	0,48 .019	14,2±1,5 .560±.060
311SM68-T	As above with gold contacts	1 Amp N	0,39 1.4	0,07 .25	2,16 .085	0,46 .018	0,48 .019	14,2±1,5 .560±.060
311SM706-T	.251 inch (6,38mm) roller lever. Lower force	4 Amps S	0,16 .57	0,03 .11	2,16 .085	0,46 .018	0,33 .013	14,2±1,5 .560±.060

311SM7-T	.535 inch (13,6mm) roller lever	5 Amps J	0,31 1.1	0,05 .18	3,05 .120	0,66 .026	0,69 .027	14,1±2 .555±.080
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Dim. Dwg. Fig. 10

Basic Switches

Subminiature

SM Series

ORDER GUIDE

INTEGRAL LEAF



Dim. Dwg. Fig. 11

Catalog Listing	Recommended For	Electrical Data And UL Code Page 20	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches
111SM1-T	Force and stability of flexible leaf actuator	5 Amps J	1,95 7	0,56 2	5,54 .218	0,76 .030	0,76 .030	8,89±0,76 .350±.030
111SM17-T	As above with gold contacts	1 Amp N	1,95 7	0,56 2	5,54 .218	0,76 .030	0,76 .030	8,89±0,76 .350±.030



Dim. Dwg. Fig. 12

111SM2-T	Flexible leaf with roller	5 Amps J	1,95 7	0,56 2	5,56 .219	0,76 .030	0,64 .025	14,3±0,76 .562±.030
111SM23-T	As above with gold contacts	1 Amp N	1,95 7	0,56 2	5,56 .219	0,76 .030	0,64 .025	14,3±0,76 .562±.030

Miniature/
Subminiature

Basic Switches

Subminiature

SM Series

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

* All characteristics are taken with actuator assembled to Catalog Listing 11SM3-T as shown.

AUXILIARY ACTUATORS

Switches are not included with the actuators.



Dim. Dwg. Fig. 14

ORDER GUIDE

Catalog Listing	Description	Actuator Length "A" mm inches	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches	F.P. max. mm inches
JS-2	Straight leaf	16,8 .66	2,78 10	0,56 2	1,98 .078	0,38 .015	0,38 .015	8,89±0,38 .350±.015	11,3 .445



Dim. Dwg. Fig. 14

JS-5	Roller leaf (Bronze roller)	15 .59	2,78 10	0,83 3	1,98 .078	0,38 .015	0,38 .015	14,2±0,38 .580±.015	16,9 .665
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Dim. Dwg. Fig. 14

JS-7	Formed leaf (Simulated roller)	14,7 .58	2,78 10	0,56 2	2,39 .094	0,79 .031	0,38 .015	9,65±0,38 .380±.015	12,1 .475
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Dim. Dwg. Fig. 16

JS-220	Straight lever	26,2† 1.03	0,28 1	0,04 .14	3,18 .125 approx.	0,76 .030	0,76 .030	10,3 .406 approx.	—
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Dim. Dwg. Fig. 16

JS-246	Roller lever (Steel roller)	25,4† 1.00	0,28 1	0,04 .14	3,18 .125 approx.	0,76 .030	0,76 .030	14,3 .562 approx.	—
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Dim. Dwg. Fig. 16

JS-221	Formed lever (Simulated roller)	25,4† 1.00	0,28 1	0,04 .14	3,18 .125 approx.	0,76 .030	0,76 .030	11,6 .455 approx.	—
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JS-33**	Tandem leaf	5,3 .21	5,00 18	2,78 10	2,36 .093	0,15 .006	0,38 .015	8,89±0,38 .350±.015	10,5 .415
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JS-31**	Tandem roller leaf (Bronze roller)	4,3 .17	11,1 40	4,45 16	2,36 .093	0,13 .005	0,38 .015	14,5±0,38 .570±.015	16,1 .635
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**Travel characteristics on tandem actuators vary with actual basic switch characteristics.

NOTE: Above actuators should be used below +300°F.

See page 79 for other actuators that may be used with SM Switches at higher temperatures.

†"A" measurement is from the pivot point of lever to the point indicated on drawing.

Basic Switches

Subminiature

SM Series

MOUNTING DIMENSIONS (for reference only)

PIN PLUNGER

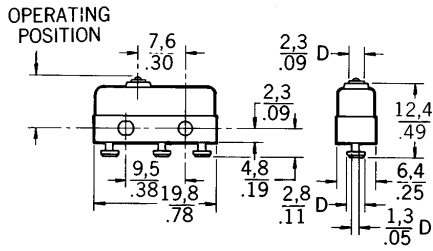


Fig. 1

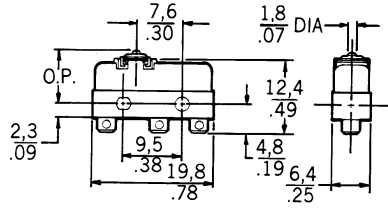


Fig. 2

INTEGRAL LEVERS

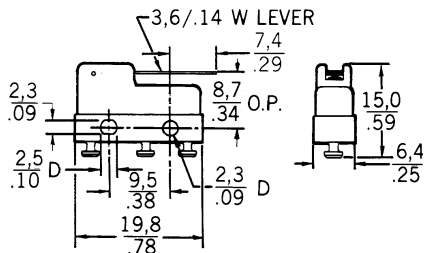


Fig. 4

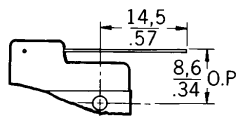


Fig. 5

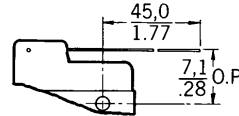


Fig. 6

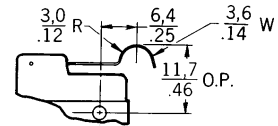


Fig. 7

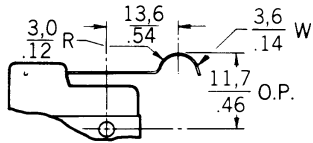


Fig. 8

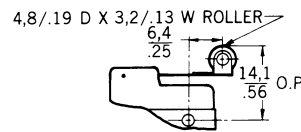


Fig. 9

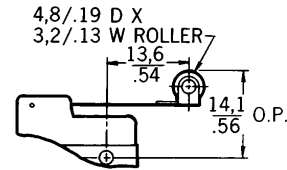


Fig. 10

Miniature/
Subminiature

INTEGRAL LEAFS

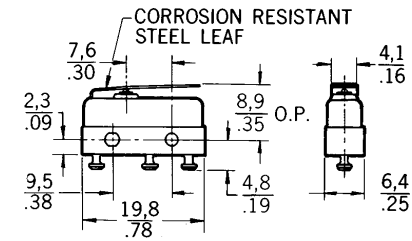


Fig. 11

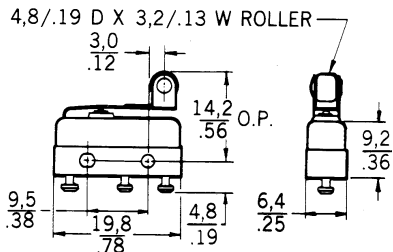


Fig. 12

Mounting holes accept pins or screws of .087 inch (2,21 mm) max. diameter

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

AUXILIARY ACTUATORS

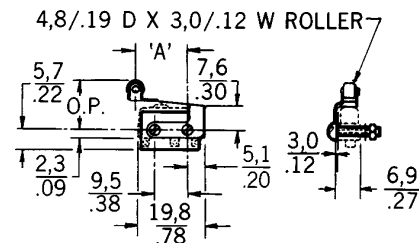


Fig. 14

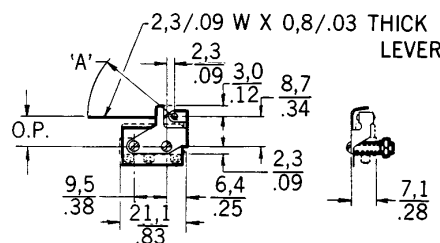


Fig. 16

Switches are not included with the actuators.

MICRO SWITCH™ Standard Subminiature Snap-Action Z Series



Snap-Action Switches

DESCRIPTION

The industry-defining name in snap-action switches, Honeywell MICRO SWITCH™ standard subminiatures are designed for repeatability and enhanced product life. The MICRO SWITCH™ Z Series combines small size and light weight with ample electrical capacity, low cost, and enhanced life.

The MICRO SWITCH™ Z Series consists of six product families with unique features that can drop right into an application.

These reliable and rugged switches offer a variety of actuators, terminations, circuitry configurations, electrical ratings, contact materials, operating characteristics, and sealing allows them to be utilized in numerous potential applications.

Carefully manufactured and thoroughly inspected, the MICRO SWITCH™ Z Series standard subminiatures are a great value for applications requiring sensing presence or absence of an object.

FEATURES




- Small size and light weight switches lend themselves to numerous potential applications
- Choice of low energy or power-duty electrical ratings allow the switch to be specified in more types of applications
- Broad range of amp ratings (from 0.1 A to 10.1 A)
- Watertight IP67 sealing available on some listings allows the switch to be used where sealing and presence/absence detection is required
- UL/CSA, cUL, ENEC, and CE approvals

POTENTIAL APPLICATIONS




- **Industrial:** Appliances, communication equipment, computers, electromechanical timers, mechanical cam assemblies (timers), office equipment, electric tools, HVAC wall controls, instrumentation, valves, vending machines
- **Transportation:** Automotive, truck, and boat wire harnesses; sub-assemblies for convertible roofs; lock modules for tail-gate/trunk; tank and hood latch detection
- **Medical:** Medical and hospital beds, foot pedal controls, and chair lifts
- Applications where a pre-wired sealed on/off switch is required

MICRO SWITCH™ Standard Subminiature Snap-Action Z Series

SPECIFICATIONS

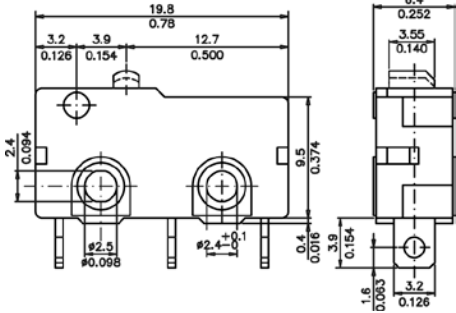
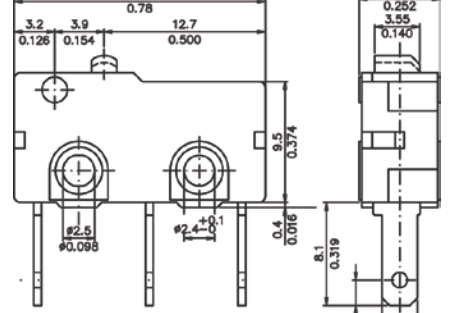
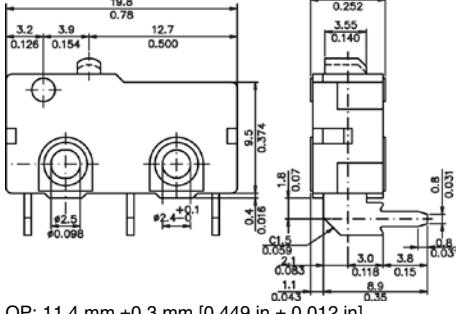
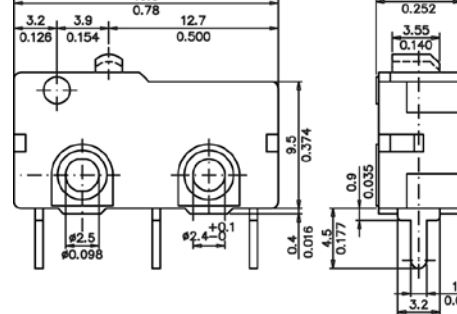
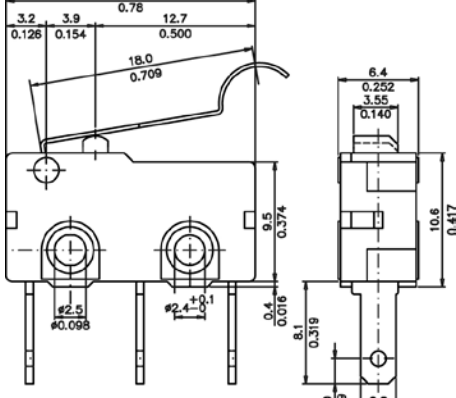
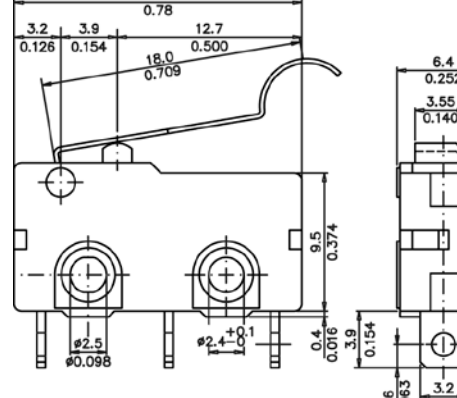
			
SERIES	ZM (coil internal spring)	ZM1 (flat internal spring)	ZV (coil spring)
Differentiator	Integral lever, no ENEC, and an internal coil spring	Integral lever, ENEC, and a flat internal spring	Snap-on lever, ENEC, and coil spring
Use	Use when ENEC is not required and the lever needs to be better secured to the switch	Used when added forces of a flat snap spring, ENEC, and a secured lever are required	Use when ENEC and a snap-on lever are required
Potential applications	alarms, computers, food processors, gas detectors, humidifiers, joysticks, money sorters, water pumps	air conditioners, consumer electronics, gas detectors, humidifiers, telephones, time recorders, toys	air conditioners, computers, consumer appliances, gas detectors, joysticks, money sorters, telephones, toys
Ampere rating	0.1 A, 5 A, 10.1 A	0.1 A, 3 A, 6 A, 10.1 A	0.1 A, 6 A, 10.1 A
Circuitry	SPDT, SPNO	SPDT, SPNO, SPNC	SPDT, SPNO, SPNC
Operating force	0.18 oz to 8.78 oz	12 gf to 355 gf	0.78 oz to 11.01 oz
Termination	Quick connect, solder, pcb	Quick connect, solder, pcb	quick connect, solder, pcb
Actuator	Pin plunger, straight, roller, sim. roller, L-shaped	Pin plunger, straight, roller, sim. roller, L-shaped	pin plunger, straight, roller, sim. roller
Voltage	125 Vac, 250 Vac, 30 Vdc	125 Vac, 250 Vac	125 Vac/125 Vdc 6(2) A 250 Vac
Agency approvals	UL, CE, CSA	UL, cUL, ENEC	UL, CE, CSA, ENEC
Agency file info	CE: 61058-1; UL: E12252; CSA: LR212438	UL: E12252; c-UL: E12252	CE: 61058-1; UL:12252; c-UL: E12252
Operating temperature	-40 °C to 120 °C [-40 °F to 248 °F]	-40 °C to 120 °C [-40 °F to 248 °F]	-40 °C to 120 °C [-40 °F to 248 °F]
Contacts	Silver, gold-plated silver, gold-plated brass, silver-tin-indium oxide	Silver, gold-plated silver, gold-plated brass, silver-tin-indium oxide	Silver, gold-plated silver, silver-tin-indium oxide
Housing	Polyamide (nylon)	Polyamide (nylon)	Polyamide (nylon)
Sealing	None		
Storage humidity	85 % RH max. at 40 °C [104 °F]		
Dielectric strength	1000 Vac (50 Hz to 60 Hz) between contacts, between terminals and ground, for one minute	1000 Vac (50 Hz to 60 Hz)/min	1000 Vac (50 Hz to 60 Hz) between contacts, between terminals and ground, for one minute
Contact resistance	300 mOhm max.	300 mOhm max.	300 mOhm max.
Insulation resistance	100 mOhm min. (at 500 Vdc/min)	100 mOhm min. (at 250 Vdc/min)	100 mOhm min. (at 500 Vdc/min)
Vibration	10 Hz to 55 Hz, displacement 0,75 mm (p-p)		
Expected mechanical life	10 million min.	10 million min. @ <10 A; 1 million min. @ 10 A	10 million min.
Electrical service life	Min. 1,000,000 operations on resistive load current 0.1 A at 125 Vac; 0.1 A at 30 Vdc; Min. 6,000 operations on resistive load 5 A at 125/250 Vac	Min. 10,000 operations	Min. 1,000,000 operations @ 0.1 A; Min 10,000 operations on resistive and motor load current 6(2) A 250 Vac
Electrical operating frequency	0.1 A – 120 operations/min other – 10 to 30 operations/min	10 to 30 operations/min	0.1 A – 120 operations/min; Other – 10 to 30 operations/min
Mechanical operation frequency	120 operations/min.		

Snap-Action Switches

			
SERIES	ZW (water-tight)	ZD (water-tight)	ZX
Differentiator	IP67 rating with lead wires; snap-on lever, coil spring, and ENEC	Smaller sized (like the ZX), sealed to IP67 (with leadwires only); plunger travel can be restricted, offers side-post quick mounting	Two-thirds the size of the ZM Series; unsealed, integral lever, and coil spring
Use	Use when a sealed position switch in a small and cost-effective package is required	Use for automotive applications due to sealing and quick mounting option	Use when a much smaller unsealed position switch is required
Potential applications	air conditioners, computers, consumer appliances, gas detectors, joysticks, money sorters, telephones, toys	automotive (operation systems and engine area interior), air conditioners, communication, electric toothbrushes, toys	calculators, computer mouse, cordless phones, electric knife & stapler, tester machines, walkie-talkies
Ampere rating	0.1 A, 5 A	0.1 A, 3 A	0.1 A, 3 A
Circuitry	SPDT, SPNO, SPNC	SPDT	SPDT
Operating force	1.94 oz to 7.16 oz	130 gf to 195 gf	0.53 oz to 5.3 oz
Termination	quick connect, solder, cable bottom exit, cable side exit	Solder, pcb straight, pcb left angle, pcb right angle, pre-wired	solder, pcb snap-in, pcb left angle, pcb right angle
Actuator	pin plunger, straight, roller, sim. roller	Pin plunger, straight, sim. roller	pin plunger, straight, roller, special
Voltage	125 Vac, 250 Vac	125 Vac, 12 Vdc	125 Vac, 48 Vdc
Agency approvals	UL, cUL, CE, ENEC	UL, cUL, CE, ENEC	UL, CE, CSA
Agency file info	CE: 61058-1; UL: E12252; c-UL: E12252	UL: E12252; c-UL: E12252	CE: 61058-1; UL:12252; CSA: LR212438
Operating temperature	-40 °C to 120 °C [-40 °F to 248 °F] (w/o wires) -40 °C to 105 °C [-40 °F to 221 °F] (w/ wires)	-40 °C to 120 °C [-40 °F to 248 °F]	-40 °C to 120 °C [-40 °F to 248 °F]
Contacts	silver, gold-plated silver	Silver, gold-plated silver	silver, gold-plated silver
Housing	PBT polyester thermoplastic	PBT polyester thermoplastic	Polyamide (nylon)
Sealing	IP67 (with leadwires only)	IP67 (with leadwires only)	None
Storage humidity	85 % RH max. at 40 °C [104 °F]		
Dielectric strength	1000 Vac (50 Hz to 60 Hz) between contacts and 1250 Vac (50 Hz to 60 Hz), between terminals and ground, for one minute	150 Vac (50 Hz to 60 Hz)/minute between contacts, 500 Vac (50 Hz to 60 Hz)/minute between live parts and dead metal parts	1000 Vac (50 Hz to 60 Hz) between contacts, between terminals and ground, for one minute
Contact resistance	30 mOhm max.	100 mOhm max.	100 mOhm max.
Insulation resistance	100 mOhm min. (at 500 Vdc/min)	100 mOhm min. (at 250 Vdc/min)	100 mOhm min. (at 500 Vdc/min)
Vibration	10 Hz to 55 Hz, displacement 0,75 mm (p-p)		
Expected mechanical life	2 million min.	500,000 min.	1 million min.
Electrical service life	Min. 10,000 operations	Min. 500,000 operations on resistive load current 10 mA; Min. 6000 operations on resistive load current 3 A	Min. 1,000,000 operations on resistive load current 0.1 A at 48 Vdc; Min. 10,000 operations on resistive load current 3 A at 125 Vac
Electrical operating frequency	10 to 30 operations/min	10 mA – 120 operations/min 3 A – 10 to 30 operations/min	0.1 A – 120 operations/min 3 A – 10 to 30 operations/min
Mechanical operation frequency	120 operations/min.		

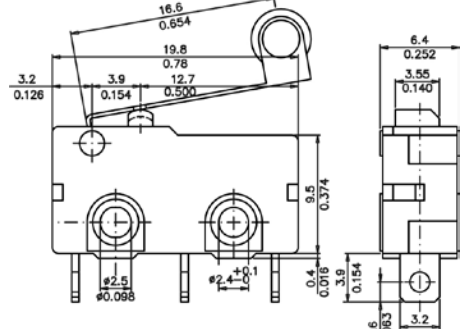
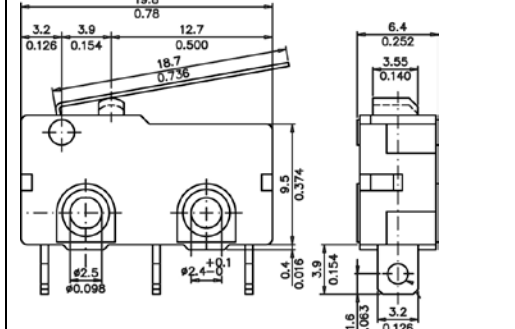
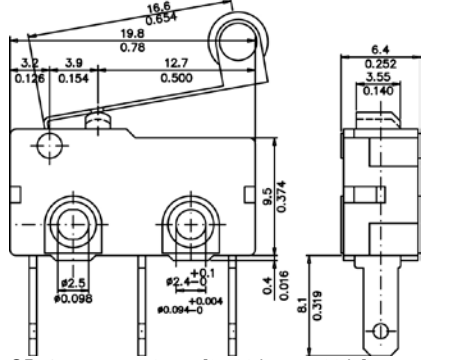
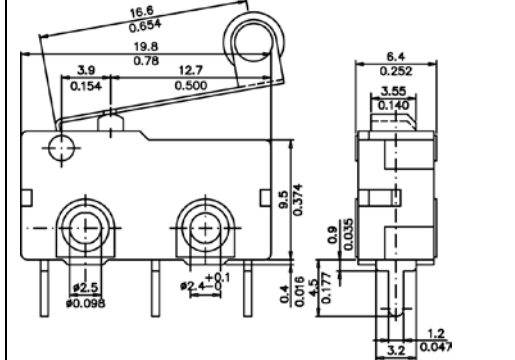
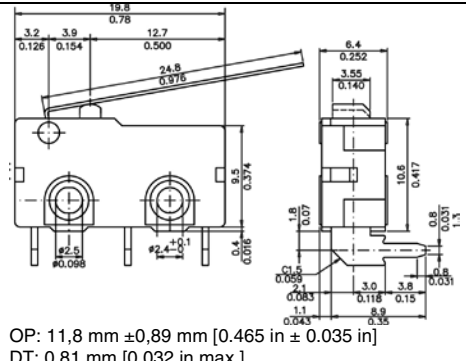
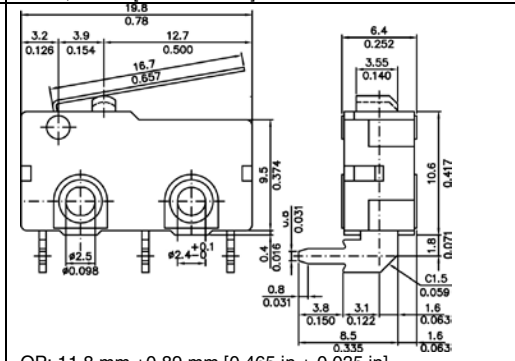
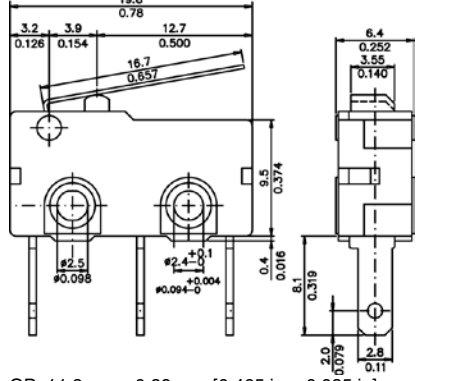
MICRO SWITCH™ Standard Subminiature Snap-Action Z Series

ZM AND ZM1 STANDARD LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions	Lever/ Terminals	Dimensions
Pin plunger/ solder	 <p>OP: 11,4 mm ±0,3 mm [0.449 in ± 0.012 in] DT: 0,2 mm [0.008 in max.]</p>	Pin plunger/ quick connect	 <p>OP: 11,4 mm ±0,3 mm [0.449 in ± 0.012 in] DT: 0,2 mm [0.008 in max.]</p>
Pin plunger/ PCB right	 <p>OP: 11,4 mm ±0,3 mm [0.449 in ± 0.012 in] DT: 0,2 mm [0.008 in max.]</p>	Pin plunger/PCB	 <p>OP: 11,4 mm ±0,3 mm [0.449 in ± 0.012 in] DT: 0,2 mm [0.008 in max.]</p>
Simulated roller/quick connect	 <p>OP: 15,1 mm ±1,5 mm [0.591 in ± 0.059 in] DT: 0,9 mm [0.035 in max.]</p>	Simulated roller/solder	 <p>OP: 15,1 mm ±1,5 mm [0.591 in ± 0.059 in] DT: 0,9 mm [0.035 in max.]</p>

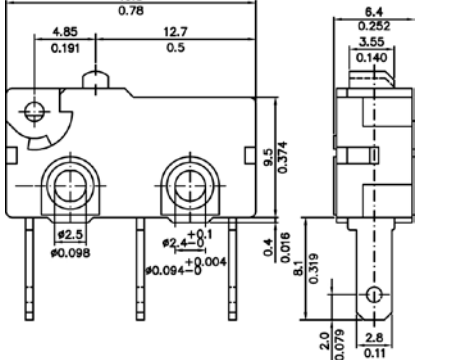
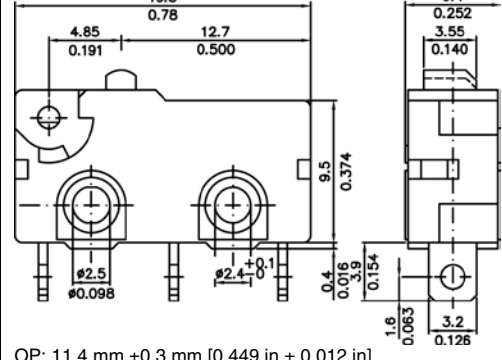
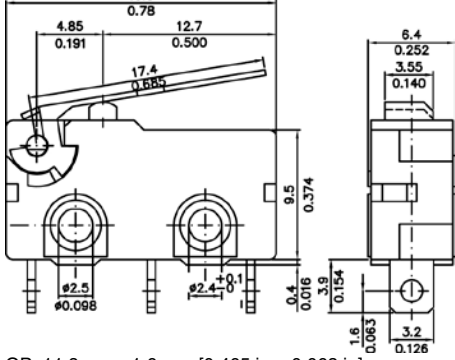
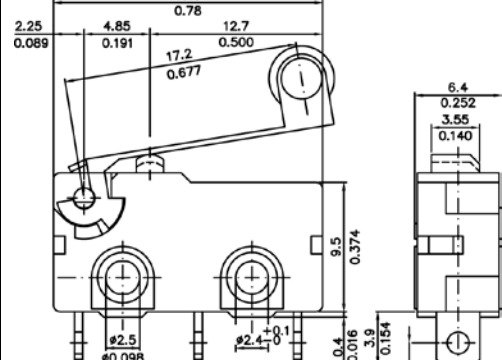
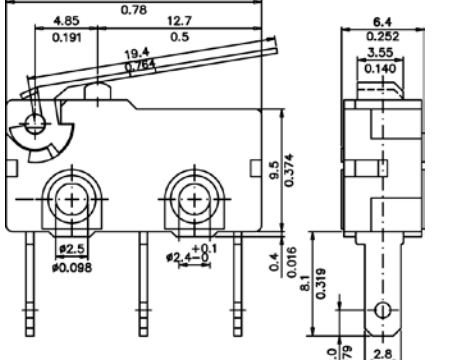
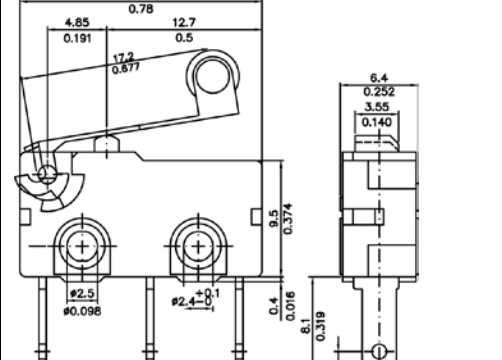
Snap-Action Switches

Continued – ZM AND ZM1 STANDARD LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions	Lever/ Terminals	Dimensions
Roller/solder	 <p>OP: 17,5 mm ±0,8 mm [0.689 in ± 0.032 in] DT: 0,81 mm [0.032 in max.]</p>	Straight/ solder	 <p>OP: 11,8 mm ±0,89 mm [0.465 in ± 0.035 in] DT: 0,81 mm [0.032 in max.]</p>
Roller/ quick connect	 <p>OP: 17,5 mm ±0,8 mm [0.689 in ± 0.032 in] DT: 0,81 mm [0.032 in max.]</p>	Roller/PCB	 <p>OP: 17,5 mm ±0,8 mm [0.689 in ± 0.032 in] DT: 0,81 mm [0.032 in max.]</p>
Straight/PCB right	 <p>OP: 11,8 mm ±0,89 mm [0.465 in ± 0.035 in] DT: 0,81 mm [0.032 in max.]</p>	Straight/PCB left	 <p>OP: 11,8 mm ±0,89 mm [0.465 in ± 0.035 in] DT: 0,81 mm [0.032 in max.]</p>
Straight/ quick connect	 <p>OP: 11,8 mm ±0,89 mm [0.465 in ± 0.035 in] DT: 0,81 mm [0.032 in max.]</p>		

MICRO SWITCH™ Standard Subminiature Snap-Action Z Series

ZV STANDARD LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions	Lever/ Terminals	Dimensions
Pin plunger/ quick connect	 <p>OP: 11.4 mm ±0.3 mm [0.449 in ± 0.012 in] DT: 0.2 mm [0.008 in max.]</p>	Pin plunger/ solder	 <p>OP: 11.4 mm ±0.3 mm [0.449 in ± 0.012 in] DT: 0.2 mm [0.008 in max.]</p>
Straight/ solder	 <p>OP: 11.8 mm ±1.6 mm [0.465 in ± 0.063 in] DT: 0.81 mm [0.032 in max.]</p>	Roller/solder	 <p>OP: 17.5 mm ±1.1 mm [0.689 in ± 0.043 in] DT: 0.81 mm [0.032 in max.]</p>
Straight/ quick connect	 <p>OP: 11.8 mm ±1.2 mm [0.465 in ± 0.047 in] DT: 0.81 mm [0.032 in max.]</p>	Roller/ quick connect	 <p>OP: 17.5 mm ±1.1 mm [0.689 in ± 0.043 in] DT: 0.81 mm [0.032 in max.]</p>

Snap-Action Switches

ZW STANDARD LEVER OPTIONS & DIMENSIONS mm/in

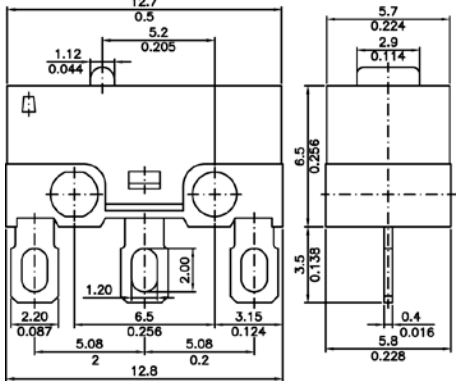
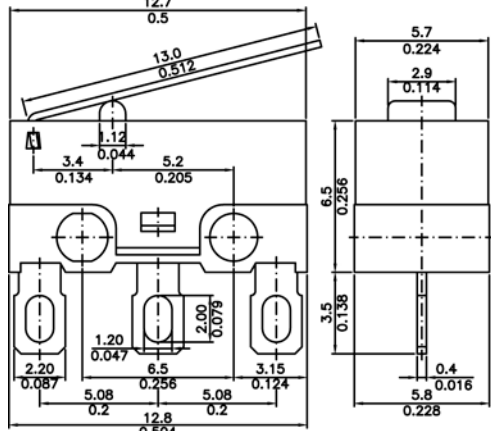
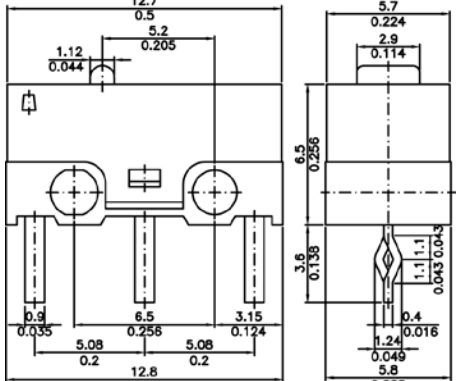
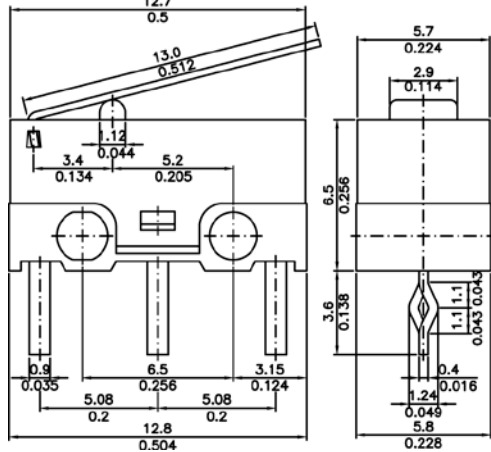
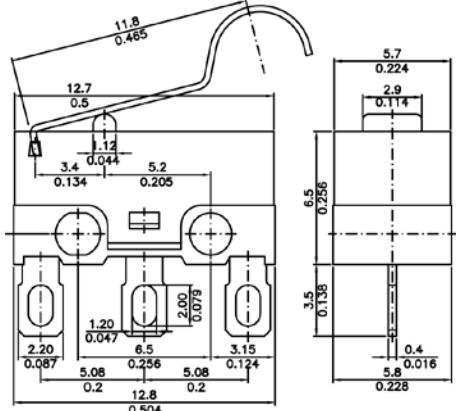
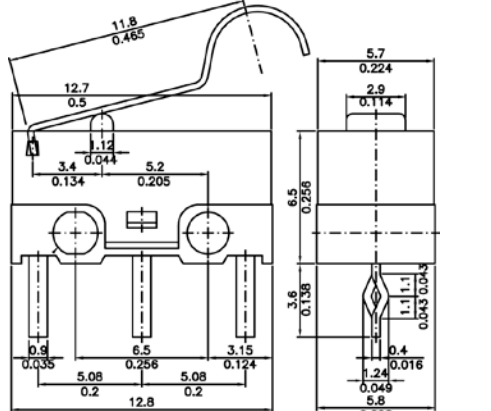
Lever/Term.	Dimensions
Straight/ solder angled	<p>OP: 8.8 mm \pm 1.2 mm [0.347 in \pm 0.047 in] DT: 0.71 mm [0.028 in max.]</p>
Roller/cable bottom exit	<p>OP: 14.5 mm \pm 1.1 mm [0.571 in \pm 0.043 in] DT: 0.6 mm [0.024 in max.]</p>
Pin plunger/ solder angled	<p>OP: 8.4 mm \pm 0.3 mm [0.331 in \pm 0.012 in] DT: 0.2 mm [0.008 in max.]</p>
Roller/quick connect	<p>OP: 14.5 mm \pm 1.1 mm [0.571 in \pm 0.043 in] DT: 0.6 mm [0.024 in max.]</p>

ZD STANDARD LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions
Pin plunger/ solder terminals	<p>OP: 3.05 mm \pm 0.2 mm [0.12 in \pm 0.008 in] DT: 0.30 mm [0.012 in max.]</p>
Pin plunger/PCB straight terminals	<p>OP: 3.05 mm \pm 0.2 mm [0.12 in \pm 0.008 in] DT: 0.30 mm [0.012 in max.]</p>
Pin plunger/wire leads	<p>OP: 3.05 mm \pm 0.2 mm [0.12 in \pm 0.008 in] DT: 0.30 mm [0.012 in max.]</p>

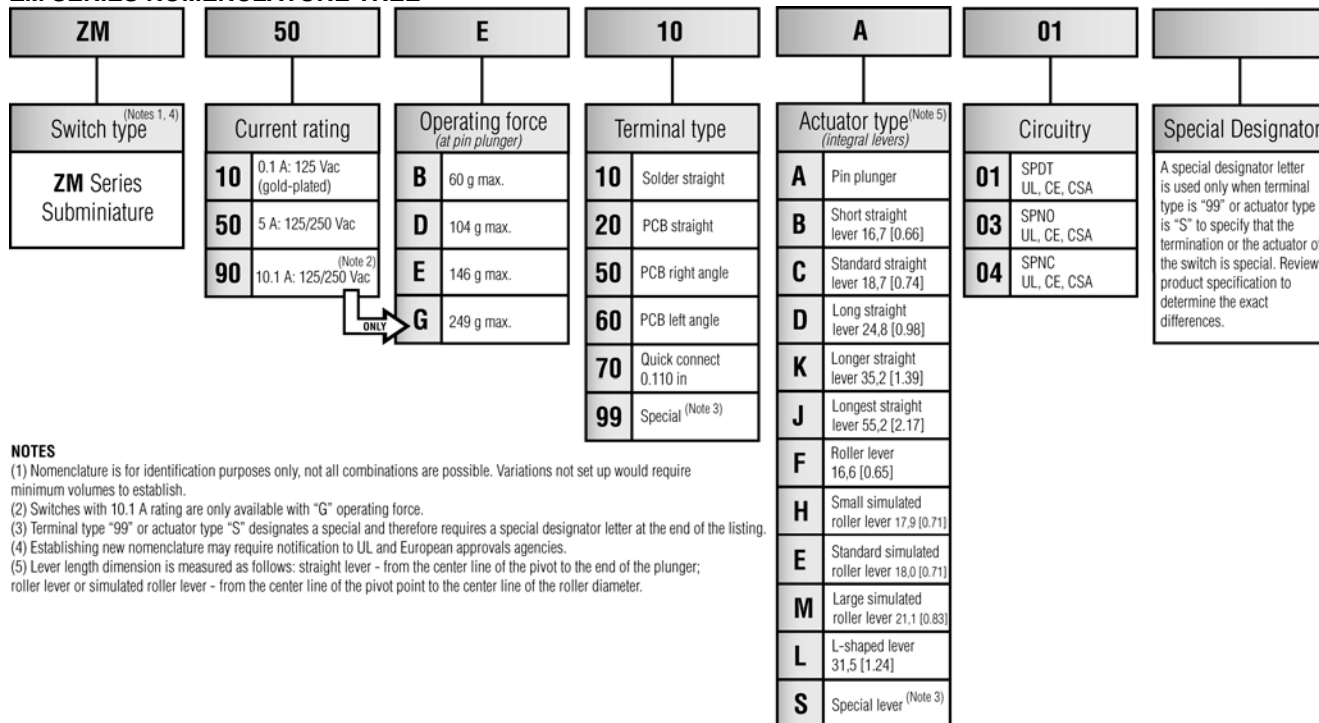
MICRO SWITCH™ Standard Subminiature Snap-Action Z Series

ZX STANDARD LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions	Lever/ Terminals	Dimensions
Pin plunger/ solder	 <p>OP: 7,0 mm ±0,3 mm [0.276 in ± 0.012 in] DT: 0,30 mm [0.012 in max.]</p>	Straight/ Solder	 <p>OP: 8,4 mm ±0,8 mm [0.331 in ± 0.032 in] DT: 1,3 mm [0.051 in max.]</p>
Pin plunger/PCB	 <p>OP: 7,0 mm ±0,3 mm [0.276 in ± 0.012 in] DT: 0,30 mm [0.012 in max.]</p>	Straight/PCB	 <p>OP: 8,4 mm ±0,8 mm [0.331 in ± 0.032 in] DT: 1,3 mm [0.051 in max.]</p>
Simulated roller/solder	 <p>OP: 11,1 mm ±0,8 mm [0.437 in ± 0.032 in] DT: 1,3 mm [0.051 in max.]</p>	Simulated roller/PCB	 <p>OP: 11,1 mm ±0,8 mm [0.437 in ± 0.032 in] DT: 1,3 mm [0.051 in max.]</p>

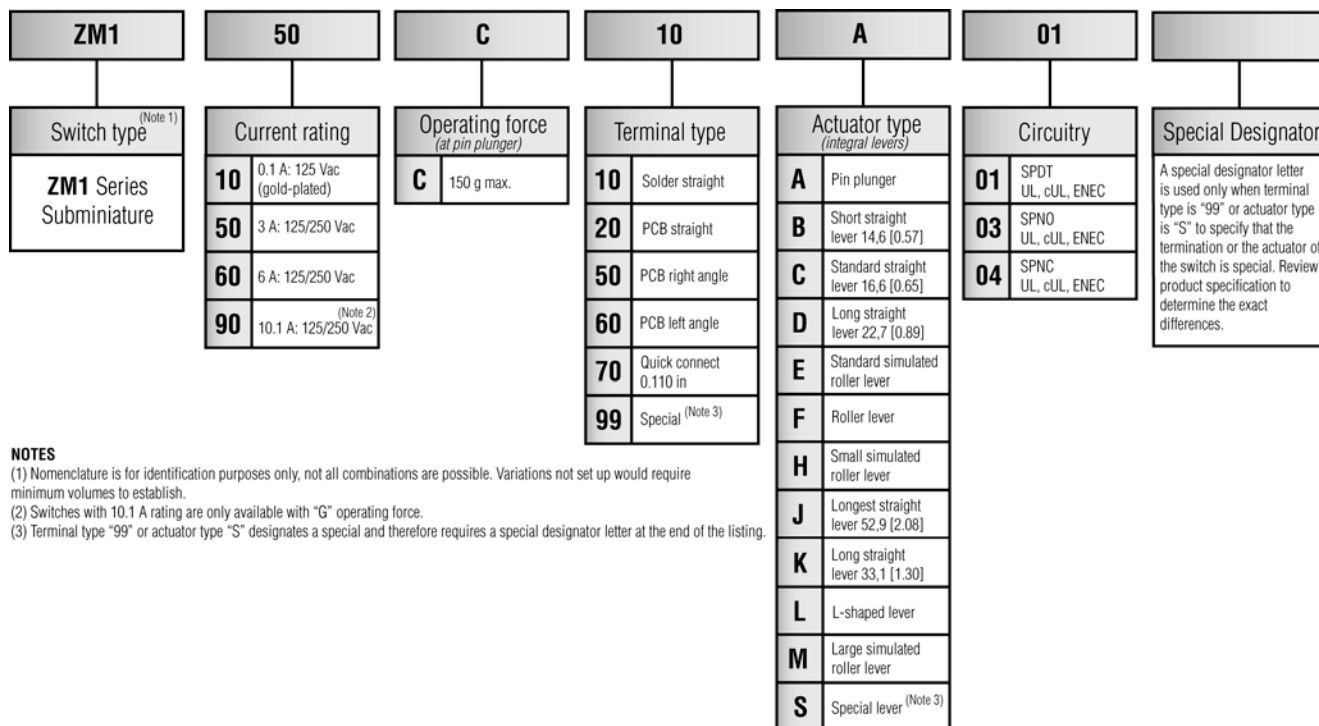
Snap-Action Switches

ZM SERIES NOMENCLATURE TREE



- NOTES**
- (1) Nomenclature is for identification purposes only, not all combinations are possible. Variations not set up would require minimum volumes to establish.
 - (2) Switches with 10.1 A rating are only available with "G" operating force.
 - (3) Terminal type "99" or actuator type "S" designates a special and therefore requires a special designator letter at the end of the listing.
 - (4) Establishing new nomenclature may require notification to UL and European approvals agencies.
 - (5) Lever length dimension is measured as follows: straight lever - from the center line of the pivot to the end of the plunger; roller lever or simulated roller lever - from the center line of the pivot point to the center line of the roller diameter.

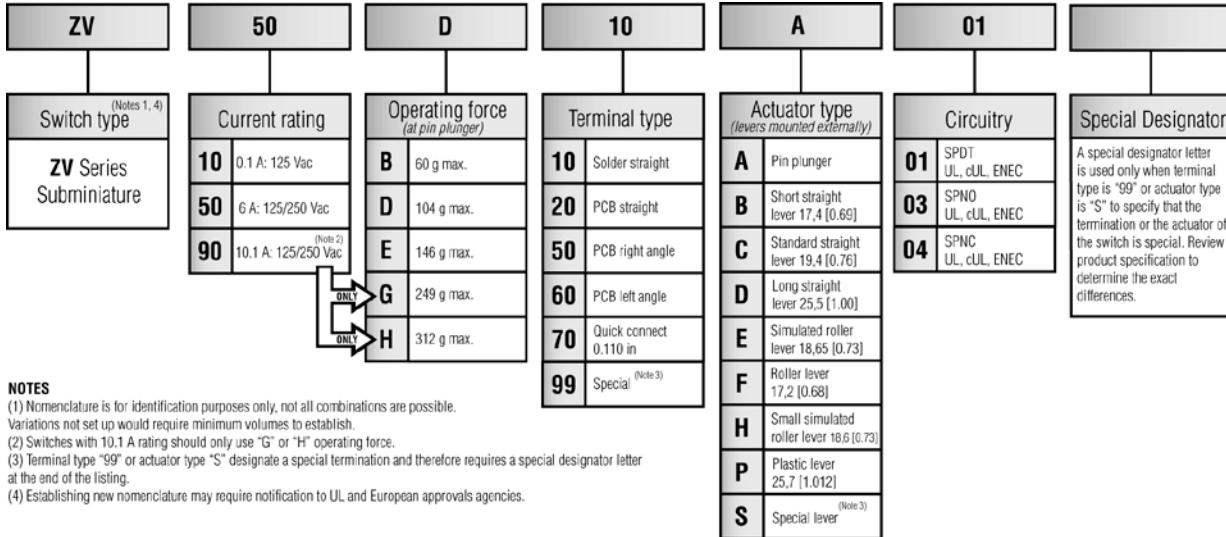
ZM1 SERIES NOMENCLATURE TREE



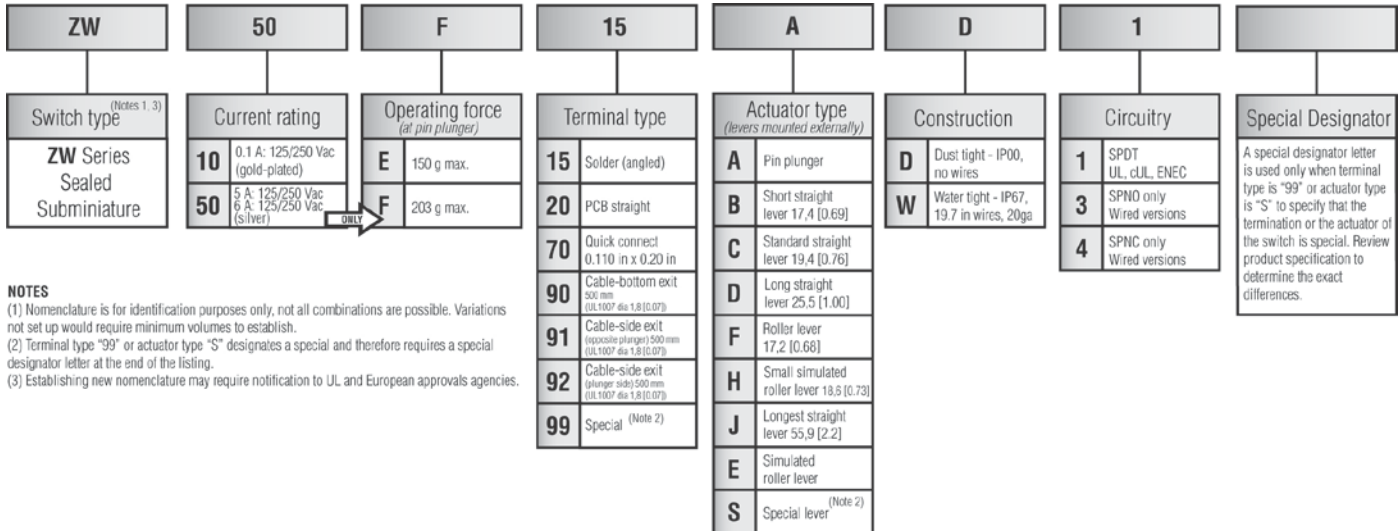
- NOTES**
- (1) Nomenclature is for identification purposes only, not all combinations are possible. Variations not set up would require minimum volumes to establish.
 - (2) Switches with 10.1 A rating are only available with "G" operating force.
 - (3) Terminal type "99" or actuator type "S" designates a special and therefore requires a special designator letter at the end of the listing.

MICRO SWITCH™ Standard Subminiature Snap-Action Z Series

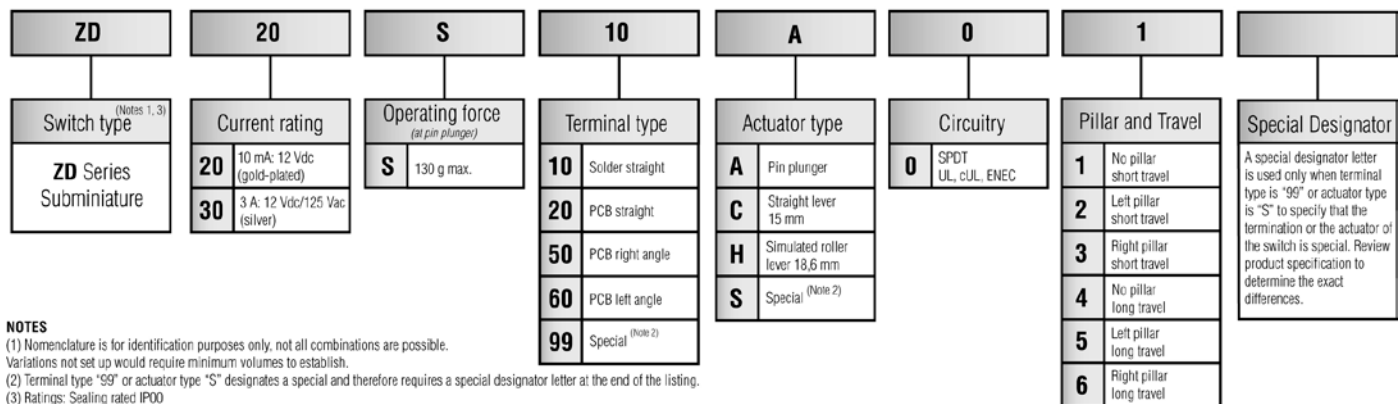
ZV SERIES NOMENCLATURE TREE



ZW SERIES NOMENCLATURE TREE

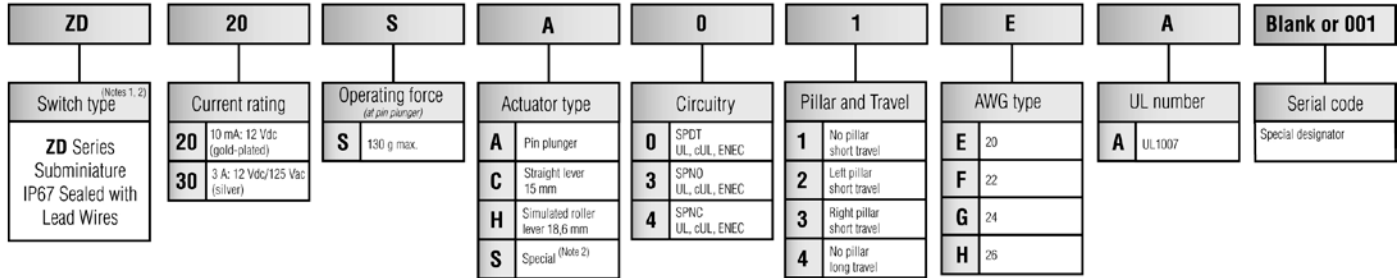


ZD SERIES (NO WIRES) NOMENCLATURE TREE



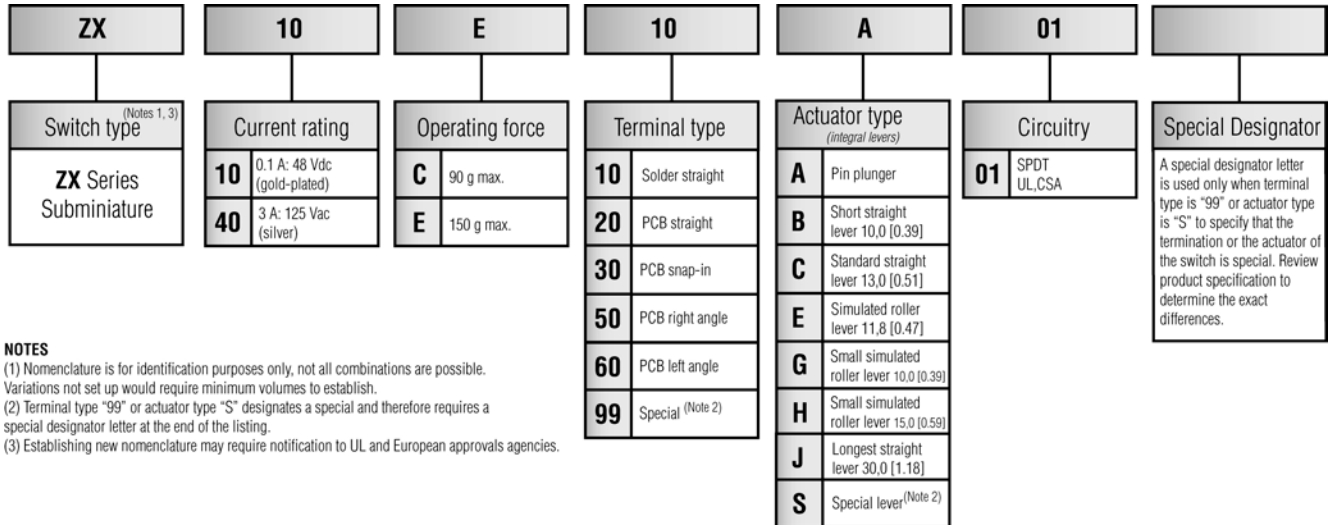
Snap-Action Switches

ZD SERIES (WITH WIRES) NOMENCLATURE TREE



NOTES
 (1) Nomenclature is for identification purposes only, not all combinations are possible. Variations not set up would require minimum volumes to establish.
 (2) Terminal type "99" or actuator type "S" designates a special and therefore requires a special designator letter at the end of the listing.

ZX SERIES NOMENCLATURE TREE



NOTES
 (1) Nomenclature is for identification purposes only, not all combinations are possible. Variations not set up would require minimum volumes to establish.
 (2) Terminal type "99" or actuator type "S" designates a special and therefore requires a special designator letter at the end of the listing.
 (3) Establishing new nomenclature may require notification to UL and European approvals agencies.

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
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Sensing and Control
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Golden Valley, MN 55422
www.honeywell.com/sensing

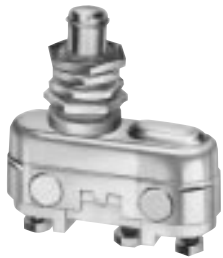
004954-1-EN IL50 GLO Printed in USA
July 2010
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Honeywell

Position Sensors

High Temperature Basic Switches

HT Series




GENERAL INFORMATION

HT switches will withstand temperatures up to +1000F. The switching element is mounted on a ceramic base within a stainless steel enclosure. HT switches are not classified as sealed switches.

FEATURES




- Temperature tolerance up to +1000°F (538°C)
- Designed to meet military applications
- Side and panel mount
- UL recognized

ELECTRICAL RATINGS

Circuitry	Electrical Rating
Single-Pole	UL Ratings: 3 amps, 1/10 HP, 125 vac. 3 amps, 1/6 HP, 250 vac.
Double-Throw 	

Characteristics: O.F. – Operating Force; R.F. – Release Force; P.T. – Pretravel; O.T. – Overtravel; O.P. – Operating Position

HT ORDER GUIDE

	Catalog Listing	Description	O.F. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	O.P. mm inches
 Fig. 1	1HT1	Straight plunger panel mount	2,78-5,56 10-20	1,67 6	1,65 .065	4,78 .188	23,7 .935 approx.
 Fig. 2	3HT1	Roller plunger panel mount	8,34 30 max.	1,67 6	1,65 .065	4,78 .188	35,9 1.413 approx.
 Fig. 3	2HT1	Pin plunger side mount	2,78-5,56 10-20	1,67 6	1,27 .050	0,25 .010	16,8 .66 approx.

HT MOUNTING DIMENSIONS (For reference only)

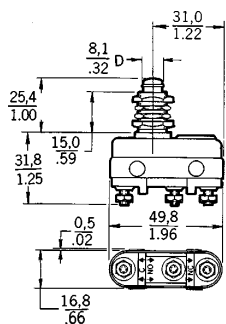


Fig. 1

Mounting holes will accept pins or screws of .139" (3,53 mm) dia.

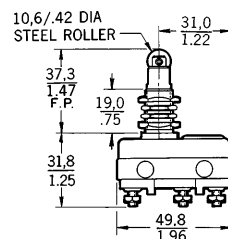
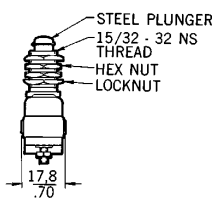


Fig. 2

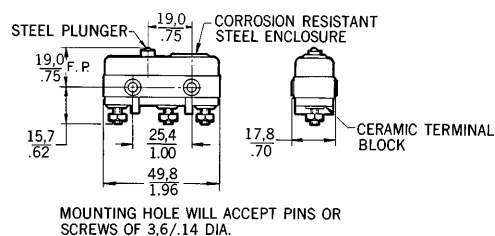


Fig. 3

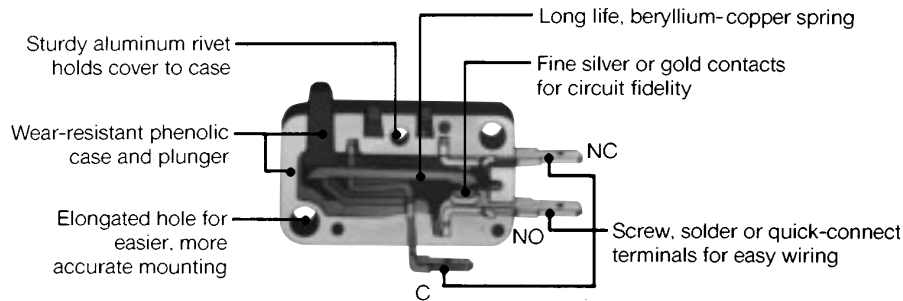
MOUNTING HOLE WILL ACCEPT PINS OR SCREWS OF 3,6/.14 DIA.

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

Basic Switches

Miniature

CUT-A-WAY V3 MINIATURE BASIC SWITCH



GENERAL INFORMATION

V3 miniature basic switches feature high electrical capacity and long life. Their size and shape meet design requirements in all types of applications.

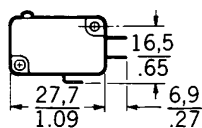
There is a choice of SPDT, SPNC, and SPNO circuitry. Many lever styles, contact materials, and terminal variations can be furnished. Contact the 800 number for ordering information.

FEATURES

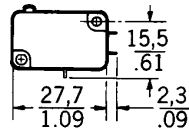
- Low operating force to .53 ounce maximum
- Sensitive differential travel as low as .006 inch maximum
- Power load switching capability up to 25 amperes—silver contacts
- Gold alloy crosspoint, silver cadmium, and other contact material for special applications
- Long mechanical life of 10,000,000 cycles—95% survival for V3-100, V3-1100, V3-2100, V3-3000 Series
- Temperature tolerance up to +180°F (82°C) on standard construction
- High temperature construction for use up to +600°F (316°C)
- 3,1 mm mounting holes available
- UL recognized File #E12252, CSA certified File #LR41370

AVAILABLE TERMINALS

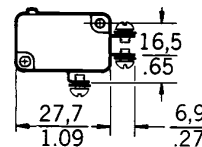
SOLDER



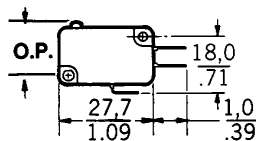
SHORT SOLDER



SCREW



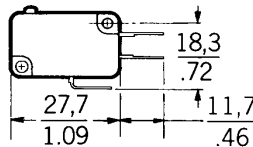
D8



.188 wide x .020 thick terminals

QUICK CONNECT

D9



.250 wide x .032 thick terminals

Dimensions shown are for reference only

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

Mounting torque:
2 inch pounds min.
5 inch pounds max.

This section covers only **60** of our most popular V3 Series catalog listings. If you don't find what you're looking for, it's likely one of the approximately **850** other active V3 listings will meet your needs. Contact the 800 number.

Basic Switches
Miniature

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

ORDER GUIDE by ascending electrical capability

PIN PLUNGERS



Dim. Dwg. Fig. 1

Catalog Listing	Recommended For	Electrical Data And UL Code Page 20	O.F. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. mm inches	O.P.** mm inches
V3-343-D8	General use. Gold alloy crosspoint contacts.	1 Amp X	2,22 8 max.	0,56 2	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578
V3-2451-D8	Lowest force.	3 Amps VV	0,15 .53	—	1,2 .047	1,27 .050	0,051-0,25 .002-.010	14,7 .578
V3-2401-D8	Lower force.	5 Amps YY	0,24 .9	—	1,2 .047	1,27 .050	0,051-0,25 .002-.010	14,7 .578
V3-70101-D8	Most 5 amp applications.	5 Amps ZZ	2,22 8	0,56 2	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578
V3-1101-D8	General use.	10 Amps TT	0,72 max. 2.6	0,10 .35	1,2 .047	1,27 .050	0,051-0,25 .002-.010	14,7 .578
V3-2101-D8	Low force.	10 Amps V	0,50 max. 1.8	0,05 .18	1,2 .047	1,27 .050	0,051-0,25 .002-.010	14,7 .578
V3-101-D8	Higher force. Most applications.	11 Amps T	2,22 8 max.	0,56 2	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578
V3-1-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	1,67-3,89 6-14	1,11 4	1,21 .047	1,0 .040	0,15-0,4 .006-.016	14,7 .578
V3-3001-D8	High force. Up to 15.1 amps load handling.	15,1 Amps U	1,47 max. 5.3	0,15 .53	1,2 .047	1,27 .050	0,051-0,25 .002-.010	14,7 .578
V3-2800-D9	Up to 20 amps load handling	20 Amps AA	0,63 - 1,22 2.3 - 4.4	0,20 0.7	1,2 .047	1,27 .050	0,25 .010 max.	14,7 .578
V3-2900-D9	Up to 25 amps load handling	25 Amps BB	1,22 - 2,20 4.4 - 7.9	0,31 1.1	1,2 .047	1,27 .050	0,25 .010 max	14,7 .578

Miniature/
Subminiature



Dim. Dwg. Fig. 2

V3-1001 (MS25253-1)	MIL-S-8805 application requirements (SPDT)	10 Amps UU	1,67-3,89 6-14	1,11 4	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578
V3-1002 (MS25253-3)	MIL-S-8805 application requirements (SPNC)	10 Amps UU	1,67-3,89 6-14	1,11 4	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578
V3-1003 (MS25253-2)	MIL-S-8805 application requirements (SPNO)	10 Amps UU	1,67-3,89 6-14	1,11 4	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578
V3-129*	Operating in temperature to +302°F (150°C)	11 Amps T	2,22 8 max.	0,56 2	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578
V3-245*	Operating in temperature to +400°F (204°C)	10 Amps W	2,78-6,95 10-25	1,67 6	1,2 .047	1,02 .040	0,15-0,41 .006-.016	14,7 .578

*For actuators, contact MICRO SWITCH Sales Office.

**Tolerances ±0.38 ±0.15

ORDER GUIDE

SIMULATED ROLLER



Dim. Dwg. Fig. 3

Catalog Listing	Recommended For	Electrical Data And UL Code Page 20	Length of Lever "A" mm inches	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P.* mm inches
V3L-1123-D8	General use.	10 Amps TT	32,6 1.285	0,39 1.4	0,05 .18	2,54 .100	2,03 .080	0,76 .030	18,5 .730
V3L-2105-D8	Low force.	10 Amps V	32,6 1.285	0,33 1.2	0,02 .07	2,54 .100	2,03 .080	0,76 .030	18,5 .730
V3L-121-D8	High force. Most applications.	11 Amps T	32,6 1.285	1,11 4	0,14 .5	3,18 .125	1,57 .062	0,81 .032	18,5 .730
V3L-5-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	32,6 1.285	2,22 8	0,28 1	3,18 .125	1,57 .062	0,81 .032	18,5 .730
V3L-3014-D8	High force. Up to 15.1 amps load handling.	15.1 Amps U	32,6 1.285	0,94 3.4	0,07 .25	2,54 .100	1,90 .075	0,76 .030	18,5 .730

*±1.5 mm ±.060 in.

Basic Switches
Miniature

Characteristics: O.F. – Operating Force; R.F. – Release Force; P.T. – Pre-travel; O.T. – Overtravel; D.T. – Differential Travel; O.P. – Operating Position.

ORDER GUIDE

STRAIGHT LEVERS



Dim. Dwg. Fig. 4

Catalog Listing	Recommended For	Electrical Data And UL Code Page 20	Length of Lever "A" mm inches	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches
V3L-1105-D8	General use.	10 Amps TT	21,3 .860	0,72 2.6	0,10 .35	1,5 .060	1,14 .045	0,33 .013	15,2±0,51 .600±.020
V3L-2101-D8	Low force. Added overtravel.	10 Amps V	21,3 .860	0,50 1.8	0,50 .18	1,5 .060	1,14 .045	0,33 .013	15,2±0,51 .600±.020
V3L-101-D8	Higher force. Most applications.	11 Amps T	21,3 .860	2,50 9	0,56 2	1,5 .060	1,02 .040	0,41 .016	15,2±0,51 .600±.020
V3L-1-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	21,3 .860	3,89 14	0,83 3	1,5 .060	1,02 .040	0,41 .016	15,2±0,51 .600±.020
V3L-3001-D8	High force. Up to 15.1 amps load handling.	15.1 Amps U	21,3 .860	1,47 5.3	0,15 .53	1,5 .060	1,02 .040	0,28 .011	15,2±0,51 .600±.020



Dim. Dwg. Fig. 4

V3L-1108-D8	General use.	10 Amps TT	35,6 1.40	0,39 1.4	0,04 .14	2,79 .110	2,29 .090	0,76 .030	15,2±1,5 .600±.060
V3L-2102-D8	Low force.	10 Amps V	35,6 1.40	0,31 1.1	0,02 .07	2,79 .110	2,29 .090	0,76 .030	15,2±1,5 .600±.060
V3L-104-D8	Higher force. Most applications.	11 Amps T	35,6 1.40	1,11 4	0,14 .5	3,18 .125	2,29 .090	1,27 .050	15,2±1,5 .600±.060
V3L-2-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	35,6 1.40	2,22 8	0,28 1	3,18 .125	2,29 .090	1,27 .050	15,2±1,5 .600±.060
V3L-3005-D8	High force. Up to 15.1 amps load handling.	15.1 Amps U	35,6 1.40	.86 3.1	0,06 .21	3,05 .120	2,29 .090	0,81 .032	15,2±1,5 .600±.060



Dim. Dwg. Fig. 4

V3L-2425-D8	Lower force.	5 Amps YY	59,4 2.34	0,07 .25	—	5,08 .200	4,06 .160	1,4 .055	15,2±2 .600±.080
V3L-1122-D8	General use.	10 Amps TT	59,4 2.34	0,22 .81	0,02 .07	5,08 .200	4,06 .160	1,4 .055	15,2±1,8 .600±.070
V3L-2106-D8	Low force.	10 Amps V	59,4 2.34	0,16 .56	0,01 .04	5,08 .200	4,06 .160	1,4 .055	15,2±1,8 .600±.070
V3L-131-D8	Higher force. Most applications.	11 Amps T	59,4 2.34	0,58 2.1	0,12 .42	6,6 .260	3,81 .150	2,29 .090	14,7±2 .580±.080
V3L-6-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	59,4 2.34	1,11 4	0,14 .50	6,95 2.60	3,81 .150	2,29 .090	14,35±1,5 .565±.060
V3L-3013-D8	High force. Up to 15.1 amps load handling.	15.1 Amps U	59,4 2.34	0,39 1.4	0,03 .11	5,33 .210	4,06 .160	1,52 .060	15,2±1,9 .600±.075



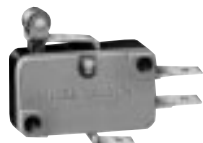
Dim. Dwg. Fig. 4

V3L-2472-D8	Lowest force.	3 Amps VV	69,45 2.75	0,03 .11	—	5,97 .235	5,08 .200	1,60 .063	15,2±2,54 .600±.100
V3L-1124-D8	General use.	10 Amps TT	69,45 2.75	0,19 .70	0,01 .04	7,74 .305	3,68 .145	1,65 .065	15,31±2,54 .603±.100
V3L-145-D8	Most applications.	11 Amps T	69,45 2.75	0,54 1.93	0,10 .36	0,76 .300	4,57 .180	2,54 .100	14,48±2,03 .570±.080
V3L-14-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	69,45 2.75	0,83 3	0,14 .50	8,38 .330	4,32 .170	2,54 .100	13,72±2,03 .540±.080

Basic Switches Miniature

V3 Series

ROLLER LEVERS



Dim. Dwg. Fig. 7

ORDER GUIDE

Catalog Listing	Recommended For	Electrical Data And UL Codes Page 20	Length of Lever "A" mm inches	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches
V3L-1117-D8	General use.	10 Amps TT	20,6 .81	0,89 3.2	0,10 .35	1,2 .047	1,14 .045	0,33 .013	20,6±0,76 .810±.030
V3L-2103-D8	Low force.	10 Amps V	20,6 .81	0,58 2.1	0,03 .11	1,42 .056	0,86 .034	0,33 .013	20,6±0,76 .810±.030
V3L-139-D8	Higher force. Most applications.	11 Amps T	20,6 .81	2,22 8	0,56 2	1,5 .060	1,02 .040	0,41 .016	20,6±0,76 .810±.030
V3L-3-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	20,6 .81	3,89 14	0,83 3	1,52 .060	1,02 .040	0,41 .016	20,6±0,76 .810±.030
V3L-3003-D8	High force. Up to 15.1 amps load handling.	15.1 Amps U	20,6 .81	1,89 6.8	0,15 .53	1,2 .047	1,02 .040	0,05 - 0,25 .002 - .010	20,6±0,76 .810±.030

V3L-1101-D8	General use.	10 Amps TT	34 1.34	0,44 1.6	0,04 .14	3,18 .125	2,16 .085	0,76 .030	20,6±1,5 .810±.060
V3L-2104-D8	Low force.	10 Amps V	34 1.34	0,31 1.1	0,02 .07	3,18 .125	2,16 .085	0,76 .030	20,6±1,5 .810±.060
V3L-111-D8	Higher force. Most applications.	11 Amps T	34 1.34	1,11 4	0,14 .5	3,18 .125	2,16 .085	1,27 .050	20,6±1,5 .810±.060
V3L-4-D8	Highest force. Up to 15.1 amps load handling with reduced life.	15.1 Amps U	34 1.34	2,22 8	0,28 1	3,18 .125	2,16 .085	1,27 .050	20,6±1,5 .810±.060
V3L-3004-D8	Higher force. Up to 15.1 amps load handling.	15.1 Amps U	34 1.34	0,89 3.2	0,14 .5	3,18 .125	2,16 .085	0,76 .030	20,6±1,5 .810±.060

Miniature/
Subminiature

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

* Characteristics taken with actuator assembled on Catalog Listing V3-1 switch as shown.

AUXILIARY ACTUATORS



Dim. Dwg. Fig. 11

ORDER GUIDE - SWITCHES ARE NOT INCLUDED WITH ACTUATORS

Catalog Listing	Description	Actuator Length "A" mm inches	O.F. max newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches	F.P. max. mm inches
JV-1	Leaf type	21,3 .84	3,34 12	1,11 4	1,19 .047	0,79 .031	0,41 .016	15±0,38 .590±.015	16,4 .645



Dim. Dwg. Fig. 11

JV-7	Long leaf	32,3 1.27	2,50 9	1,11 4	1,57 .062	1,27 .050	0,64 .025	14,5±0,76 .570±.030	17,4 .685
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Dim. Dwg. Fig. 11

JV-5	Roller leaf	20,6 .81	3,34 12	1,11 4	1,52 .060	0,79 .031	0,41 .016	20,3±0,64 .800±.025	22,1 .870
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NOTE: Contact a MICRO SWITCH Sales Office for application assistance when actuators will be used at temperatures above 300°F (149°C).

Basic Switches
Miniature

Characteristics: O.F. — Operating Force;
R.F. — Release Force; P.T. — Pretravel;
O.T. — Overtravel; D.T. — Differential Travel;
O.P. — Operating Positon; F.P. — Free Position
* Characteristics taken with actuator assembled on Catalog Listing V3-100 switch as shown.

AUXILIARY
ACTUATORS

Switches are not included with actuators

ORDER GUIDE - SWITCHES ARE NOT INCLUDED WITH ACTUATORS

Catalog Listing	Description	Actuator Length "A" mm inches	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P. mm inches	F.P. max. mm inches
JV-26	Long lever	44,5† 1.75	0,39 1.4	0,06 .21	8,33 .328	3,58 .141	4,75 .187	12,7±3,18 .500±.125	—



Dim. Dwg. Fig. 14

JV-20	Roller lever	19,1† .750	0,83 3	0,14 .5	4,78 .188	1,57 .062	1,98 .078	19,5±1,4 .766±.055	23,8 .936
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Dim. Dwg. Fig. 14

JV-220	Roller lever	17,7† .695	0,83 3	0,14 .5	4,78 .188	1,57 .062	1,98 .078	19,5±1,1 .766±.045	23,8 .936
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Dim. Dwg. Fig. 14

JV-30	One-way roller lever	20,6 .81	3,34 12	1,11 4	2,03 .080	0,51 .020	0,38 .015	25,7±0,76 1.010±.030	27,7 1.09
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Dim. Dwg. Fig. 11

JV-91**	Tandem leaf	20,6 .81	5,00 18	1,67 6	1,57 .062	0,89 .035	—	14,9±0,76 .588±.030	16,5 .650
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Dim. Dwg. Fig. 17

JV-82**	Tandem roller leaf	20,6 .81	5,00 18	1,67 6	1,57 .062	0,89 .035	—	20,5±0,76 .806±.030	21,8 .860
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Dim. Dwg. Fig. 17

NOTE: Contact the 800 number for application assistance when actuators will be used at temperatures above 300°F (149°C).
** Travel characteristics on tandem actuators vary with actual basic switch characteristics. These shown are typical for the assembly.
† "A" measurement is from the pivot point of lever to the point indicated on drawing.

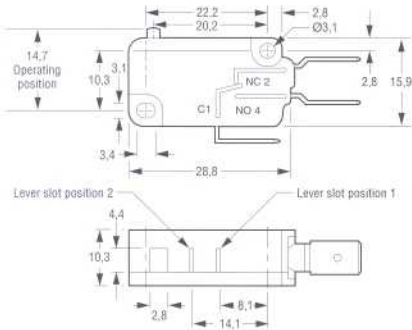
**V5 Series
Miniature Basic Switches**

V5 Series Basic Switches are used for simple or precision on/off, end of limit, presence/absence, pressure, temperature and manual operator interface application needs.

Voltage:	250 Vac
Operating temperature:	
Standard	-55 °C to 85 °C
	-67 °F to 185 °F
High temperature	-55 °C to 150 °C
	-67 °F to 302 °F
Termination:	6,3 mm x 0,8 mm Quick connect (QC)
Contact type:	Silver/silver cadmium oxide
Electrical rating:	
	V5A 20 A
	V5B/P/R 16 A
	V5C/D 10 A
	V5S 22 A
Switching options:	SPDT
	Single Pole Double Throw

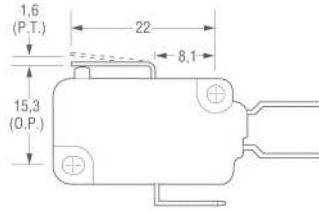
OPTIONS

Top pin plunger



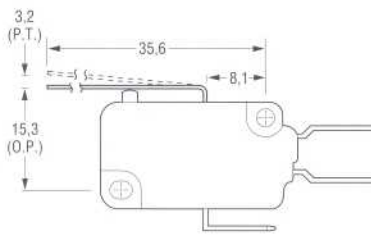
APPROVALS		REFERENCE
CE, ENEC		V5A010CB
CE, CSA, ENEC, UL		V5B010CB3
CE, CSA, UL	4,8 mm x 0,5 mm QC	V5B010FB3
CE, ENEC	Solder terminals	V5B010TB
CE, ENEC	High temperature	V5B210CB
CE, ENEC		V5C010BB
CE, CSA, ENEC, UL	4,8 mm x 0,5 mm QC	V5C010EB3
CE, CSA, ENEC, UL	Solder terminals	V5C010TB3
CE, ENEC		V5P010CB
APPROVALS	SWITCHING OPTIONS	REFERENCE
CE, ENEC	SPNO	V5D030BB
CE, ENEC	SPNO	V5R030CB
CE, BEAB	SPNC	V5S020CB
CE, BEAB	SPNO	V5S030CB

**Straight lever
Type B**



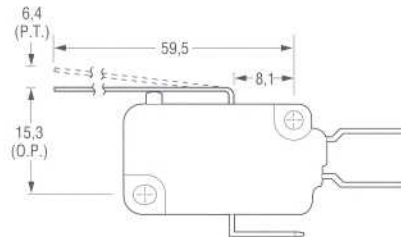
APPROVALS	REFERENCE
CE, CSA, ENEC, UL	V5C010BB3B

Type C



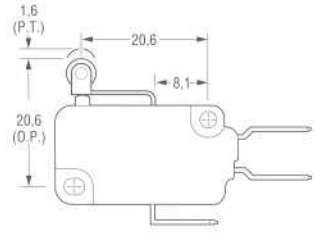
APPROVALS	REFERENCE
CE, ENEC	High temperature V5B210CB1C

Type G



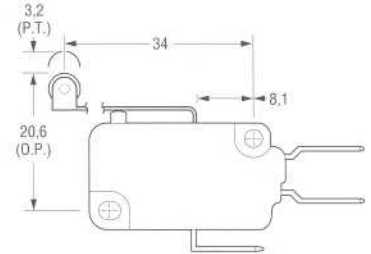
APPROVALS	REFERENCE
CE, ENEC	V5C010BB1G

**Roller lever
Type D**



APPROVALS	REFERENCE
CE, CSA, ENEC, UL	High temperature V5B210CB3D
CE, CSA, ENEC, UL	V5C010BB3D

Type E



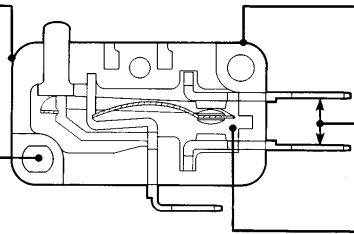
APPROVALS	REFERENCE
CE, CSA, ENEC, UL	Lever position 2 V5A010CB4E
CE, ENEC	High temperature V5B210CB1E



CUTAWAY V7 MINIATURE BASIC SWITCH

Thermoplastic material meets KC 250 arc tracking test per VDC 0630, DIN 53 480, and UL94V-0.

Mounting hole size options for #4 or 3mm screw.



4mm (min) spacing between current carrying parts and mounting hardware.

"E" terminals designed to provide 3mm (min.) spacing with uninsulated receptacles installed. Terminals meet DIN 46 244 dimensions.

Internal construction meet 3mm (min.) creepage and clearance requirement.

FEATURES

- Quick-connect and printed wiring board termination
- Proven V3 switching mechanism
- Physically interchangeable with existing V3 switches
- All existing V3 lever options available
- UL recognized File # E12252; CSA certified File # LR41370
- International listings carry VDE approval
- Power load switching capability up to 21 amps
- Temperature tolerance -40° to 185°F (-40° to 85°C)
- High temperature construction available—350°F

APPLICABLE EUROPEAN SYMBOLS

- μ = microgap construction. (The measurement between open contacts is less than 3mm).**
- \sim = alternating current (used with value of voltage source: 250V \sim).
- T = maximum rated use temperature; followed by the temperature value in °C (example T 85).
- +++ = switch is rated for at least 50,000 cycles at its rated current. (Sometimes referred to as "frequent" operation.)
- 10(3) = first number represents resistive rating. Second number represents inductive (motor) rating.

GENERAL INFORMATION

The V7 Series is available in two versions, the Timesaver series and the International series. The Timesaver series is UL recognized and CSA certified. Timesaver series switches use readily available high-volume components to provide especially responsive delivery performance. The International V7 provides VDE approval in addition to UL recognition and CSA certification.

The V7 offers a choice of four quick-connect and two printed wiring board terminal types. Three quick-connect types are offset to meet international 3mm spacing requirements and one is designed for use with molded connectors. Contact material choice includes gold alloy, silver alloy or silver for handling various electrical loads. There are two mounting hole sizes available. Standard .114" or 3mm to meet European design requirements.

Terminal variations and switch dimensions of the European designed version conform to applicable DIN standards. These V7s mate with both standard domestic and international industry stan-

dard receptacles and connectors. The plastic enclosure meets VDE KC250 arc tracking requirement and is approvable under the Refrigeration Industry Taste and Odor test.

OPERATING FORCES

- 175 grams (V rating only)
- 150 grams (Not applicable to Electrical Rating V)
- 75 grams (Not applicable to Electrical Rating C or V)
- 50 grams (Not applicable to Electrical Rating B, C, V)
- 25 grams (Not applicable to Electrical Rating B, C, E, V)
- 15 grams (Not applicable to Electrical Rating A, B, C, E, S, V)

Mounting Torque:
2 inch pounds min.
5 inch pounds max.

ELECTRICAL RATINGS

A	B	C*	D	E	F	S	V
5 amps, 125, 250 or 277 VAC; 1/10 hp, 250 VAC	11 amps and 1/8 hp, 125, 250 or 277 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC; 4 amps, 125 VAC "L"	15.1 amps and 1/8 hp, 125, 250 or 277 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC; 5 amps, 120 VAC "L"	1 amp, 125 VAC	10 amps and 1/8 hp, 125 or 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC; 4 amps, 125 VAC "L"	3 amps, 125, 250 or 277 VAC; 1/10 hp, 250 VAC	.1 amp, 125 VAC	21 amps 125, 250 or 277 VAC, 1 HP 125, 250, 277 VAC; 2 HP, 250, 277 VAC
W	X						
15.1 amps, 125, 250 or 277 VAC	6 amps; 1/8 HP, 125, 250 or 277 VAC						
International Series Only							
10 (3) +++ 250V \sim T 85 μ			5 (2) +++ 250V \sim T 85 μ			+++	16 (4) 250V \sim T 85 μ 50E3 SPNO only

* Available only when specifying 150 gram operating force.
NOTE: "L" denotes lamp load.

** The microgap construction (M) means contact gap is less than 3mm. Therefore, these products are suitable for secondary circuit use but not primary circuit use which requires a 3mm gap.

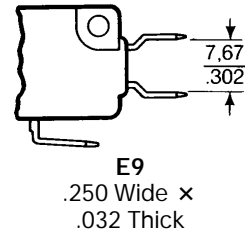
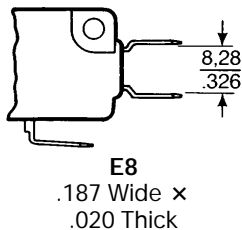
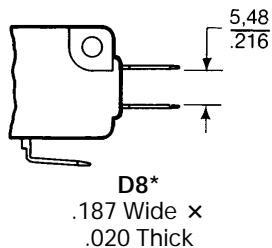
Basic Switches

Miniature

V7 Series

AVAILABLE TERMINALS

Quick-connect



NOTE: D8 and E8 terminals are European approved when used with electrical ratings B, D, or E. E9 terminals are European approved when used with electrical ratings B, C, D, or E.

* International approving agencies will require that switches with these terminals have insulated receptacles or connector.

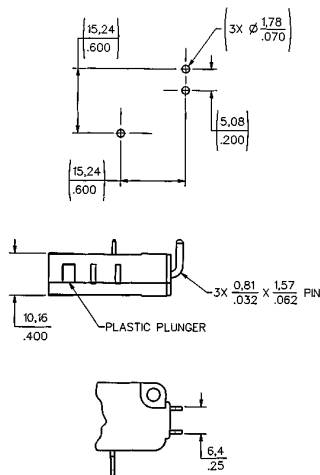
Printed Wiring Board

Printed wiring board terminals interface with snap-on receptacles and other components from AMPMODU interconnection system.

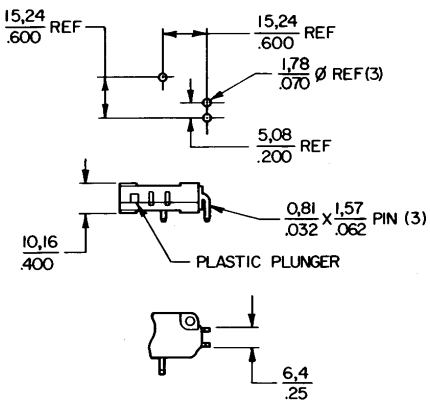
Dimensions shown are for reference only.

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

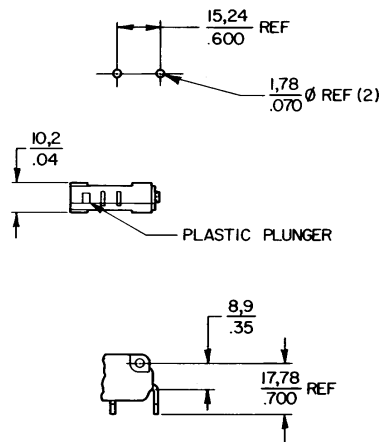
PO1



PO2



PO7



Miniature/
Subminiature

This section covers only 48 of our most popular V7 Series catalog listings. If you don't find what you're looking for, it's likely one of the approximately 300 other active V7 listings will meet your needs. Contact the 800 number.

Basic Switches

Miniature

V7 Series

TIMERSAVER SERIES

PIN PLUNGERS



Dim. Dwg. Fig. 1

ORDER GUIDE - SPDT*

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

Catalog Listing	Elect. Rating P. 38	O.F. max. grams ounces	R.F. min. grams ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. mm inches
V7-1S17D8	1 Amp S	150 5.3	25 .88	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-3S17E9	1 Amp S	50 1.75	5 .175	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-3A17E9	5 Amps A	50 1.75	5 .175	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-2B17D8	11 Amps B	75 2.63	10 .35	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-2B17E9	11 Amps B	75 2.63	10 .35	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-1C17D8	15.1 Amps C	150 5.3	25 .88	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-9W1AE9	15.1 Amps W (350°F)	300 10.6	25 .88	1,19 .047	1,27 .050	0,25 .010 max.
V7-1V19E9	21 Amps V	175 6.1	20 .70	1,19 .047	1,27 .050	0,05-0,25 .002-.010

STRAIGHT LEVERS



Dim. Dwg. Fig. 2

ORDER GUIDE - SPDT* .87" LEVER TIMESAVER SERIES

V7-3S17D8-002	1 Amp S	54 1.9	3 .11	1,52 .060	0,89 .035	0,33 .013
V7-1A17D8-002	5 Amps A	160 5.6	7 .25	1,52 .060	0,89 .035	0,38 .015
V7-2B17D8-002	11 Amps B	80 2.8	5 1.76	1,52 .060	0,89 .035	0,38 .015
V7-1C17E9-002	15.1 Amps C	160 5.6	17 .60	1,52 .060	0,89 .35	0,36 .014
V7-1V19E9-002	21 Amps V	185 6.5	13 .5	1,65 .065	0,89 .035	0,38 .015

1.40" LEVER TIMESAVER SERIES

V7-3S17D8-022	1 Amp S	30 1.05	1 0.035	3,04 .120	2,16 .085	0,76 .030
V7-1A17E9-022	5 Amps A	85 3	8 .28	3,04 .120	1,52 .060	0,76 .030
V7-1X2AD8-022	6 Amps X (350°F)	185 6.5	15 .53	1,40 .055	0,76 .030	0,38 .015
V7-1B17D8-022	11 Amps B	82 2.9	8 .28	3,04 .120	1,7 .067	0,68 .027
V7-1C17E9-022	15.1 Amps C	82 2.9	8 .28	3,04 .120	1,7 .067	0,76 .030
V7-1V19E9-022	21 Amps V	95 3.3	5 .18	3,3 .130	1,78 .070	0,76 .030

2.34" LEVER TIMESAVER SERIES

V7-3S17D8-048	1 Amp S	16 .56	.5 .018	5,97 .235	3,0 .118	1,27 .050
V7-2B17D8-048	11 Amps B	20 .7	1 .035	5,97 .235	2,92 .115	1,27 .050
V7-1C17E9-048	15.1 Amps C	85 3	4 .14	5,97 .235	1,65 .065	1,29 .051
V7-9W1AE9-048	15.1 Amps W (350°F)	90 3.2	4 .14	6,35 .250	3,15 .124	1,37 .054

* For SPST (N.O. & N.C.) circuitry, contact the 800 number.

NOTE: Catalog listings in V7 Order Guides have standard .114" mounting holes. For 3mm size holes, contact the 800 number.

Basic Switches

Miniature

V7 Series

SIMULATED ROLLER LEVERS

ORDER GUIDE - SPDT* 1.29" LEVER TIMESAVER SERIES

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

Catalog Listing	Elect. Rating P. 38	O.F. max. grams ounces	R.F. min. grams ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches
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1.29" LEVER TIMESAVER SERIES

V7-1S17D8-263	1 Amp S	90 3.15	9 .32	2,79 .110	1,9 .075	0,76 .030
V7-1B17D8-263	11 Amps B	90 3.15	9 .32	2,79 .110	1,52 .060	0,76 .030
V7-1C17D8-263	15.1 Amps C	91 3.19	9 .32	2,79 .110	1,54 .061	0,61 .024

.81" ROLLER LEVER TIMESAVER SERIES

V7-2S17D8-201	1 Amp S	90 3.15	7 .25	1,19 .047	1,02 .040	0,38 .015
V7-2B17D8-201	11 Amps B	88 3.1	7 .25	1,3 .052	1,04 .041	0,3 .012
V7-1C17E9-201	15.1 Amps C	176 6.16	19 .67	1,3 .052	0,81 .032	0,3 .012
V7-1V19E9-201	21 Amps V	205 7.2	15 .5	1,42 .056	0,81 .032	0,33 .013

1.34" ROLLER LEVER TIMESAVER SERIES

V7-3S17D8-207	1 Amp S	35 1.23	2 .07	2,79 .110	2,03 .080	0,76 .030
V7-2A17D8-207	5 Amps A	43 1.51	3 .105	2,92 .115	1,52 .060	0,64 .025
V7-1C17E9-207	15.1 Amps C	86 3	9 .32	2,84 .112	1,63 .064	0,64 .025
V7-1V19E9-207	21 Amps V	100 3.5	7 .25	3,07 .121	1,65 .065	0,76 .030

* For SPST (N.O. & N.C.) circuitry, contact the 800 number.

NOTE: Catalog listing in V7 Order Guides have standard .114" mounting holes. For 3mm size holes, contact the 800 number.



Dim. Dwg. Fig. 3



Dim. Dwg. Fig. 4

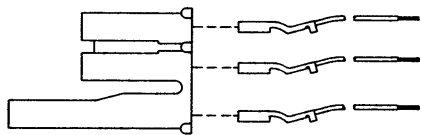
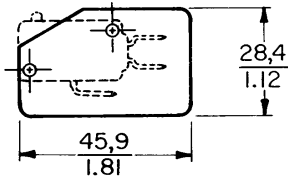



Dim. Dwg. Fig. 7

Miniature/
Subminiature

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

ORDER GUIDE – ACCESSORIES

Catalog Listing	Description	Catalog Listing	Description
15PA176-V7	Connector/Receptacle packet - Includes 25 connectors and 75 receptacles with 18", blue 16 gauge PVC insulated, stranded wire. (To be used with D8 terminals only). 	15PA177-V7	Insulator packet (500 pcs.) .018" thick varnished fiberglass. 
15PA260	Plunger boot seal. Elastomer dust and splash resistant plunger seal. 		

Dimensions shown are for reference only.

Basic Switches

Miniature

V7 Series

INTERNATIONAL SERIES

PIN PLUNGER



Dim. Dwg. Fig. 1

ORDER GUIDE - SPDT* INTERNATIONAL SERIES

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

Catalog Listing	Elect. Rating P. 38	O.F. max. grams ounces	R.F. min. grams ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. mm inches
V7-1B11E9	11 Amps B	150 5.3	25 .88	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-2B11D8	11 Amps B	75 2.63	10 .35	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-2B11PO2	11 Amps B	75 2.63	10 .35	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-3E11D8	10 Amps E	50 1.75	5 .175	1,19 .047	1,27 .050	0,05-0,25 .002-.010
V7-3E11E9	10 Amps E	50 1.75	5 .175	1,19 .047	1,27 .050	0,05-0,25 .002-.010

STRAIGHT LEVERS



Dim. Dwg. Fig. 5

1.40" LEVER INTERNATIONAL SERIES

V7-1B11E9-022	11 Amps B	80 2.8	8 .28	2,79 .110	2,28 .090	0,76 .030
V7-2B11E9-022	11 Amps B	45 1.58	4 .14	2,79 .110	2,28 .090	0,76 .030
V7-3E11D8-022	10 Amps E	30 1.05	2 .070	2,79 .110	2,28 .090	0,76 .030

SIMULATED ROLLER LEVERS



Dim. Dwg. Fig. 3

1.29" LEVER INTERNATIONAL SERIES

V7-2B11D8-263	11 Amps B	50 1.75	5 .175	2,54 .100	1,9 .075	0,76 .030
V7-3E11E9-263	10 Amps E	33 1.16	2 .070	2,54 .100	1,9 .075	0,76 .030

ROLLER LEVERS



Dim. Dwg. Fig. 4

ORDER GUIDE - SPDT* .81" LEVER INTERNATIONAL SERIES

V7-2B11D8-201	11 Amps B	90 3.15	10 .35	1,19 .047	1,02 .040	0,38 .015
V7-3E11D8-201	10 Amps E	62 2.17	5 .175	1,19 .047	1,02 .040	0,38 .015

1.34" LEVER INTERNATIONAL SERIES

V7-2B11E9-207	11 Amps B	45 1.58	5 .175	2,54 .100	2,16 .085	0,76 .030
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NOTE: Catalog listings in V7 Order Guides have standard .114" mounting holes. For 3mm size holes, contact the 800 number.



Dim. Dwg. Fig. 7

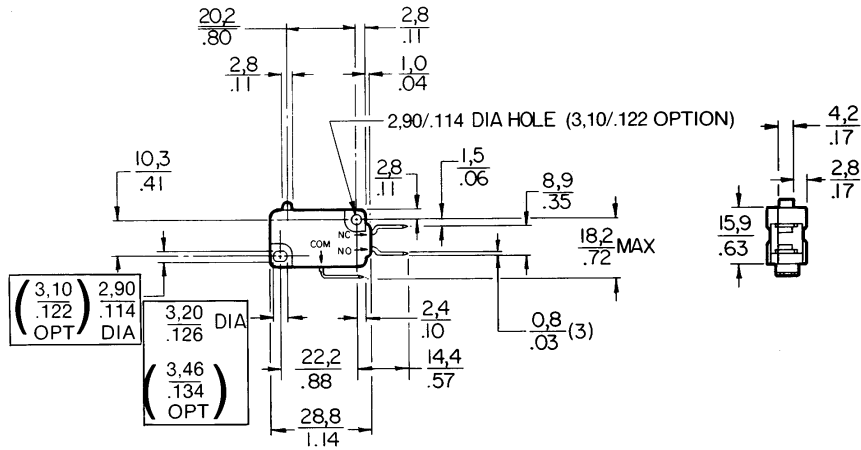
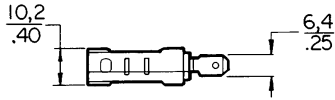
Basic Switches Miniature

MOUNTING DIMENSIONS (for reference only)

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

PIN PLUNGER

Fig. 1



Miniature/
Subminiature

Fig. 2 Straight Lever (Style-002)

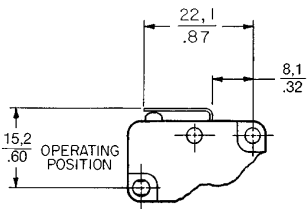


Fig. 3 Simulated Roller (Style-263)

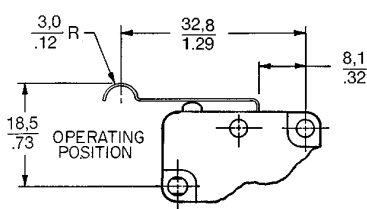


Fig. 4 Roller Lever (Style-201)

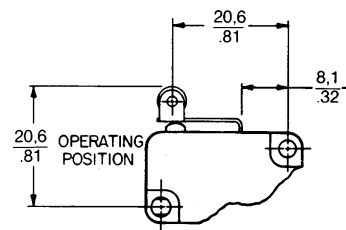


Fig. 5 Straight Lever (Style-022)

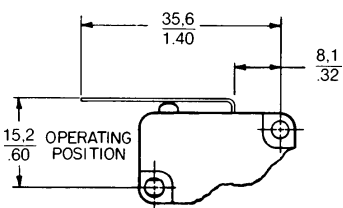


Fig. 6 Straight Lever (Style-048)

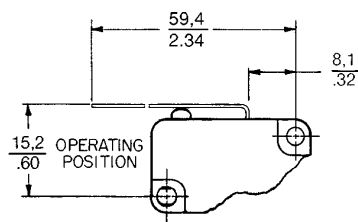
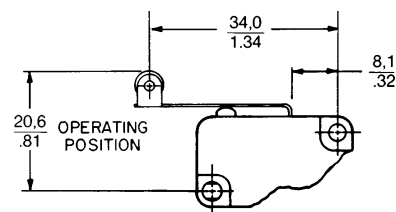


Fig. 7 Roller Lever (Style-207)



NOTE: All levers are 0.17" (4,31 mm) wide. Rollers are 0.19" (4,82 mm) wide.

NOTE: Operate point dimensions taken at top of lever/roller.

MICRO SWITCH™ V-Basic Switch Standard V15 Series

Electromechanical Basic Switch



DESCRIPTION

Honeywell's MICRO SWITCH™ V-Basic Switch Standard, V15 Series, is an electromechanical switch designed for enhanced reliability at a great value. This switch is often ideal for “low-cost-of-failure” – where the cost to replace the switch or to service any failure related to the switch is minimal. The V15 is designed for applications requiring ≥ 100 g of operating force and electrical ratings ranging from 16A to 26A.

The V15 Series switch offers a wide range of standard offerings, including a choice of actuators, electrical ratings, operating forces, and circuitry, and holds global approvals (ENEC, CQC, UL, cUL).

FEATURES

- Broad range of electrical loads
- Straight, roller, simulated roller, and special actuators
- Special terminations available upon request
- Precision operation and application versatility
- Wide temperature range
- Global approvals (ENEC, CQC, UL, cUL)

POTENTIAL APPLICATIONS

- Appliance
- Gaming
- Vending machines
- Water heaters
- Industrial controls

BENEFITS

- Compatible with many applications due to the switches design flexibility, broad range of electrical loads, and actuators
- Accepts insulated connections, most quick connect openings
- Reliability, repeatability within range of conditions

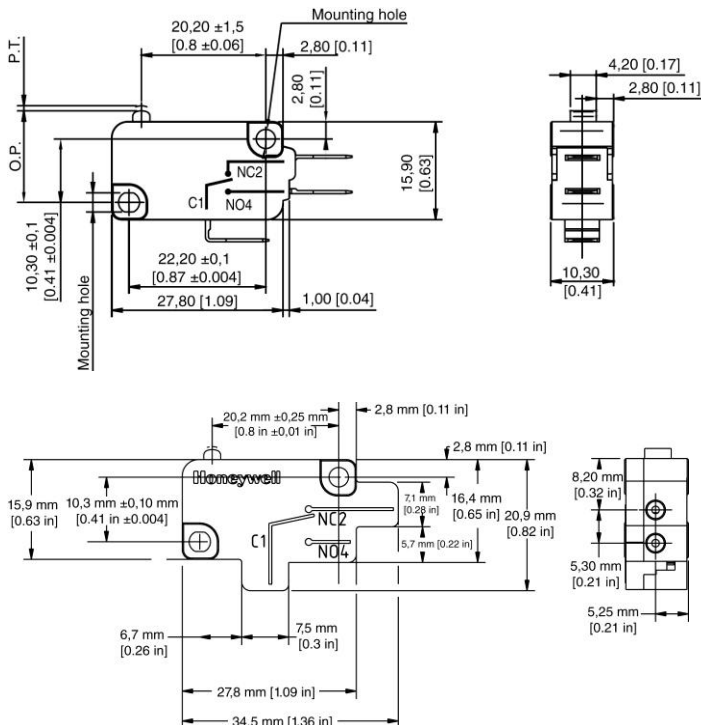
MICRO SWITCH™ V-Basic Switch Standard V15 Series

Specifications	
Insulation resistance	≥ 100 mOhm (500 Vdc)
Dielectric strength	1000 Vac (50 Hz/60 Hz, 1 min.)
Contact resistance	100 milliOhm max.
Operating frequency - electrical	10 to 30 operations per minute
Operating frequency – mechanical	300 operations per minute max.
Operating speed	0,1mm - 1m/sec.
Service life mechanical	5 million cycles (operating force ≤ 200 g); 1 million cycles (operating force > 200 g)
Service life electrical	6000 or 50000 operations minimum
Storage temperature	-25 °C to 100 °C [-13 °F to 212 °F]
Storage humidity	85 % RH max.
Micro disconnection (μ)	< 3 mm contact gap
Agency approvals	ENEC, CQC, UL, cUL

ELECTRICAL CHARACTERISTICS

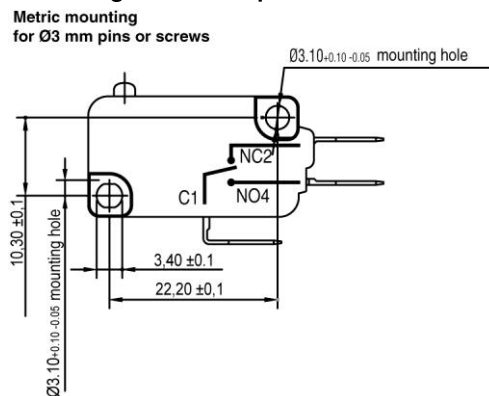
Electrical rating	
5 A	ENEC/CQC: 5 (2.5) A, 125 Vac/250 Vac (50000 cycles)
10 A	UL/cUL: 10 A 1½ HP, 125 Vac/250 Vac (100000 cycles)
11 A	ENEC/CQC ; 11(3) A, 125/150 Vac UL/cUL ; 11(3) A, 125/150 Vac
16 A	ENEC/CQC ; 16(4) A, 250 Vac (50000 cycles) UL/cUL ; 16½ HP, 125 Vac/250 Vac (6000 cycles)
22 A	ENEC/CQC: 22(8) A, 250 Vac (10000 cycles) UL/cUL: 22 A 1HP, 125 Vac/250Vac (6000 cycles)
26 A	ENEC: 26(10) A, 250 Vac (25000 cycles)

DIMENSIONS

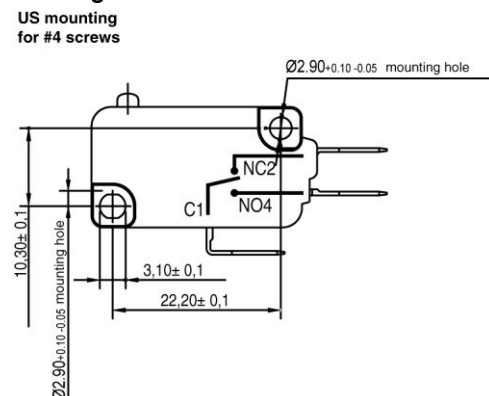


MOUNTING HOLE DIMENSIONS

Metric mounting for Ø3 mm pins or screws



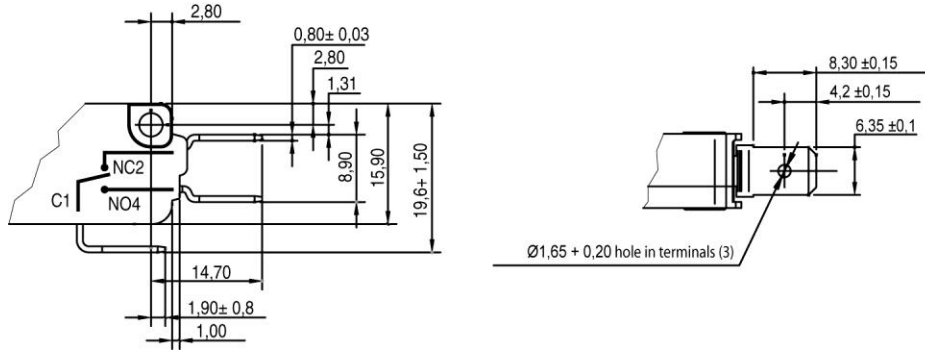
USA mounting for #4 screws



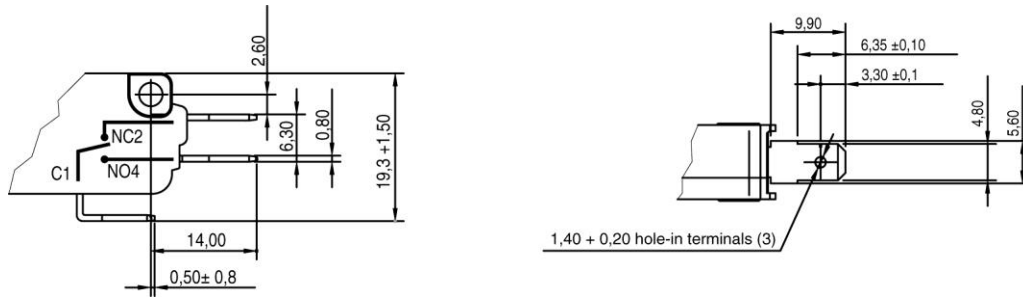
Electromechanical Basic Switches

CONNECTION DIMENSIONS

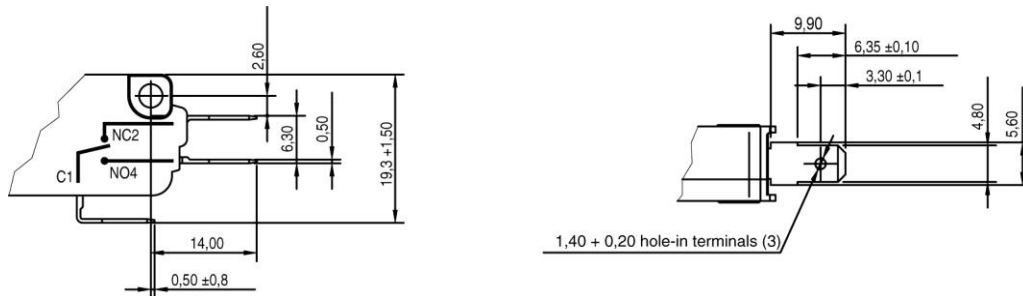
C-style quick connect - 6,35 mm wide x 0,8 mm thick



D-style quick connect - 4,80 mm wide x 0,8 mm thick



E-style quick connect - 4,80 mm wide x 0,5 mm thick



MICRO SWITCH™ V-Basic Switch Standard V15 Series

STANDARD LEVER OPTIONS

Lever code/Description	Outline dimensions
A01/Straight short lever	
A02/Standard straight lever	
A03/Long straight lever	
A04/Simulated roller lever	
A05/Short roller lever	
A06/Roller lever	

Electromechanical Basic Switches

NOMENCLATURE TREE

MICRO SWITCH™ V15 Series Ordering Instructions

V15	T	16	C	Z	200	A	01	XX	K
Switch type	Temp. grade °C	Electrical rating	Terminal style	Circuit code	Operating force at pin plunger, max.	Lever position	Lever type	Special designator	Mounting holes
MICRO SWITCH™ V-Basic Switch Standard (V15 Series)	T T125	5 ENEC/CQC: 5 (2.5) A, 125 Vac/250 Vac (50000 cycles)	C Quick connect 6,35 mm x 0,80 mm [0.250 in x 0.032 in]	Z SPDT	100 100 gf 0.98 N	No lever pin plunger	No lever pin plunger	A special designator letter is used only when Terminal Type is "X" or Actuator/Lever Type is "99" to specify that the terminals or the actuator of the switch is special. Review Product Specification to determine the exact differences.	Metric Ø3,1 mm
	H T150	10 UL/cUL: 10 A 1½ HP, 125 Vac/250 Vac (100000 cycles)	D Quick connect 4,80 mm x 0,8 mm [0.187 in x 0.032 in]	P SPST-NO	200 200 gf 1.96N	A Far from pin plunger	01 Short straight lever		USA Ø2,9 mm
	S T85	11 ENEC/CQC: 11(3) A, 125/150 Vac 25T85 µ 5E4 UL/cUL: 11(3) A, 125/150 Vac 25T85 µ 5E4	E Quick connect 4,80 mm x 0,5 mm [0.187 in x 0.020 in]	C SPST-NC	300 300 gf 2.94 N	B Near pin plunger	02 Std. straight lever		
		16 ENEC/CQC: 16(4)A 250 Vac UL/cUL: 16 1/2HP 125/250 Vac	H Push-in terminals		400 400 gf 3.92 N		03 Long straight lever		
		22 ENEC/CQC: 22(8) A, 250 Vac UL/cUL: 22 A 1HP, 125/250 Vac					04 Simulated roller lever		
		26 ENEC: 26(10) A, 250 Vac					05 Roller lever		
							06 Long roller lever		
							99 Special lever		

Disclaimer: Not all configurations are immediately available.

ORDER GUIDE

The MICRO SWITCH™ V-Basic Switch Standard, V15 Series, provides customers with the flexibility to request quotes FOB Hong Kong or FOB Freeport. In addition, drop shipments can be arranged to any location in Asia Pacific.

- FOB Freeport orders will be entered using ICOM. Lead time 8 weeks.
- FOB New House orders will be entered using SAP. Lead time 8 weeks.
- FOB Hong Kong or drop shipments a special order request form will need to be submitted please contact your application engineer or product manager for details.

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

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- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

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SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell

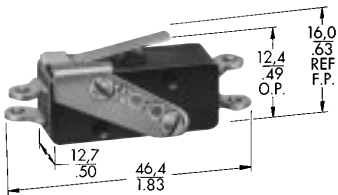
Basic Switches

Miniature Double-break

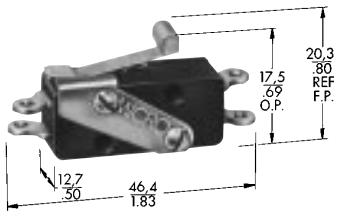
TB Series

AUXILIARY ACTUATORS

For use with 1TB1-1 and 1TB1-2 switches



JT-1



JT-5

ORDER GUIDE

Catalog Listing	Description
JT-1	Leaf actuator
JT-5	Roller leaf actuator

Switches are not included with the actuators.

MOUNTING DIMENSIONS (For reference only)

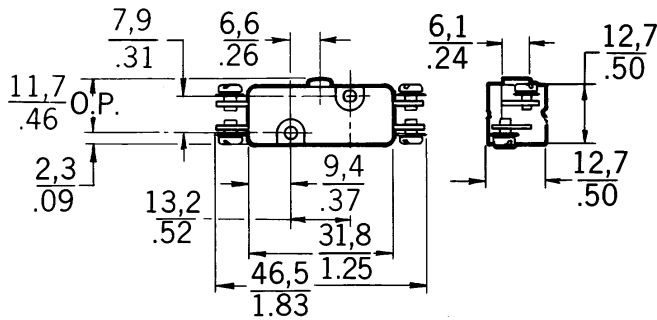


Fig. 1

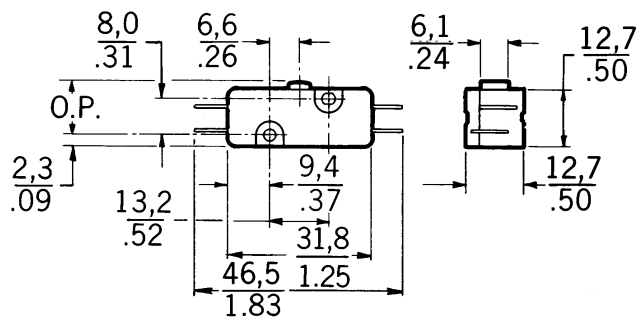


Fig. 2

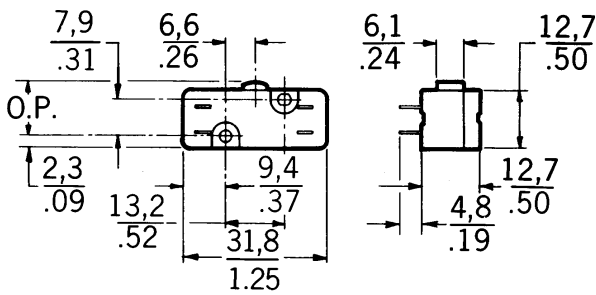


Fig. 3

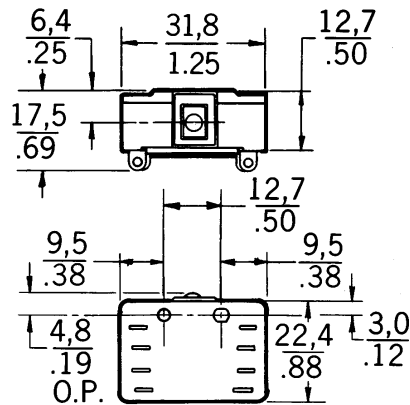


Fig. 4

Fig. 4

Miniature/
Subminiature

Key: 0,0 = mm
0.00 = inches

MICRO SWITCH™ Premium Large Snap-Action Series

Snap-Action Switches & Accessories



DESCRIPTION

MICRO SWITCH™ premium large snap-action series are designed for repeatability and enhanced life. These series of precision switches feature application-specific characteristics. From double-break circuitry to handling very high loads, MICRO SWITCH™ premium large snap-action series are suitable for a variety of applications.

DT Series switches consist of two independent single-pole double throw circuits in one housing actuated by one actuator. The terminals are separated by a non-conductive shield to reduce shorting.

MT Series magnetic blow-out switches are designed to switch high-capacity (125 Vdc/250 Vdc) systems. An integral magnet around the contact gap protects the contacts by deflecting the arc. Vents between the cover and housing allow the hot gas to escape.

Easy to gang mount, **MN Series** twin-break circuit type switches are for use with limit or control mechanisms on machine tools, presses, or other industrial equipment.

MICRO SWITCH™ **TB Series** miniature double-break basic switches are basic double-break units that offer a means of controlling isolated circuits. Each circuit may be driven by an independent voltage source.

FEATURES




- Broad and deep array of product options and characteristics
- SPDT circuits
- High capacity Vdc
- Broad range of accessories, including brackets and actuators
- Rugged construction
- Reliable performance with enhanced mechanical life
- Various international agency approvals

POTENTIAL APPLICATIONS



- Building controls and fire suppression systems
- dc motors
- Door latches
- HVAC
- Industrial equipment
- Irrigation systems
- Machine tools
- Manually operated devices
- Medical/dental equipment
- Office equipment
- Presses
- Solenoids
- Semi-trailer trucks
- Test instruments
- Timing devices
- Valves
- Welders

MICRO SWITCH™ Premium Large Snap-Action Series

SPECIFICATIONS

			
SERIES	DT	MT	MN
Differentiator	same size as the MICRO SWITCH™ BZ Series, but with two circuits	contains a magnet for very high dc loads	double-break circuitry
Use	wiring permits several different wiring configurations	designed to switch high capacity (125 Vdc and 250 Vdc) systems	limit or control mechanisms
Potential applications	HVAC, irrigation systems, manually operated devices, medical/dental equipment, office equipment, semi-trailer trucks, test instruments, timing devices, valves	dc motors, solenoids	machine tools, presses, other industrial equipment
Ampere rating	10 A	10 A	15 A
Circuitry	DPDT	SPDT	2 CKT DB
Operating force	3,34 N to 5,56 N [12.0 oz to 20.0 oz] max.	3,34 N to 5,00 N [12 oz to 18 oz] max.	1,95 N to 3,1 N [7.0 oz to 11.0 oz]
Termination	screw	solder, screw	screw
Actuator	pin plunger, straight plunger, straight lever, reversed lever, roller lever	pin plunger, straight lever, roller lever, flexible leaf, flexible leaf with roller	pin plunger
Voltage	125 Vac, 250 Vac, 28 Vdc	125 Vdc, 250 Vdc	480 Vac
Agency approvals	UL recognized; CSA certified	UL recognized	UL recognized; CSA certified
Operating temperature	-55 °C to 85 °C [-67 °F to 185 °F]	-55 °C to 82 °C [-67 °F to 180 °F]	-55 °C to 85 °C [-67 °F to 185 °F]
Contacts	silver	silver	silver
Housing	general purpose phenolic	arc resistant melamine	general purpose phenolic
Sealing	no	no	no
Expected mechanical life	–	100,000 operations	10,000,000 cycles

Snap-Action Switches & Accessories

			
SERIES	TB	WZ/WA/WM/WE	YZ/YA/YM/YE
Differentiator	smaller double-break switch	SPNC contacts	SPNO contacts
Use	offer a means of controlling isolated circuits	ideal for high cost-of-failure applications	
Potential applications	control systems, industrial equipment, and welders	communication systems, elevators/lifts, HVAC, irrigation systems, semi-trailer trucks, and valves	
Ampere rating	10 A	15 A (WZ/YZ), 20 A (WA/YA), 22 A (WM/YM), 25 A (WE/YE)	
Circuitry	2 CKT DB	SPNC	SPNO
Operating force	1,95 N to 3,89 N [7 oz to 14 oz] max.	1.0 oz to 28 oz	
Termination	screw, solder	quick connect, solder, screw	
Actuator	pin plunger	pin plunger, overtravel plunger, straight, roller, flexible leaf roller, flexible leaf	
Voltage	250 Vac	115 Vac, 125 Vac, 250 Vac	
Agency approvals	UL recognized, CSA certified	UL, CSA, ENEC, CE (varies by specific model)	
Operating temperature	-55 °C to 125 °C [-67 °F to 257 °F]	-55 °C to 85 °C [-67 °F to 185 °F]	
Contacts	silver	silver, silver cadmium oxide	
Housing	general purpose phenolic	general purpose phenolic	
Sealing	none	environment sealing option available	
Expected mechanical life	–	up to 20,000,000 cycles at 95% survival	

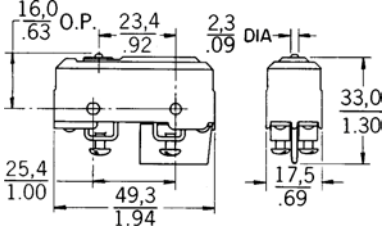
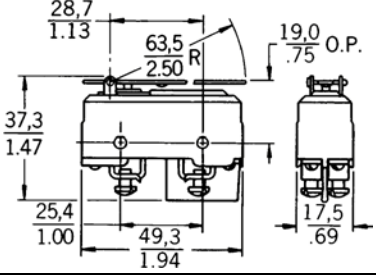
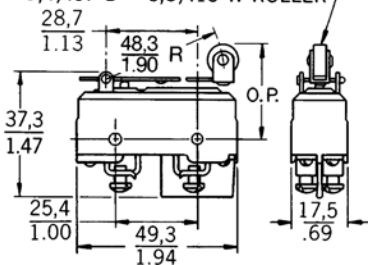
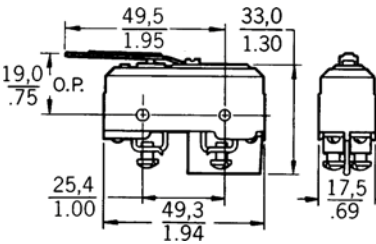
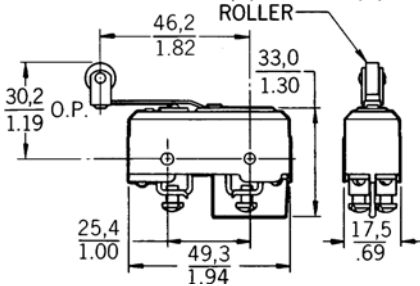
MICRO SWITCH™ Premium Large Snap-Action Series

DT SERIES LEVER OPTIONS & DIMENSIONS mm/in

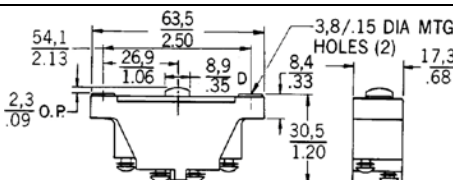
Lever/ Terminals	Dimensions	Lever/ Terminals	Dimensions
Pin plunger/ Screw	<p>MOUNTING HOLES ACCEPT PINS OR SCREWS OF 3.53/.139 DIA</p>	Straight/ Screw	
Straight/ Screw		Roller lever/ Screw	<p>9,4/.37 D × 3,8/.15 W ROLLER</p>
Roller lever/ Screw	<p>9,4/.37 D × 3,8/.15 W ROLLER</p>	Roller lever/ Screw	<p>9,4/.37 D × 3,8/.15 W ROLLER</p>
Roller lever/ Screw	<p>9,4/.37 D × 3,8/.15 W ROLLER</p>	Roller lever/ Screw	<p>9,4/.37 D × 3,8/.15 W ROLLER</p>
Straight plunger/ Screw			

Snap-Action Switches & Accessories

MT SERIES LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions	Lever/ Terminals	Dimensions
Pin plunger/ Screw		Straight lever/ Screw	
Roller lever/ Screw	<p>9,4/.37 D x 3,8/.15 W ROLLER</p> 	Flexible leaf/ Screw	
Flexible leaf roller/ Screw	<p>9,4/.37 D X 3,8/.15 W ROLLER</p> 		

3MN SERIES LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions
Pin plunger/ Screw	

MICRO SWITCH™ Premium Large Snap-Action Series

TB SERIES LEVER OPTIONS & DIMENSIONS mm/in

Lever/ Terminals	Dimensions	Lever/ Terminals	Dimensions
Pin plunger/ Screw		Pin Plunger/ Solder	
Pin plunger/ Solder front		Pin plunger/ Solder front four circuit	

Snap-Action Switches & Accessories

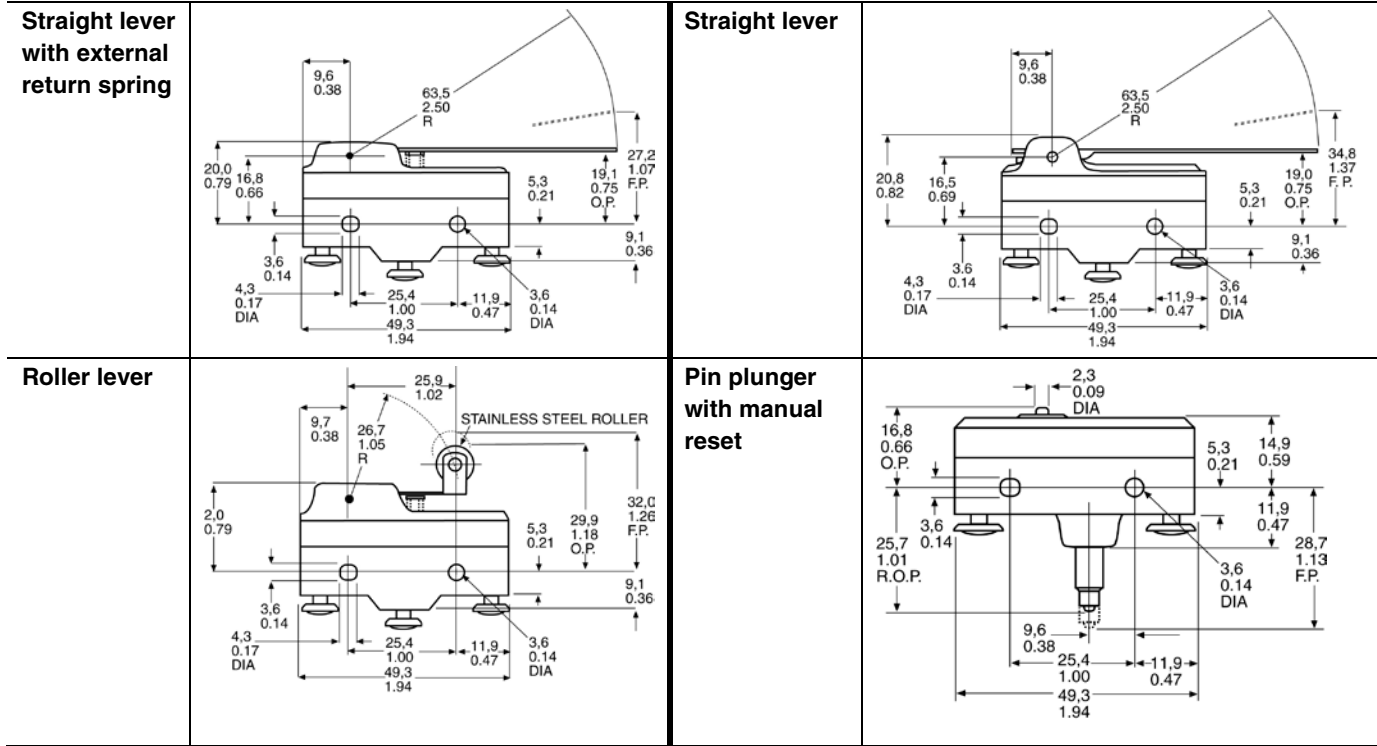
WZ/WA/WM/WE SERIES LEVER OPTIONS & DIMENSIONS mm/in

All products shown with screw terminals. See next page for available terminal options.

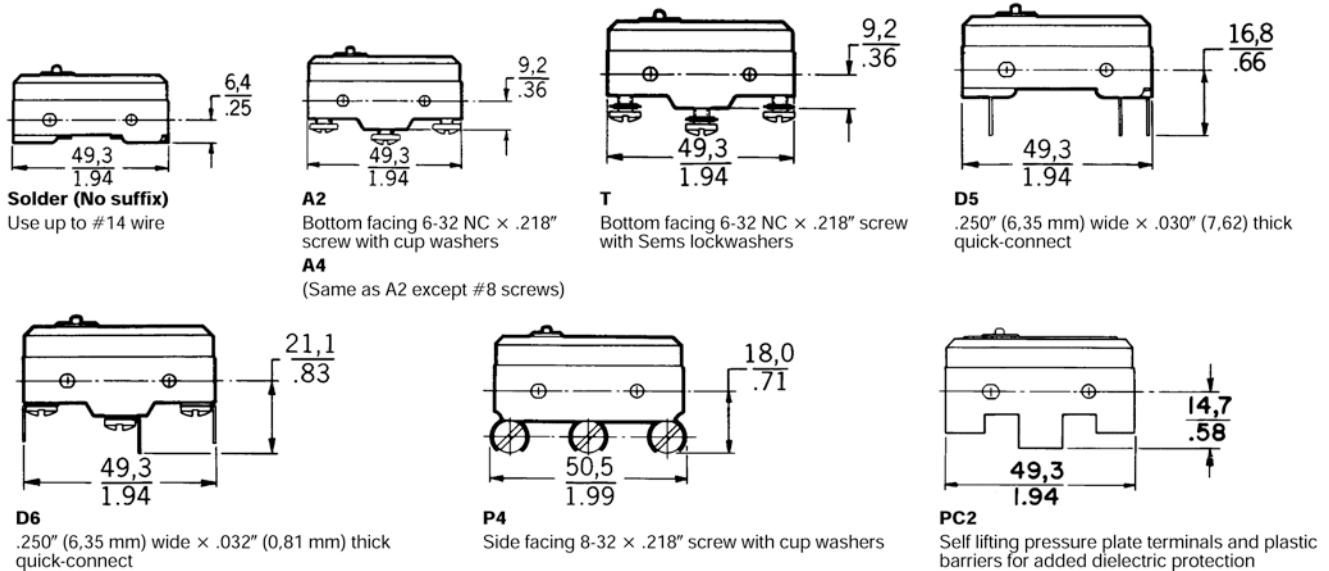
Lever	Dimensions	Lever	Dimensions
Pin plunger		Pin plunger	
Overtravel plunger		Overtravel plunger	
Bushing mount overtravel plunger		Bushing mount overtravel plunger	
Flexible leaf actuator		Flexible leaf actuator	

MICRO SWITCH™ Premium Large Snap-Action Series

Continued - WZ/WA/WM/WE SERIES LEVER OPTIONS & DIMENSIONS mm/in

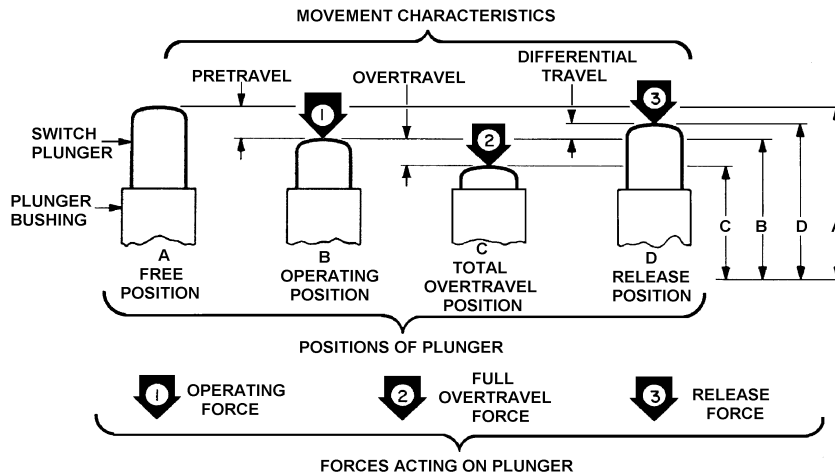


WZ/WA/WM/WE SERIES AVAILABLE TERMINALS



MICRO SWITCH™ Premium Large Snap-Action Series

OPERATING CHARACTERISTICS



Differential Travel-DT	Plunger or actuator travel from point where contacts “snap-over” to point where they “snap-back.”
Free Position-FP	Position of switch plunger or actuator when no external force is applied.
Full Overtravel Force	Force required to attain full overtravel of actuator.
Operating Position-OP	Position of switch plunger or actuator at which point contacts snap from normal to operated position. With flexible or adjustable actuators, the operating position is measured from the end of the lever or its maximum length. Location of operating position measurement shown on mounting dimension drawings.
Operating Force-OF	Amount of force applied to switch plunger or actuator to cause the contact “snap-over.” Note in the case of adjustable actuators, the force is measured from the maximum length position of the lever.
Overtravel-OT	Plunger or actuator travel safely available beyond operating position.
Pretravel-PT	Distance or angle traveled in moving plunger or actuator from free position to operating position.
Release Force-RF	Amount of force still applied to switch plunger or actuator at the moment contacts snap from operated position to non-operated position.
Total Travel	Distance from actuator free position to overtravel limit position.

Snap-Action Switches & Accessories

WARNING

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SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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Internet: www.honeywell.com/sensing

Phone and Fax:

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	+65 6445-3033 Fax
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	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
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Golden Valley, MN 55422
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June 2010
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Honeywell

Basic Switches

Double-pole Double-throw

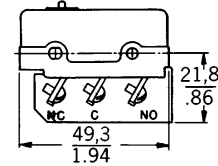


FEATURES

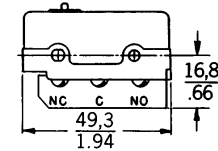
- Two independent single-pole double-throw circuits on one housing
- Design permitting several wiring combinations
- Savings in space and weight
- Mounting interchangeability with type Z switches
- Temperature tolerance to +180°F (82°C)
- UL recognized, CSA certified

AVAILABLE TERMINALS

B6
6-32 UNC x .188"
(No. 5 pan head screws)



A7
4-40 UNC x .125"
Screws with lockwashers.
Fiberglass insulator isolates terminals and prevents accidental shorting.



ELECTRICAL RATING

Circuitry	Electrical Data and UL Codes
Double-pole double-throw 	J 10 amps, 125 or 250 vac; 0.3 amp, 125 vdc; 0.15 amp, 250 vdc. UL Code L59

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

DOUBLE-POLE DOUBLE-THROW



Dim. Dwg. Fig. 1

ORDER GUIDE

Catalog Listing	Description	Electrical Data and UL Code	O.F. max. newtons	R.F. min. newtons	P.T. max. mm inches	O.T. mm inches	D.T. max. min. mm inches	O.P.* mm inches
DT-2R-A7 MS25008-1	Pin plunger	10 Amps J	3,34-5,56 12-20	0,56 2	1,91 .075	0,13 .005	1,02-1,52 .040-.060	15,6 .615±.015



Dim. Dwg. Fig. 9

DT-2RS1-A7	Straight plunger	10 Amps J	3,34-5,56 12-20	0,28 1	1,91 .075	0,51 .020	1,02-1,52 .040-.060	28,2±0,38 1.11±.015
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Dim. Dwg. Fig. 3

DT-2RV3-A7	Straight lever Reversed lever position	10 Amps J	1,11-1,95 4-7	0,14 0.5	6,86 .270	0,25 .010	2,92-4,83 .115-.190	18,3 .719
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Dim. Dwg. Fig. 2

DT-2RV-A7	Straight lever	10 Amps J	0,97-1,67 3.5-6	0,28 1	25,4 1	1,57 .062	12,4-19,2 .490-.755	21,8 .859
------------------	----------------	---------------------	---------------------------	------------------	------------------	---------------------	-------------------------------	---------------------

Except where stated * ±0.76 mm ±.030 in.

Basic Switches

Double-pole Double-throw

ORDER GUIDE



Dim. Dwg. Fig. 8

Catalog Listing	Recommended For	Electrical Data and UL Codes	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P.* mm inches
DT-2RV216-A7	Roller lever (centered steel roller)	10 Amps J	11,1 2.5 lbs.	1,11 4	1,02 .040	0,13 .005	0,51-0,76 .020-.030	31 1.219



Dim. Dwg. Fig. 5

DT-2RV22-A7	1.03 inch (26,2mm) roller lever (steel roller)	10 Amps J	2,5-4,17 9-14	0,83 3	-	0,79 .031	4,95-7,75 .195-.305	30,2±0,38 1.188±.015
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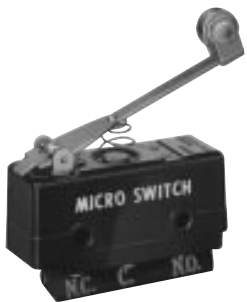
Dim. Dwg. Fig. 7

DT-2RV212-A7	Roller lever Reversed lever position	10 Amps J	2,5-4,17 9-15	0,42 1.5	3,3 .130	0,13 .005	1,27-2,16 .050-.085	29,4 1.156
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Dim. Dwg. Fig. 6

DT-2RV23-A7	Roller lever Reversed lever position	10 Amps J	1,53-2,64 5.5-9.5	0,21 .75	4,45 .175	0,25 .010	2,16-3,43 .085-.135	29,4 1.156
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Dim. Dwg. Fig. 4

DT-2RV2-A7	1.90 inch (48,3 mm) roller lever (steel roller)	10 Amps J	1,25-2,09 4.5-7.5	0,42 1.5	— —	1,19 .047	9,27-14,4 .365-.565	31,8 1.250
------------	---	--------------	----------------------	-------------	--------	--------------	------------------------	---------------

Except where stated * ±0,76 mm ±.030 in.

Auxiliary actuators see page 68-69.

Standard
Basic Switches

Basic Switches

DT Series

Double-pole Double-throw

MOUNTING DIMENSIONS (For reference only)

PIN PLUNGER

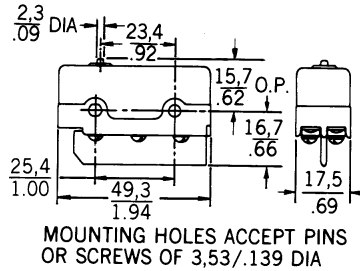


Fig. 1

STRAIGHT LEVER

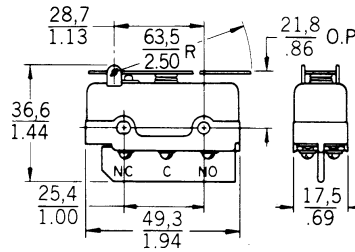


Fig. 2

STRAIGHT LEVER

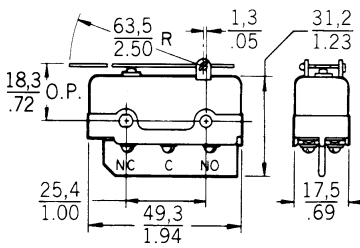


Fig. 3

ROLLER LEVER

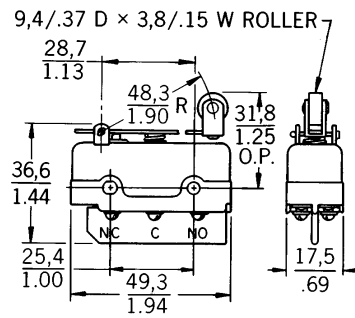


Fig. 4

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

Basic Switches

DT Series

Double-pole Double-throw

MOUNTING DIMENSIONS (For reference only)

ROLLER LEVER

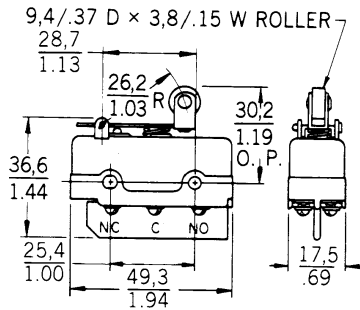


Fig. 5

ROLLER LEVER

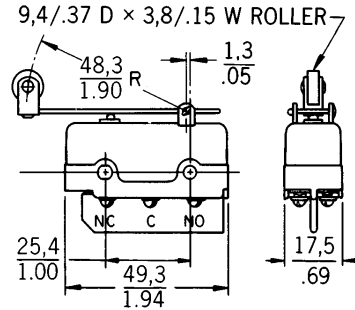


Fig. 6

ROLLER LEVER

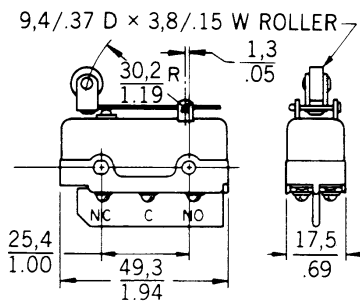


Fig. 7

ROLLER LEVER

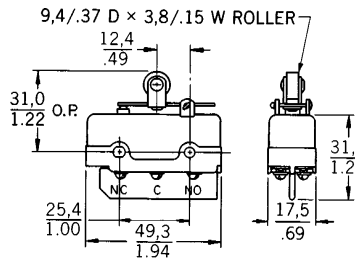


Fig. 8

STRAIGHT PLUNGER

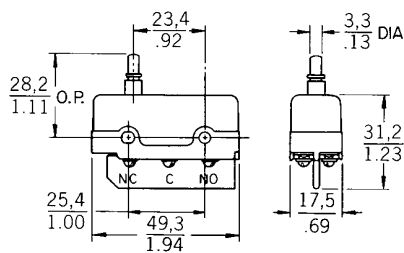


Fig. 9

Standard Basic Switches

Basic Switches

Magnetic Blow-out



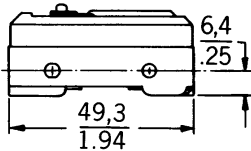
FEATURES

- Arc resistant case
- Mechanical life of 100,000 operations — 95% survival
- Temperature tolerance to +180°F (82°C)
- Mounting interchangeability with Z switches
- UL recognized

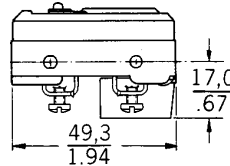
GENERAL INFORMATION

MT (single-pole double-throw) magnetic blow-out switches are designed to switch high capacity (125 and 250 VDC) systems. An integral magnet around the contact gap protects the contacts by deflecting the arc. Vents between the cover and housing allow the hot gas to escape. These switches are designed for the control of DC motors, solenoids, etc.

AVAILABLE TERMINALS



Solder (No listing designation)



A28
6-32NC x .218" Screws
will accept up to #12 wire.

ELECTRICAL RATING

Circuitry	Electrical Data and UL Codes
Single-pole double-throw unless otherwise noted in order guide	<p>K Rating established with switch non-polarized 10 amps, 125 vac or vdc; 1/4 hp, 125 vac or vdc. UL Code L 168</p> <p>Non-polarized: 10 amps res. or 1/4 hp, 125 vdc; 3 amps max. res. 250 vdc.</p> <p>Polarized*: 10 amps res. or 1/2 hp, 125 vdc; 3 amps max. res., 250 vdc.</p>

*To polarize, connect negative side of line to common terminal. To achieve the same effect, mount switch with brass screws, using a non-magnetic barrier (at least 1/4" thick) between the switch and mounting surface.

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

ORDER GUIDE

Catalog Listing	Recommended For	Electrical Data and UL Codes	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
MT-4R-A28	Pin plunger SPDT	10 Amps K	3,34-5,0 12-18	1,39 5	1,02 .04	0,13 .005	0,1-0,18 .004-.007	15,9±0,38 .625±.015



Dim. Dwg. Fig. 1

Basic Switches

Magnetic Blow-out

MT Series

ORDER GUIDE



Dim. Dwg. Fig. 2

Catalog Listing	Description	Electrical Data and UL Codes	O.F. max. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	O.P.* mm inches
MT-4RV-A28	Straight lever	10 Amps K	0,56 2	0,14 0.5	12,7 0.5	1,19 .047	2,16 .085	19,1 .750



Dim. Dwg. Fig. 3

MT-4RV2-A28	1.90 inch (48,3mm) lever with hardened steel roller	10 Amps K	0,76 2.75	0,07 0.25	8,89 0.35	0,79 .031	1,65 .065	30,2 1.188
MT-4RV22-A28	1.03 inch (26,2mm) lever with hardened steel roller	10 Amps K	1,25 4.5	0,28 1	5,08 .200	0,38 .015	0,89 .035	31,3 1.234



Dim. Dwg. Fig. 4

MT-4RL-A28	1.95 inch (49,5mm) flexible leaf	10 Amps K	3,34 12	0,28 1	—	1,52 .060 max.	—	19,1 .750
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Dim. Dwg. Fig. 5

MT-4RL2-A28	1.82 inch (46,2mm) flexible leaf with hardened steel roller	10 Amps K	3,34 12	0,28 1	—	1,52 .060 max.	—	30,2 1.188
-------------	---	--------------	------------	-----------	---	----------------------	---	---------------

Standard Basic Switches

Except where stated * ±0,76 mm
±.030 in.

Basic Switches

Magnetic Blow-out

MT Series

MOUNTING DIMENSIONS (For reference only)

PIN PLUNGER

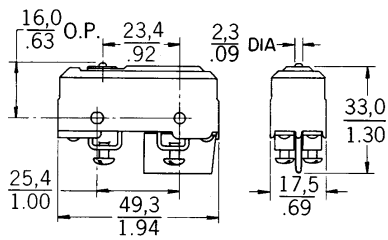


Fig. 1

STRAIGHT LEVER

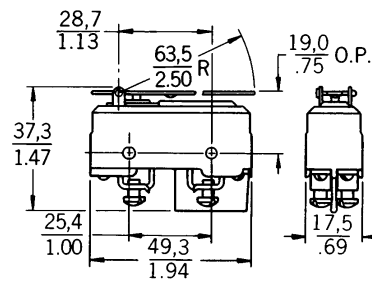


Fig. 2

ROLLER LEVER

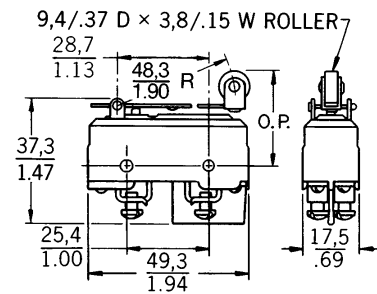


Fig. 3

FLEXIBLE LEAF

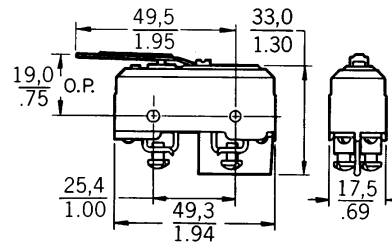


Fig. 4

FLEXIBLE ROLLER LEAF

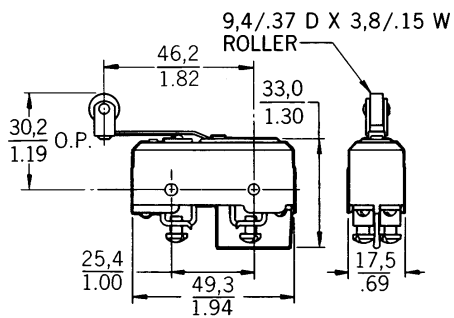


Fig. 5

Mounting holes accept pins or screws of .139" (3.53 mm) diameter.

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

Basic Switches

Double-break

3MN Series



FEATURES

- .080 inch minimum overtravel
- Power load switching capability up to 15 amperes
- Motor handling capacity of 1 horsepower at 240 vac.
- Long mechanical life of 10,000,000 cycles—95% survival
- Arc resistant plastic
- More space between terminals to reduce possibility of shorting
- #8 Terminal screws
- UL recognized, CSA certified

GENERAL INFORMATION

3MN switches are for use with limit or control mechanisms on machine tools, presses or other industrial equipment.

These switches provide easy gang mounting.

The terminals of double-break switches must be wired to identical voltage sources and the same polarity. The loads should be on the same sides of the lines.

ELECTRICAL RATING

Circuitry	Electrical Data and UL Codes
<p>Two-circuit double-break</p>	V Motor Control 15 amps, 120, 240, 480 or 600 vac; 1/2 hp, 120 vac; 1 hp, 240 vac; 0.8 amp, 115 vdc; 0.4 amp, 230 vdc.

ORDER GUIDE

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	Electrical Data and UL Codes	O.F. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. mm inches	O.P.* max. mm inches
3MN1	For most applications	15 Amps V	3,34-5,56 12-20	1,67 6	1,52 .060	2,03 .080	0,38-0,63 .015-.025	2,16 .085
3MN6	Lower force	15 Amps V	1,95-3,1 7-11	1,11 4	1,52 .060	2,03 .080	0,38-0,63 .015-.025	2,16 .085

* ±0,38 mm
±.015 in.

Standard Basic Switches



Dim. Dwg. Fig. 1

MOUNTING DIMENSIONS (For reference only)

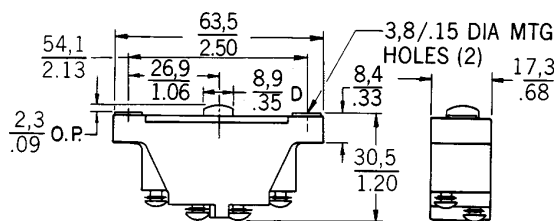


Fig. 1

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

Basic Switches

Miniature Double-break

TB Series



FEATURES

- Power load switching capability up to 10 amperes
- Motor handling capacity of 1/2 horsepower, 125 VAC
- Two- and four-circuit double-break
- Several auxiliary actuators
- Choice of terminal styles
- UL recognized, CSA certified
- Momentary action

GENERAL INFORMATION

TB miniature switches are basic double-break units which offer a means of controlling isolated circuits. Each circuit can be driven by independent voltage sources. These switches find many uses in modern control systems because of their circuitry.

The terminals of two- and four-circuit double break switches must be wired to identical voltage sources and the same polarity so that a voltage potential is not set up between adjacent terminals. A voltage potential between adjacent terminals could promote dielectric breakdown at high energy levels. The loads should be on the same sides of the line.

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

ORDER GUIDE

Catalog Listing	Description	Electrical Data And UL Code Page 20	O.F. newtons ounces	R.F. min. newtons ounces	P.T. max. mm inches	O.T. min. mm inches	D.T. mm inches	O.P.** mm inches
1TB1-1	Two-circuit, double-break end screw terminals	10 Amps Z	1,95-3,61 7-13	1,11 4	1,52 .060	0,25 .010	0,25-0,64 .010-.025	11,7 .460



Dim. Dwg. Fig. 1

1TB1-2	Two-circuit, double-break end solder terminals	10 Amps Z	1,95-3,61 7-13	1,11 4	1,52 .060	0,25 .010	0,25-0,64 .010-.025	11,7 .460
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Dim. Dwg. Fig. 2

1TB1-3	Two-circuit, double-break front solder terminals	10 Amps Z	1,95-3,61 7-13	1,11 4	1,52 .060	0,25 .010	0,25-0,64 .010-.025	11,7 .460
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Dim. Dwg. Fig. 3

41TB5-3	Four-circuit, double-break front solder terminals	10 Amps Z	5,56-10,0 20-36	2,22 8	1,78 .070	0,25 .010	0,64-1,14 .025-.045	4,70 .185
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Dim. Dwg. Fig. 4

* ±0,38 mm
±.015 in

MICRO SWITCH™

Premium Large Snap-Action BZ/BA/BM/BE & 6AS Series

Snap-Action Switches & Accessories



DESCRIPTION

Accurate, reliable, and repeatable, MICRO SWITCH™ BZ/BA/BM/BE Series feature wide operating characteristics and enhanced life. These premium, large snap-action switches offer precision operation and sensitive differential travel.

Utilizing state-of-the-art manufacturing processes and quality controls, Honeywell has engineered premium, large snap-action switches that meet all international agency requirements. Some models have military qualifications.

FEATURES

- Accepted world-wide with international agency approvals
- Various operating force and differential travel options
- Momentary or maintained contact action
- Watertight IP64 option
- Enhanced mechanical life up to 20,000,000 cycles
- Elongated mounting hole for easier, more accurate mounting
- Current rating ranges from 15 A to 25 A
- Choice of actuation, termination and operating characteristics
- Gold contacts available
- Precision operation – sensitive differential travel from 0,005 mm to 0,008 mm
- Internal flat spring design for improved performance and contact wiping ability
- High temperature options to 204 °C [400 °F]
- UL508 ratings offered
- Military standard construction – listings available with MIL-S-8805 qualification

MICRO SWITCH™ BZ/BA/BM/BE Series are often used for precision on/off applications, as well as end of limit, presence/absence, and manual operator interface functions.

Their engineering design meets most applications needs. Configuration options with BM, BA and BE switches give a broader range of operating and interface characteristics.





The MICRO SWITCH™ 6AS Series consists of two large premium BZ/BA/BM/BE snap-action switches ganged together and actuated by a single actuator. Field adjustable operating point is an option for one or both switches.

POTENTIAL APPLICATIONS

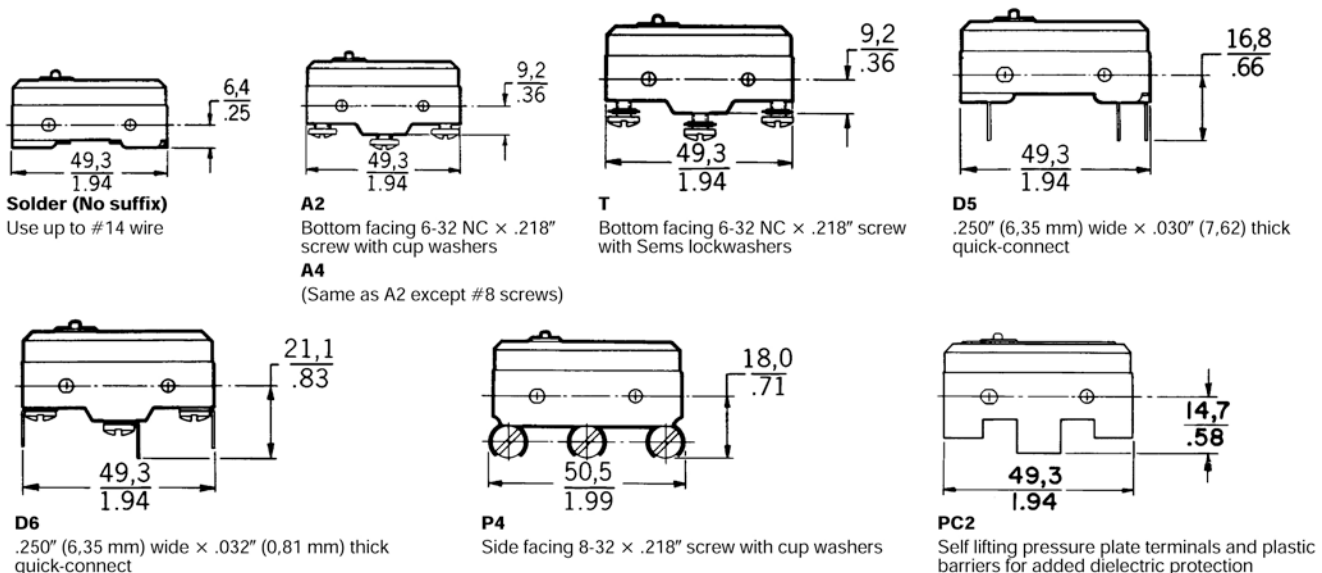
- Building controls and fire suppression systems
- Communication systems
- Door latching mechanisms
- Elevators/lifts
- Foot pedals
- HVAC
- Industrial kitchen equipment
- Irrigation systems
- Machine tools
- Manually operated devices
- Medical/dental equipment
- Semi-trailer trucks
- Surtran
- Test instruments
- Timing devices
- Valves

MICRO SWITCH™ Premium Large Snap-Action BZ/BA/BM/BE Series

SPECIFICATIONS

				
SERIES	BZ	BA	BM	BE
Potential applications	brake assemblies, building controls (sprinkler systems), communication systems, door latches, elevators/lifts, foot pedals, HVAC, industrial kitchen equipment, irrigation systems, timing devices, and valve positioning,			
Ampere rating	15 A	20 A	22 A	25 A
Circuitry	SPDT			
Operating force	1.0 oz to 28 oz			
Termination	quick connect, solder, screw			
Actuator	pin plunger, overtravel plunger, straight, roller, flexible leaf roller, flexible leaf			
Voltage	115 Vac, 125 Vac, 250 Vac			
Agency approvals	UL, CSA, ENEC, CE (varies by specific model)			
Operating temperature	-55 °C to 85 °C [-67 °F to 185 °F]			
Contacts	silver, silver cadmium oxide			
Housing	general purpose phenolic (options for IP64 watertight version)			
Sealing	Environment sealing option available			
Dielectric strength	2000 V between each terminal and ground			
Contact resistance	15 mOhm max.			
Insulation resistance	100 mOhm min.			
Vibration	1,5 mm peak-to-peak amplitude, frequency 10 Hz to 55 Hz, for two continuous hours			
Expected mechanical life	up to 20,000,000 cycles at 95% survival			
Expected electrical service life	100K operations at full load			
Rated frequency	45 Hz to 65 Hz			

AVAILABLE TERMINALS



Snap-Action Switches & Accessories

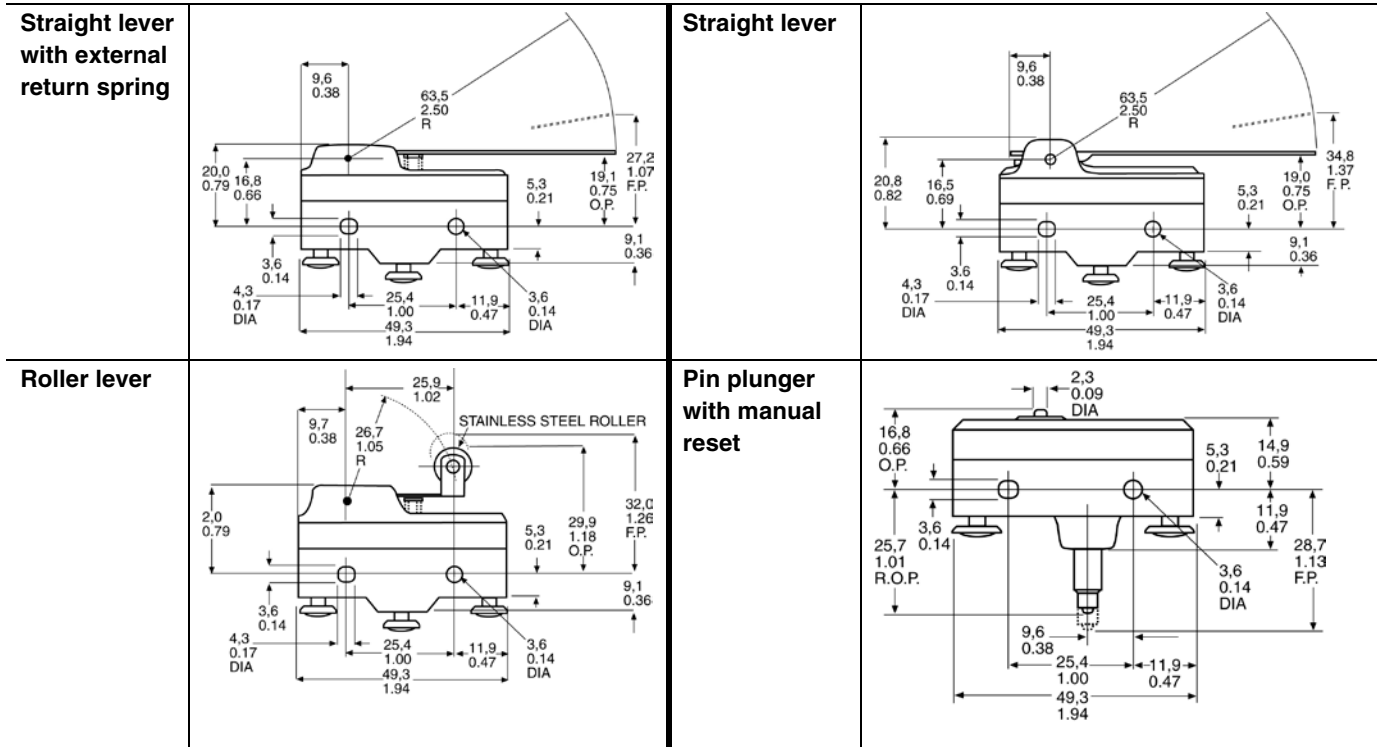
STANDARD LEVER OPTIONS & DIMENSIONS mm/in

All products shown with screw terminals. See page 2 for available terminal options.

Lever	Dimensions	Lever	Dimensions
Pin plunger		Pin plunger	
Overtravel plunger		Overtravel plunger	
Bushing mount overtravel plunger		Bushing mount overtravel plunger	
Flexible leaf actuator		Flexible leaf actuator	

MICRO SWITCH™ Premium Large Snap-Action BZ/BA/BM/BE Series

STANDARD LEVER OPTIONS & DIMENSIONS mm/in



6AS SERIES – PREMIUM LARGE SNAP-ACTION TANDEM SWITCH ASSEMBLY



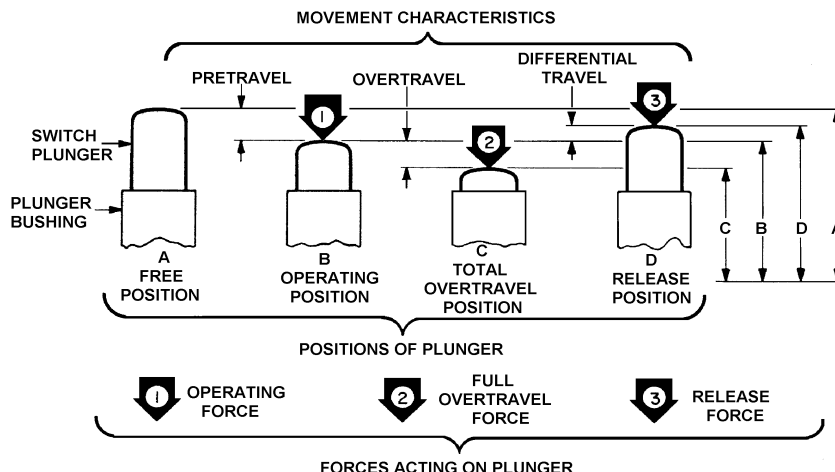
The MICRO SWITCH™ 6AS Series consists of two large premium BZ/BA/BM/BE snap-action switches ganged together and actuated by a single actuator. Operating characteristics are dependent upon the type of individual switches and actuators chosen. Field adjustable operating point on one or both basic switches.

Solder, A2, and T-type terminations available, along with straight, roller, and leaf levers. Mounting holes accept pins or screws of 3,53 mm [0.139 in] diameter.

Often used for boiler controls or anywhere two circuits need to be controlled by one actuator.

Snap-Action Switches & Accessories

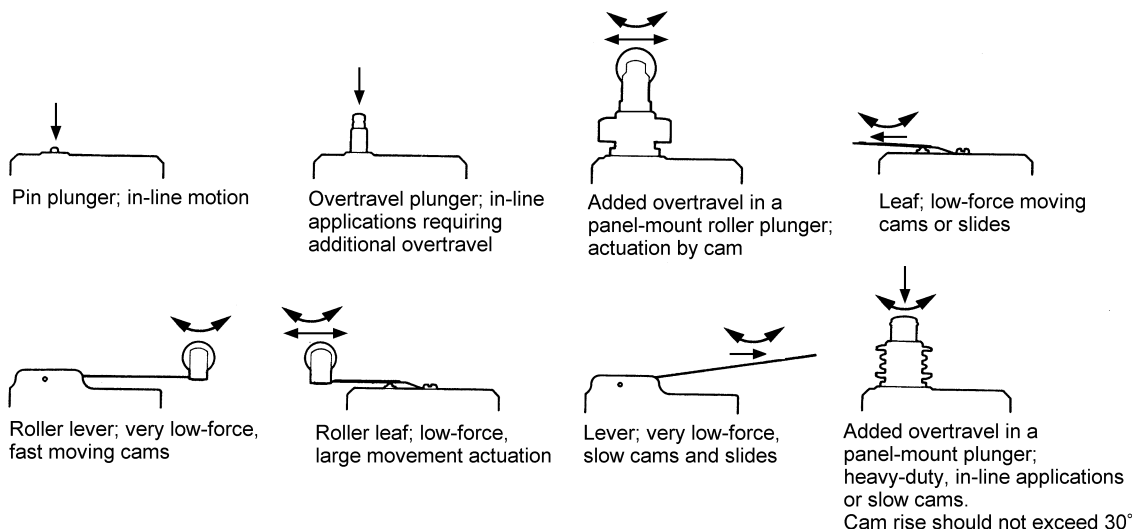
OPERATING CHARACTERISTICS



Differential Travel-DT	Plunger or actuator travel from point where contacts “snap-over” to point where they “snap-back.”
Free Position-FP	Position of switch plunger or actuator when no external force is applied.
Full Overtravel Force	Force required to attain full overtravel of actuator.
Operating Position-OP	Position of switch plunger or actuator at which point contacts snap from normal to operated position. With flexible or adjustable actuators, the operating position is measured from the end of the lever or its maximum length. Location of operating position measurement shown on mounting dimension drawings.
Operating Force-OF	Amount of force applied to switch plunger or actuator to cause the contact “snap-over.” Note in the case of adjustable actuators, the force is measured from the maximum length position of the lever.
Overtravel-OT	Plunger or actuator travel safely available beyond operating position.
Pretravel-PT	Distance or angle traveled in moving plunger or actuator from free position to operating position.
Release Force-RF	Amount of force still applied to switch plunger or actuator at the moment contacts snap from operated position to non-operated position.
Total Travel	Distance from actuator free position to overtravel limit position.

ACTUATORS

BA, BE, BM, and BZ standard snap-action switches use the actuators described:



MICRO SWITCH™ Premium Large Snap-Action BZ/BA/BM/BE Series

LARGE PREMIUM SWITCH SERIES NOMENCLATURE TREE (not all configurations available)

B	Z-	2	R	W	82255-	A2	S
Type & Contact	Switch type	Break distance (nominal)	Construction	Integral actuator	Misc. Variations (Numbers or Letters)	Terminal type	Snap spring mat'l (variation)
B Series Premium Basics SPDT substitute W Series for SPNC circuitry substitute Y Series for SPND circuitry	Z 15 A capacity, pin plunger 23.5 (0.917) from mounting hole A 20 A capacity, pin plunger 19 (0.750) from mounting hole M 22 A capacity, pin plunger 23.5 (0.917) from mounting hole E 25 A capacity, pin plunger 25.4 (1.00) from mounting hole	1 0.25 mm (0.01 in) 2 0.50 mm (0.02 in) 3 0.91 mm (0.036 in) 4 1.14 mm (0.045 in) (MT-4R only) 5 1.27 mm (0.050 in) Type A switches only 7 1.78 mm (0.07 in) Type Z switches only 0.15 mm (0.006 in)	R Moving contact rivet construction A Shorting bar circuitry Type Z switches only S Shorting bar circuitry Type A switches only K Resilient type N.C. contacts G Make-before-break switches Y Split contact switches Type Z switches only	B Low overtravel plunger, Type A & E D Low overtravel plunger, Type Z DS Sealed low overtravel plunger, Type Z only L Lead actuator Type A & Z only N High overtravel plunger/sealed boot Q High overtravel plunger, Type A & Z S Medium overtravel plunger, Type Z only V Rigid lever Type A & E only W Rigid or resilient lever, Type Z only M Reverse actuating lever QW Omnidirectional "wobble" lever Standard pin plunger	0 Below other number—military construction 1 Threaded bushing, panel mount Q-plunger 2 Variation of design 4 On W-lever, light force var. (no spring) 5 Used with other 5s, denotes sealed conis. 67 On Q plunger, repac. for die-cast switches 7 Variation of design, other than Q plungers 8 With W-levers, rigid type lever (ext. W80) 8 With Q-plunger, roller plunger inline to axis 9 With L-lead actuators, flat lead 72 Gold contacts 722	A2 Bottom facing #6 screws & cupwashers A4 Bottom facing #8 screws & cupwashers A22 A2 type without screws & cupwashers A41 A4 type without screws & cupwashers A46 A4 type #8 screws and lock washers D1 80° OC used with flat base w/o slots D5 45° OC used with flat base D6 90° OC used with A2 (step) base P1 (left) side facing #8 screw w/ cupwasher solder lug base P2 Same as P1, except facing right P4 (left) side facing #8 screw w/ cupwasher integral construction P5 Same as P4, except facing right T Bottom facing #6 screws/lockwashers Solder lug or no terminal hardware	S Snap spring mat'l Stainless steel snap spring

NOTES
 * Min. distance between separated mating contacts in fully open position (nominal values).
 ** Some versions have lower electrical ratings.
 *** Except BZ-H31 and BZ-RZ switches.

Basic Switches

Tandem Switch Assemblies



FEATURES

- Variety of actuators
- Choice of circuitries and electrical ratings
- Choice of terminations
- Field adjustable operating point on one or both basic switches

GENERAL INFORMATION

6AS switches are two standard basic switches ganged together and actuated by a single actuator. Operating characteristics will depend on the type of individual switches and actuators.

ELECTRICAL RATING

Circuitry	Electrical Data and UL Codes
Single-pole double-throw unless otherwise noted in order guide 	A 15 amps, 125, 250 or 480 vac; 1/8 hp, 125 vac; 1/4 hp, 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L96
Single-pole double-throw unless otherwise noted in order guide 	G 20 amps, 125, 250 or 480 vac; 10 amps, 125 vac "L" (tungsten lamp load); 1 hp, 125 vac; 2 hp, 250 vac; 1/2 amp, 125 vdc; 1/4 amp, 250 vdc. UL Code L23

Characteristics: O.F. – Operating Force; R.F. – Release Force; P.T. – Pre-travel; O.T. – Overtravel; D.T. – Differential Travel; O.P. – Operating Position.

ORDER GUIDE

Catalog Listing	Description	Lever Length mm inches	Type Terminals	Electrical Data and UL Codes	O.F. max. newtons ounces	R.F. min. newtons ounces	O.T. min. mm inches	D.T. max. mm inches	O.P.* mm inches
6AS32	Centered lever. Adjustment over both switches.	58,72 2.312	Solder	15 Amps A	2,22 8	0,14 0.5	0,51 .020	2,77 .109	18,29 .720 adj.
6AS54	Short lever. Adjustment over switch D.	20,47 .806	Solder	15 Amps A	3,34 12	0,83 3	0,25 .010	3,96 .156	18,24 .718 max.
6AS25	Centered lever. Adjustment over switch D.	32,26 1.270	A2	20 Amps G	3,89 14	1,11 4	1,02 .040	—	18,67 .735

Unless otherwise noted * ±0,76 mm
±.030 in.



Dim. Dwg. Fig. 1

Basic Switches

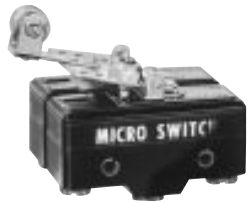
Tandem Switch Assemblies

6 AS Series

ORDER GUIDE

Catalog Listing	Description	Lever Length mm inches	Type Terminals	Electrical Data and UL Codes	O.F. max. newtons ounces	R.F. min. newtons ounces	O.T. min. mm inches	D.T. max. mm inches	O.P.* mm inches
6AS13	Centered lever. Adjustment over switch D.	30,56 1.203	Solder	15 Amps A	2,22 8	0,14 0.5	0,51 .020	2,77 .109	29,77 1.172
6AS18	Centered lever. Adjustment over both switches.	30,56 1.203	Solder	15 Amps A	2,22 8	0,14 0.5	0,51 .020	2,77 .109	29,77 1.172 adj.
6AS36	Lever over switch C. Adjustment over switch D.	30,56 1.203	A2	15 Amps A	2,22 8	0,14 0.5	0,51 .020	2,77 .109	29,77 1.172
6AS35	Lever and adjustment over switch D.	30,56 1.203	A2	15 Amps A	2,22 8	0,14 0.5	0,51 .020	2,77 .109	29,77 1.172
6AS16	Centered lever. Adjustment over switch D.	30,56 1.203	A2	20 Amps G	3,89 14	1,11 4	1,02 .040	3,96 .156	30,96±1,14 1.219±.045
6AS69	Centered lever. Adjustment over switch D.	27,25 1.073	T	25 Amps M	—	—	—	—	30,96±1,14 1.219±.045
6AS112	Centered lever. Adjustment over switch D.	30,56 1.203	A2	25 Amps H	3,89 14	1,11 4	1,02 .040	3,96 .156	30,96±1,14 1.219±.045
6AS5	Centered leaf. No adjustment. Switches operate within .030" of each other.	38,35 1.51	A2	15 Amps A	—	—	0,76-1,52 .030-.060	—	

Unless otherwise noted * ±0,76 mm
±.030 in.



Dim. Dwg. Fig. 2



Dim. Dwg. Fig. 3

MOUNTING DIMENSIONS (For reference only)

Standard
Basic Switches

STRAIGHT LEVER

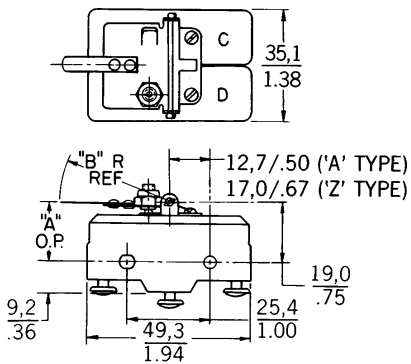


Fig. 1

ROLLER LEVER

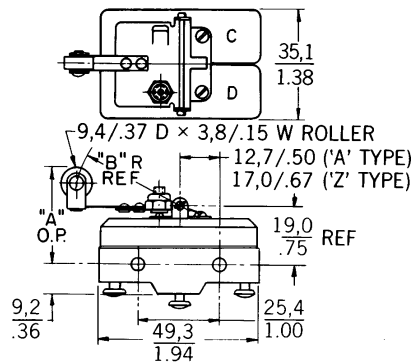


Fig. 2

LEAF

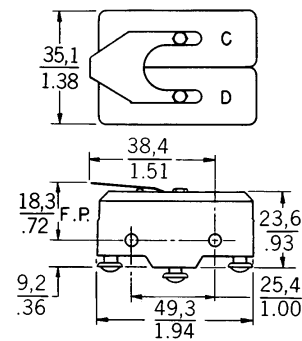


Fig. 3

Mounting holes accept pins or screws of .139" (3,53 mm) diameter.

Key: 0,0 = mm
0.00 = inches

Snap-Action Switches & Accessories

LARGE SNAP-ACTION SWITCH ACCESSORIES

Brackets



	8MA1	8MA2	17MA1-B
Description	Adjustable mounting bracket with adjustment slot on left	Adjustable mounting bracket with adjustment slot on right	Conversion mounting bracket
Housing material	Steel	Steel	Corrosion-resistant metal
Measurements	60,2 mm W x 21,3 mm H x 7,4 mm D [2.37 in W x 0.84 in H x 0.29 in D]		66,8 mm W x 19,0 mm D [2.63 in W x 0.75 in D]
Features	sturdy plated steel construction; fast, easy screwdriver adjustment; can be used with all standard basic switches		converts standard basic switches from side to top mount; corrosion resistant; snaps into switch mounting holes without tools

Die-cast zinc enclosures



	3PA1	3PA28	3PA2
Description	mounted from either side through 3,55 mm [0.140 in] dia. holes on 25,4 mm [1.0 in] centers	mounted from either side through 3,55 mm [0.140 in] dia. holes on 25,4 mm [1.0 in] centers. 1/2-14 NPSM internal thread conduit hub	switch secured in enclosure; two 4,37 mm [0.172 in] dia. holes in flange accept #8 screws for mounting on 41,3 mm [1.625 in] centers
Housing material	die-cast zinc enclosure (side mount)	die-cast zinc enclosure (side mount)	die-cast zinc enclosure (flange mount)
Measurements	74,8 mm W x 42,9 mm H x 25,4 mm D [2.95 in W x 1.69 in H x 1.00 in D]	74,8 mm W x 42,9 mm H x 25,4 mm D [2.95 in W x 1.69 in H x 1.00 in D]	74,8 mm W x 42,9 mm H x 25,4 mm D [2.95 in W x 1.69 in H x 1.00 in D]
Features	protects the switch from physical abuse and personnel from contact with exposed terminals		

Plastic thermal enclosures



	5PA1	5PA2	5PA3
Description	Plastic terminal enclosure used with solder terminal switches	Plastic terminal enclosure use with screw terminal switches	Plastic terminal enclosure used with either solder or screw terminal switches with auxiliary actuators assembled
Housing material	plastic	plastic	plastic
Measurements	52,8 mm W x 16,1 mm H [2.08 in W x 0.64 in H]	52,8 mm W x 20,2 mm H x 21,0 mm D [2.08 in W x 0.80 in H x 0.83 in D]	52,8 mm W x 20,2 mm H x 21,0 mm D [2.08 in W x 0.80 in H x 0.83 in D]
Features	easy to use; screw and solder terminal versions; protect personnel from contact with exposed terminals		

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell

Basic Switches

Auxiliary Actuators Standard Basic



FEATURES

- Additional overtravel
- Quick, easy installation
- Corrosion resistance
- MIL-S-8805 listed units

NOTE: Switches shown are not included with the actuator. All actuators are for use with pin plunger types only except catalog listing JR.

GENERAL INFORMATION

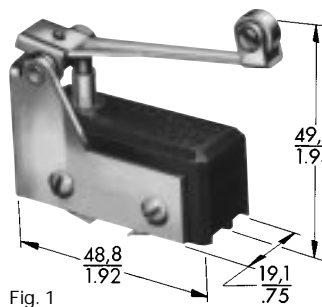
Auxiliary actuators adapt the plunger-type standard basic switches to many application needs. Auxiliary actuators minimize the need for a large inventory of switch types. Actuators and switches are sold as separate items and must be ordered separately. Mounting hardware is furnished with the actuator.

Characteristics:

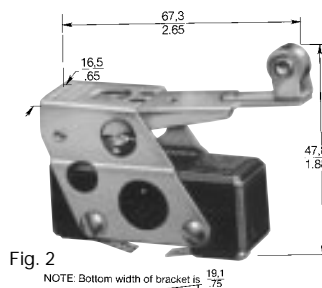
O.T. — Overtravel;
O.P. — Operating Position;
F.P. — Free Position.

ORDER GUIDE

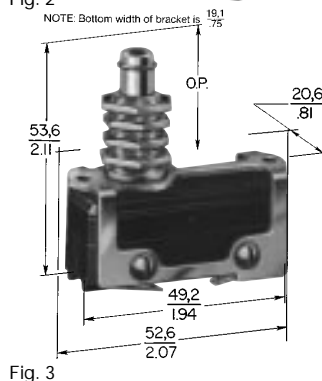
Description	Catalog Listing	Use Only With	O.T. min. mm inches	O.P.* mm inches	F.P. max. mm inches
Roller lever for "S" plunger type BZ and DT switches only. Permits cam operation.	JR	BZ DT	11,1 .437	44,45±3,18 1.75±.125	



Adjustable roller lever. Tang on top of actuator can be bent to adjust O.P. and F.P.	AD5721R (8805/59) AN3169-1	BZ BM	11,1 .437 approx.	31,75-41,15 1.25-1.62	39,6-43,7 1.56-1.72
	ADA3721R	BA BE	9,53 .375 approx.	40,48 1.594 approx.	43,03 1.812
	ADD3721R	DT MT	9,53 .375 approx.	39,6 1.562 approx.	46,03 1.812



Straight plunger. Panel mount.	MC2711 (8805/59) AN3168-2	BZ BM	4,78 .188	27,79 .188	29,4 1.156
	MCA2711	BA BE	3,96 .156	28,17 1.109	30,18 1.188
	MCD2711	DT MT	3,58 .141	27,79 1.094	30,18 1.188

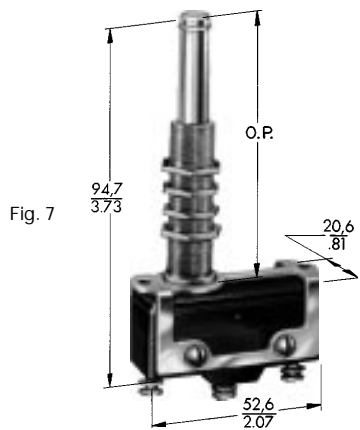
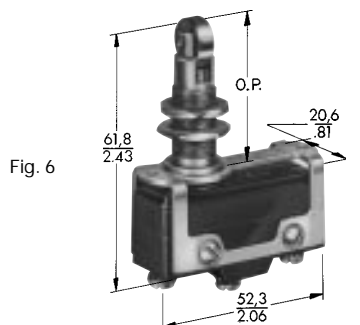
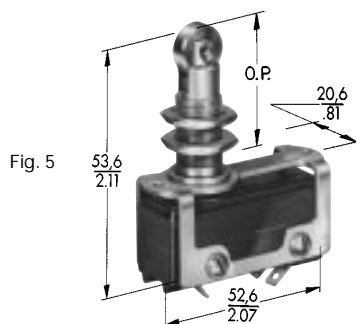
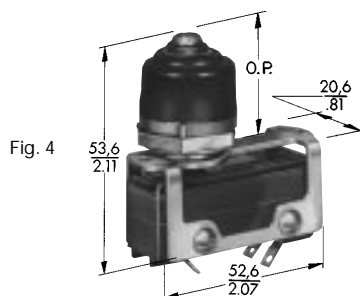


Dimensions shown are for reference only.

Except where stated * ±1,14 mm ±.045 in.

Basic Switches

Auxiliary Actuators Standard Basics



ORDER GUIDE

Description	Catalog Listing	Use Only With	O.T. min. mm Inches	O.P.* mm Inches	F.P. max. mm Inches
Sealed straight plunger. Panel mount. Elastomer seal boot keeps out liquid splash and dirt. Furnished unassembled.	MC2711H	BZ BM	4,78 .188	28,98 1.141	29,4 1.156
	MCA2711H	BA BE	4,37 .172	27,38±0,76 1.078±.030	29,56 1.156
	MCD2711H	DT MT	3,58 .141	27,79 1.094	30,18 1.188

Roller plunger. Panel mount. Roller parallel to long axis of the switch.	MD3211Q	BZ BM	3,18 .125 approx.	35,7 1.406	37,69 1.484
	MDA3711Q	BA BE	3,18 .125	36,12 1.422	37,69 1.484
	MD3211Q	DT MT	3,18 .125	35,7 1.406	37,69 1.484

Cross roller plunger. Panel mount. Roller perpendicular to long axis of the switch.	MD3211Q1	BZ BM	3,18 .125 approx.	35,7 1.406	37,69 1.484
	MDA3711Q1	BA BE	3,18 .125	36,12 1.422	37,69 1.484
	MD3211Q1	DT MT	3,18 .125	35,7 1.406	37,69 1.484

High overtravel plunger. Panel mount.	MC7711 (8805/58) AN3167-1	BZ BM	20,62 .812	69,1 2.719	70,64 2.781
	MCA7711	BA BE	19,84 .781	69,44 2.734	71,42 2.812
	MCD7711	DT MT	18,26 .719	69,1 2.719	71,42 2.812

Except where stated* ±1,14 mm
±.045 in.

Standard
Basic Switches

EVN2000 Series Limit Switch



Features

- Innovative wiring system featuring insulation displacement termination (IDT)
- Integrated cable gland/cord grip
- EN 50047 mounting compatible
- Designed to meet switch requirement within EN 81-1
- Snap action basic switch with 4 mm air gap
- IP 66/67 Enclosure rating, EN 60529. NEMA 1, 12, 13
- Direct opening of Normally Closed contacts conforming to IEC/EN 60947-5-1 annex K
- Double insulated switch element
- Compact plastic housing

Description

The EVN2000 series limit switch is an innovative product which has been developed to address a need highlighted by Original Equipment Manufacturers (OEM), where “Ease of Wiring” is required. With the new design there is no need for access to the inside of the housing and therefore the housing cover, cover screws and gasket become obsolete. Furthermore, the integrated cable gland eliminates the need for additional conduit or cable gland hardware.

Benefits

- Reduced wiring time, up to 50 % savings can be achieved
- Provides a truly global product by removing the need for conduit or cable gland hardware
- Meets globally accepted mounting standard
- Meets switch requirements within “Safety rules for the construction and installation of elevators/lifts”
- 1 Normally Closed, 1 Normally Open circuit conforming to EN 81-1
- Suitable for wet applications
- Forced opening of the normally closed circuit in the event of contacts welding
- No earth connection required, internal or external
- Suitable where space is at a premium

Typical applications

- Elevators and moving stairs
- Scissor/platform lifts
- Overhead doors
- Material handling
- Packaging machinery
- Agricultural equipment

WARNING


MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as product installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARNING

IF USED IN APPLICATIONS CONCERNING HUMAN SAFETY

- Only use NC direct opening (“positive opening”/ “positive break”) contacts, identified by the symbol .
- Do NOT use flexible / adjustable actuators. Only use actuators designed for safety applications.
- Do NOT defeat, tamper, remove, or bypass this switch.
- Hazardous voltage, disconnect power before servicing.
- Strictly adhere to all installation instructions.
- Consult with local safety agencies and their requirements when designing a machine-control link, interface and all control elements that affect safety.

Failure to comply with these instructions could result in death or serious injury.

EVN2000 Series Limit Switch

Technical information

Specifications

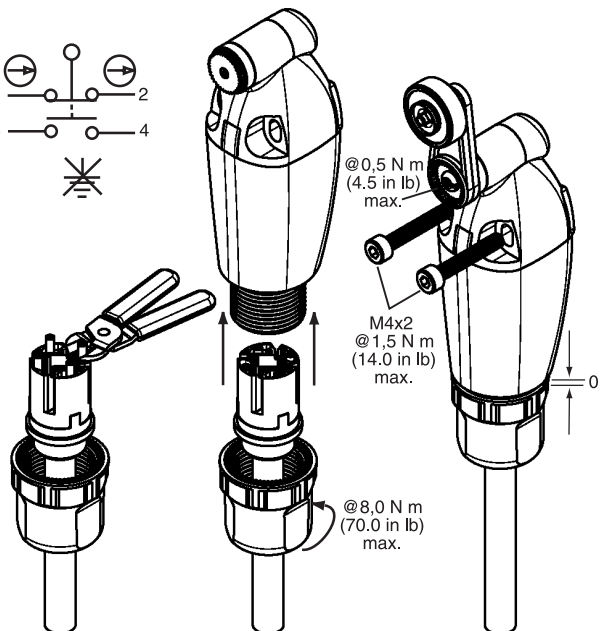
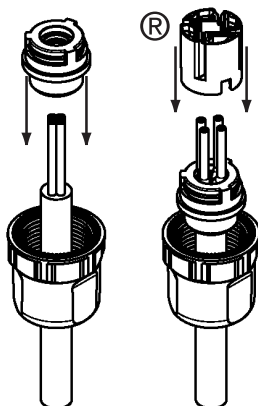
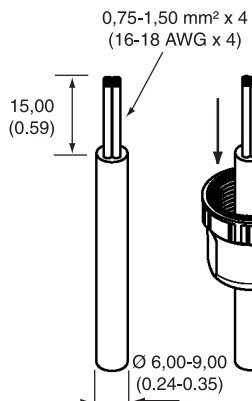
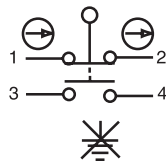
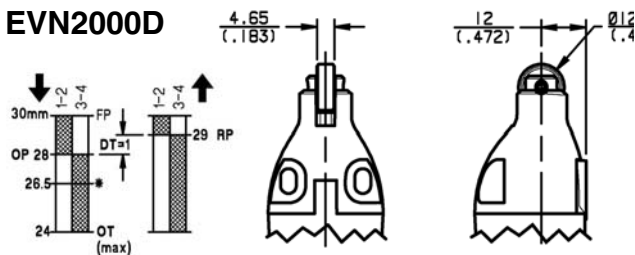
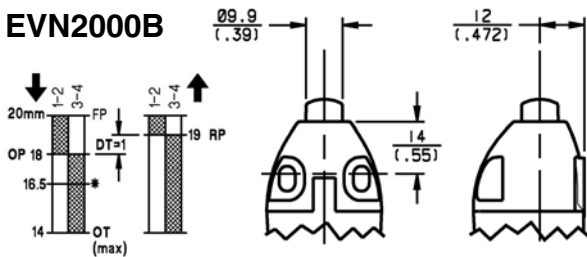
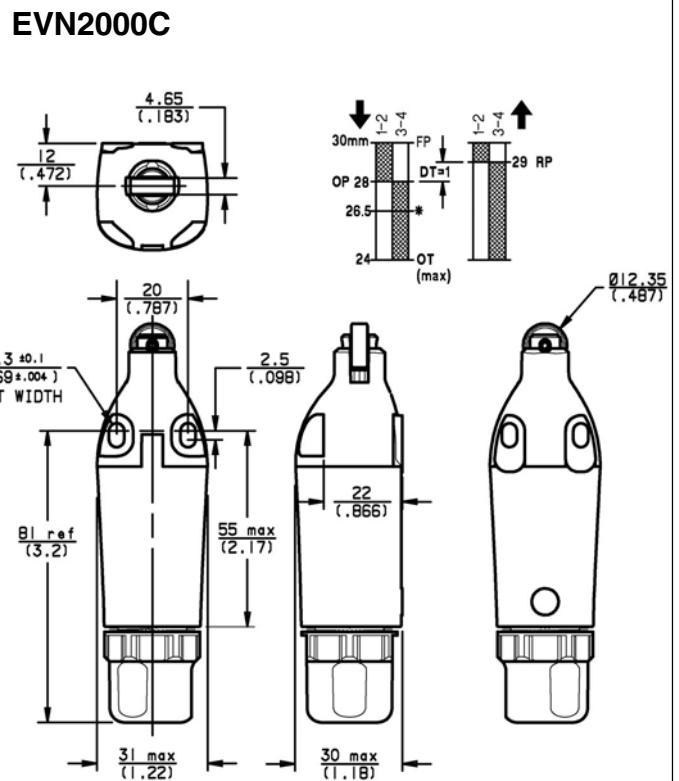
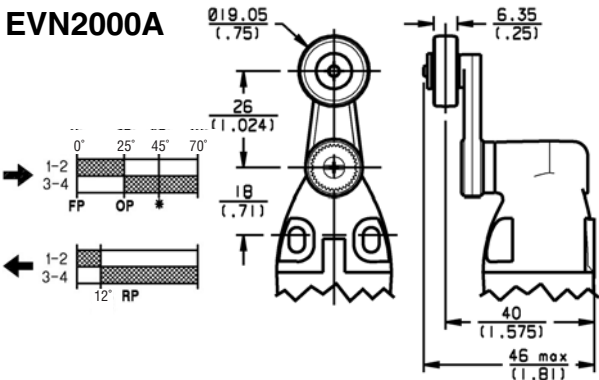
Mechanical life:	up to 10 million operations		
Degree of protection:	IP 66/67, EN 60529 NEMA/UL type 1, 12, 13		
Operating temperature:	-25 °C to 85 °C (-13 °F to 185 °F)		
Storage temperature:	-40 °C to 85 °C (-40 °F to 185 °F)		
Standards/approvals:	IEC/EN 60947-5-1 - European standard for electromechanical industrial control equipment EN 50047 - European standard for designing limit switches UL 508 - US standard for industrial control equipment UL 746C - US standard for plastic enclosures EN 60529 - European standard for IP codes EN 81-1 - European standard for electrical lifts		
Electrical rating: IEC/EN 60947-5-1	Rated operational current I _e (A) at rated operational voltage U _e	VA rating	
	120 V 240 V	Make	Break
AC15, A300	6 3	7200	720
	125 V 250 V		
DC13, Q300	0.55 0.27	69	69
Rated insulation voltage : (Dielectric)	320 V		
Rated impulse withstand:	2500 V		
Polution degree:	3		
Thermal current:	10 A		
Short circuit withstand:	SCPD 10 A quick acting fuse (IEC 269.1 gG-type)		
Contact material:	Silver		
Circuit type:	1NO/1NC Direct opening Single pole, single throw, double break Contact type Z _b - the 2 contact elements are electrically separated		
Cable/leadwire:	Outside cable Ø 6.0 mm to 9.0 mm (0.24 in to 0.35 in) Leadwire 0,75 mm ² to 1,5 mm ² (16-18 AWG)		
Shock:	50 g conforming to IEC 68-2-27 (BS 2011, Part 2.1 Ea) (actuator not fitted)		
Vibration:	10 g conforming to IEC 68-2-6 (BS 2011, Part 2.1 Fc) (actuator not fitted)		
Bump:	40 g conforming to IEC 68-2-29 (BS 2011, Part 2 LeB)		

Order guide

Description	Catalogue Listing
Side Rotary Lever	EVN2000A
Top Pin Plunger	EVN2000B
Top Roller Plunger, Parallel	EVN2000C
Top Roller Plunger, Perpendicular	EVN2000D

EVN2000 Series Limit Switch

Mounting drawings in mm and (inches)



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Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective material and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during that period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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Sensing and Control

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MICRO SWITCH™ GLL Series Limit Switches




DESCRIPTION

Honeywell MICRO SWITCH™ GLL Series limit switches are part of the OEM set of miniature limit switches. They combine and enhance MICRO SWITCH™ GLS and SZL-VL switches into one common family, competitively priced for OEM applications.

The double insulated compact housing conforms to EN500047 and makes GLL Series switches often ideal for mounting where space is at a premium. These products feature direct opening normally closed circuits.

FEATURES

- Double break, direct-opening snap action contacts conform to IEC 60947-5-1-3 
- EN50047 mounting
- 20 mm and 1/2 in NPT conduit options
- Galvanically isolated contacts
- Double insulated plastic housing
- Snap action and slow action circuitry
- Contact block integral to switch housing
- Hinge cover for easy wiring access
- 50 mm rubber rollers ideal for elevator applications
- Sealing IP66; NEMA 1, 12, 13
- c-UL-US, CE, CCC
- rOhs compliant

The MICRO SWITCH™ GLL Series is available in a variety of actuator styles required for OEM applications. Designed to the IEC electrical standard, GLL is suitable for world-wide use and also meets globally accepted mounting standards.

The GLL Series provides a cost-effective solution for OEM high volume applications and enables manufacturers to be competitive in today's demanding business environment.


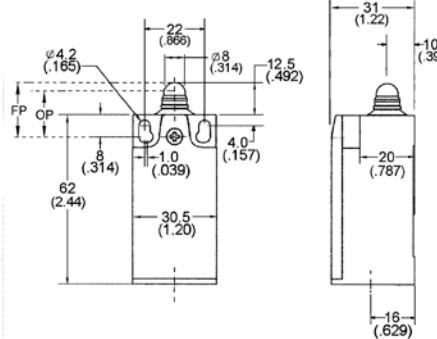
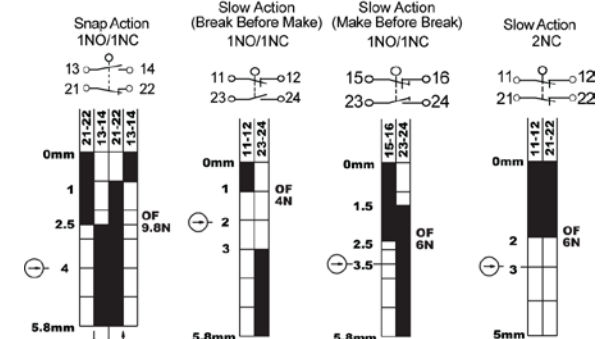

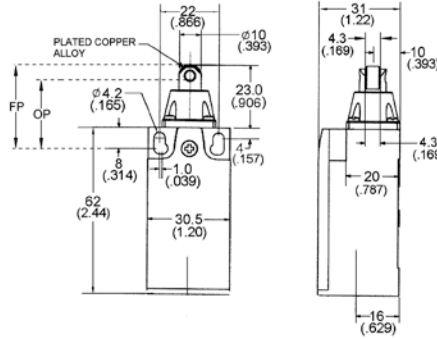
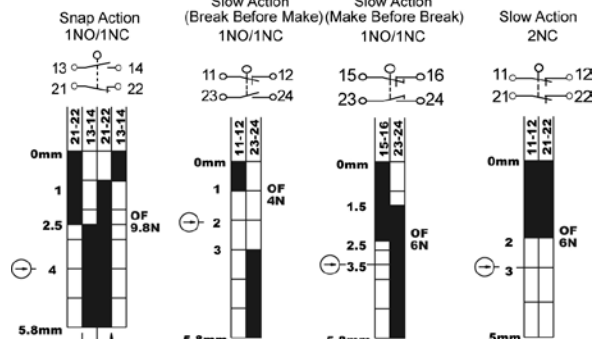

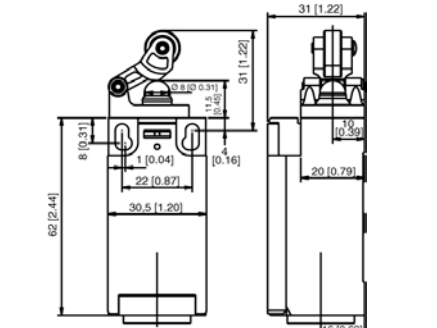
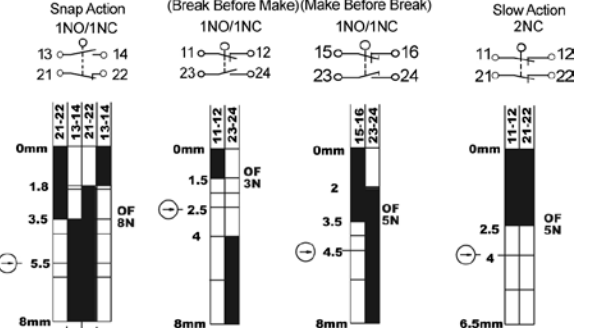
POTENTIAL APPLICATIONS

- Elevators
- Escalators
- Aerial/platform lifts
- Industrial doors
- Packaging equipment

MICRO SWITCH™ GLL Series

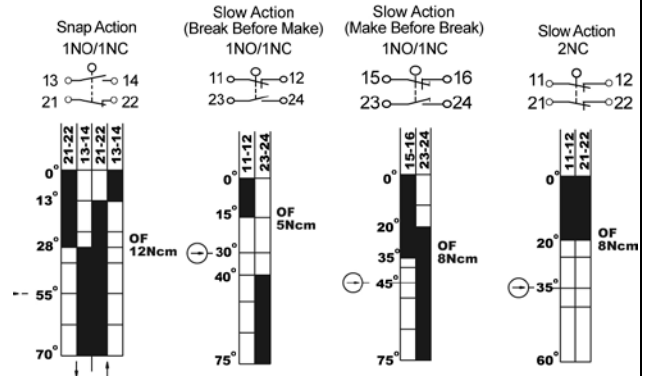
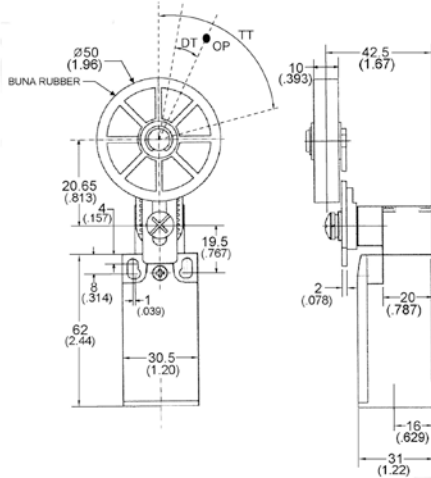
SPECIFICATION DATA

Circuitry	1 NO 1 NC direct opening snap action, slow action (BBM), slow action (MBB); 2NC slow action
Ampere rating	10 A (Thermal)
Supply voltage	300 Vac and 250 Vdc max.
Housing material	Plastic
Termination type	12,7 mm [0.5 in] conduit; 20 mm [0.79 in] conduit
Housing type	EN 50047
Shock	50 g per PEC 68-2-27c (w/o actuator)
Vibration	10 g per IEC 68-2-6 (w/o actuator)
Sealing	IP66; NEMA 1, 12, 13
Approvals	c-UL-US, CE, CCC
Mechanical life	5 million operations
Operating temperature range	-10 °C to 80 °C [14 °F to 176 °F]

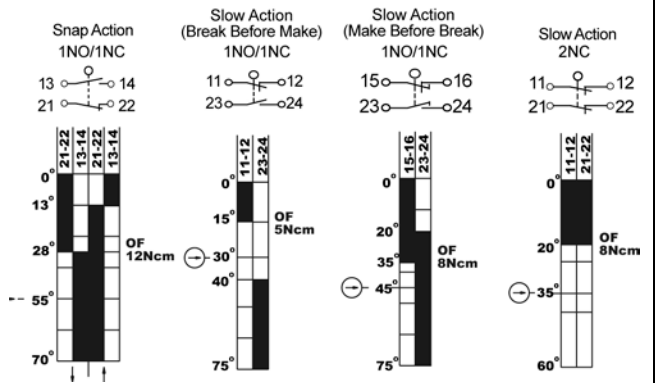
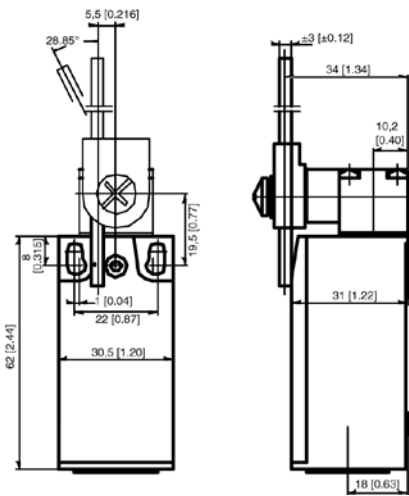
<p>GLLA**B, GLLC**B</p> 		
<p>GLLA**C, GLLC**C</p> 		
<p>GLLA**D, GLLC**D</p> 		

MICRO SWITCH™ GLL Series

GLLA**A2Y, GLLC**A2Y

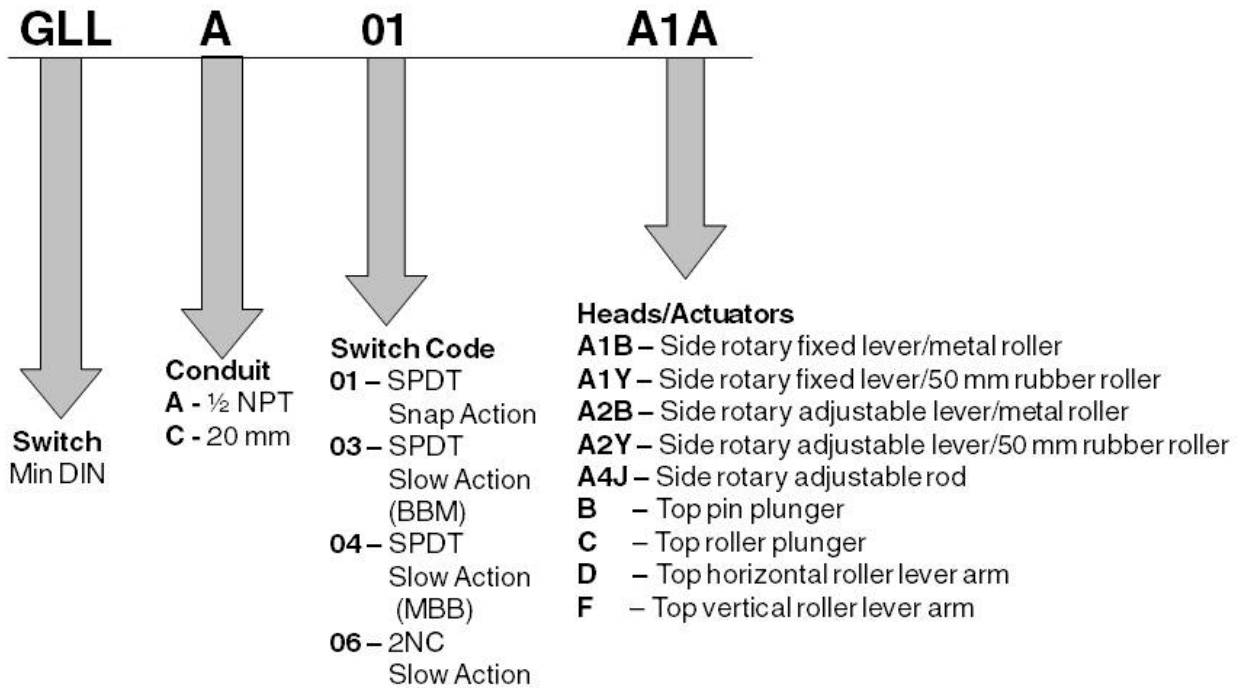


GLLA**A4J, GLLC**A4J



Limit Switches

MICRO SWITCH™ GLL MIN-DIN (EN500047) PLASTIC



▲ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

▲ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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Honeywell

MICRO SWITCH™ GLS Series

Miniature Global Limit Switch



DESCRIPTION

GLS miniature limit switches are designed to provide a complete range of globally approved products. These rugged and reliable limit switches are often suitable for most industrial applications.

Side rotary versions offer a unique dual-bearing design which prevents side loading during application. The compact housing size makes them often ideal for mounting where space is at a premium. The extensive product range offers the user a choice of plastic, metal, and three conduit version housing, which are all mounting compatible to EN50047. A wide range of actuator and circuitry options makes it easy for the user to customize a switch to the particular application.

FEATURES

- Double break, direct-opening contacts conform to IEC 60947-5-1-3 (except on 2NO models)
- Dual bearing design on side rotary shaft
- Choice of rugged metal or double-insulated plastic housings
- Full range of actuator heads and levers
- Snap action, slow action basic switches
- Gold contact versions available
- Galvanically isolated contacts (Form Zb)
- Sealing up to IP67/NEMA 4
- CE, UL, CSA, CCC
- -40 °C [-40 °F] standard construction for side rotary and plunger styles

POTENTIAL APPLICATIONS

- Elevators and moving stairs
- Scissor/platform lifts
- Material handling
- Packaging machinery
- Agricultural and machine tool equipment

LOW-ENERGY SWITCHING

In today's demanding age of low-energy controls, electromechanical switches are frequently used to interface directly with PLCs and other low-energy devices. To accommodate this requirement, GLS offers a gold-plated version of the standard basic switch. This improves reliability of switching at low currents and voltages by protecting the contact surfaces from contamination during operation or storage prior to use. Standard silver contacts have the disadvantage in that the contact surface may tarnish under certain environmental conditions (e.g., presence of moisture). Low energy basic switches are rated as follows:

Operating Voltage U_e 1 Vac/Vdc to 50 Vac/Vdc
 Operating Current I_e 1 microamp to 100 mA

Electrical Ratings

IEC 947-5-1 / EN 90947-5-1									
Designation & Utilization Category		Rated operational current I_e (A) at rated operational voltage U_e						VA Rating	
		120 V	240 V	380 V	480 V	500 V	600 V	Make	Break
AC15	A600	6	3	1.9	1.5	1.4	1.2	7200	720
AC15	A300	6	3	-	-	-	-	7200	720
AC15	B300	3	1.5	-	-	-	-	3600	360
AC14	D300	0.6	0.3	-	-	-	-	432	72
		125 V	250 V						
DC13	Q300	0.55	0.27					69	69
DC13	R300	0.22	0.1					28	28

BENEFITS

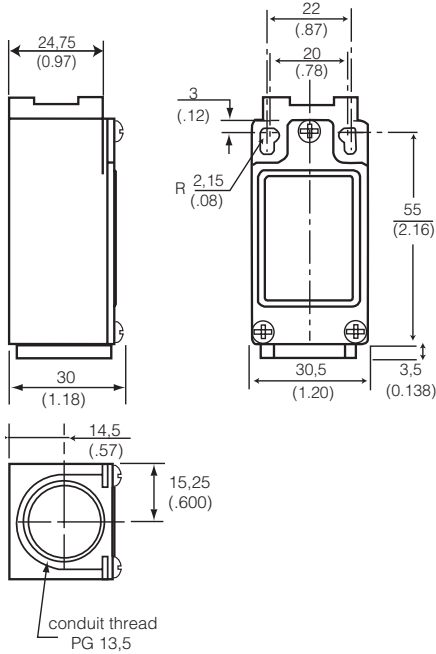
- Forced opening of the normally closed circuitry in the event of contacts welding (on all models except 2NO)
- Meets globally accepted mounting standards
- Prevents side loading
- Design flexibility
- Can be applied for both logic level and power-duty loads
- Each contact throw can accept a different voltage (SPDT versions)
- Suitable for outdoor environments
- Designed to IEC electrical standard for world-wide use



GLC EN 50047 Metal standard

Technical data

Mechanical life	up to 15 million operations
Degree of protection	IP67 (wobble IP66) NEMA/UL type 1, 4, 12, 13
Temperature range	Operating : -40 °C to 85 °C [-40 °F to 185 °F] Storage : -40 °C to 85 °C -40 °F to 185 °F
Approvals	IEC 60947-5-1 EN 60947-5-1 AC15 A300 DC13 Q300 UL & CSA
Vibration	10 g conforming to IEC 68-2-6
Shock	50 g conforming to IEC 68-2-27 Terminal marking to EN 50013



Conduit thread

- A** = 1/2 in NPT adaptor
- B** = PG 13,5
- C** = 20 mm

Ordering :

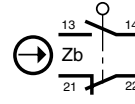
GLC

X

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Snap-Action Contacts

1 NORMALLY CLOSED / 1 NORMALLY OPEN

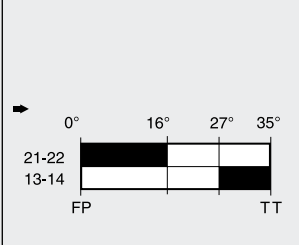
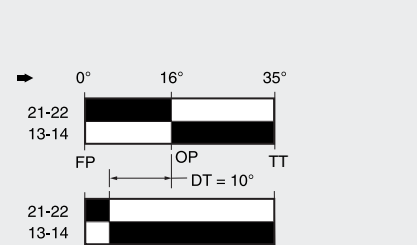
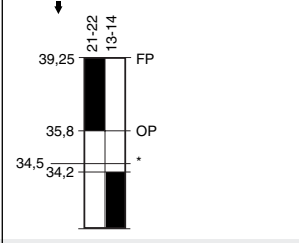
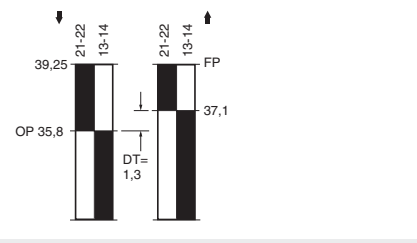
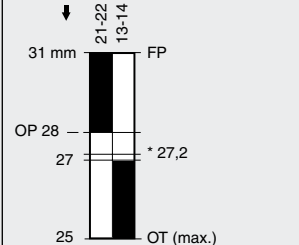
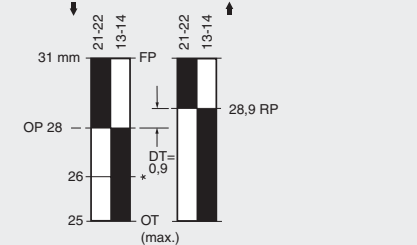
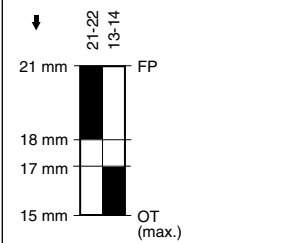
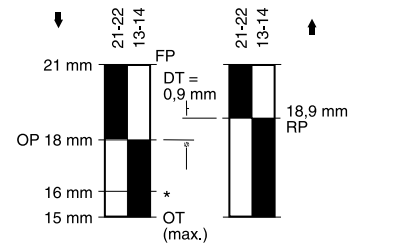
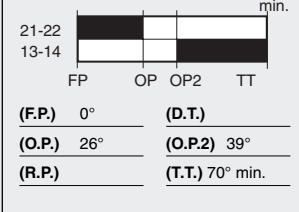
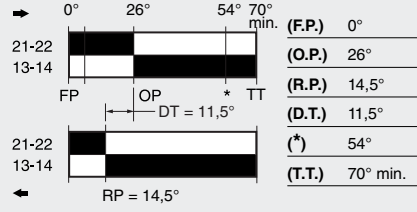
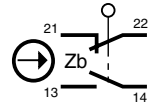


█ Circuit closed
* Positive opening to IEC/EN 60947-5-1-3

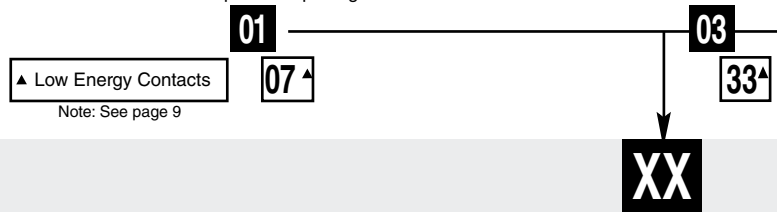
Slow-Action Contacts

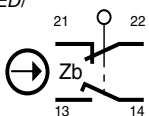
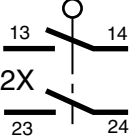
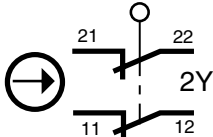
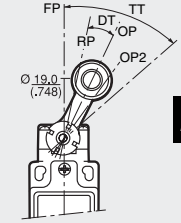
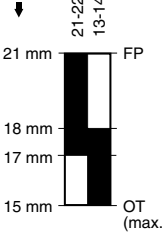
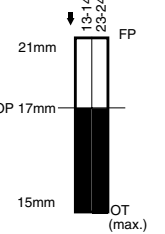
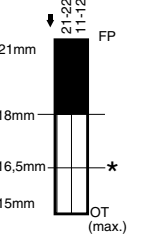
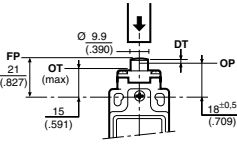
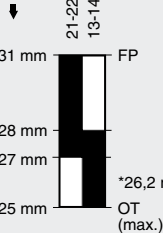
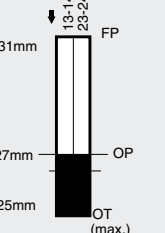
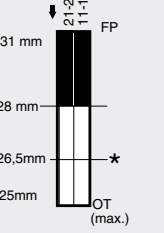
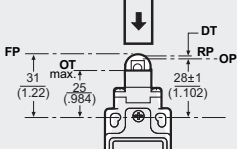
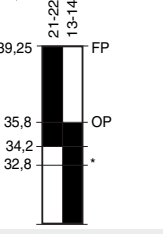
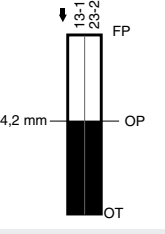
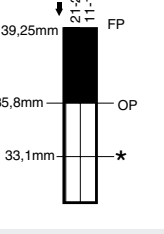
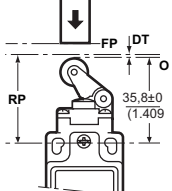
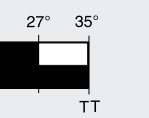
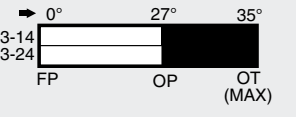
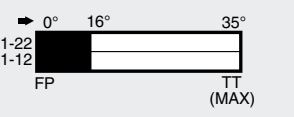
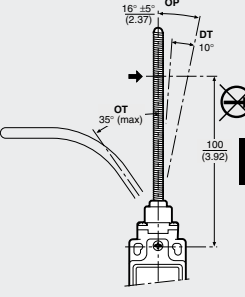
BREAK-BEFORE-MAKE

1 NORMALLY CLOSED /
1 NORMALLY OPEN



* Point from which the positive opening is assured



Slow-Action Contacts <i>MAKE BEFORE BREAK</i> 1 NORMALLY CLOSED/ 1 NORMALLY OPEN	Slow-Action Contacts 2 NORMALLY OPEN	Slow-Action Contacts 2 NORMALLY CLOSED	Operating Torque	Actuator Types																																								
 0° 26° 39° 50,5° 70° min. 21-22 13-14 FP OP OP2 * TT <table border="1"> <tr><td>(F.P.)</td><td>0°</td><td>(D.T.)</td><td></td></tr> <tr><td>(O.P.)</td><td>26°</td><td>(O.P.2)</td><td>39°</td></tr> <tr><td>(R.P.)</td><td></td><td>(T.T.)</td><td>70° min.</td></tr> <tr><td>(*)</td><td>50,5</td><td></td><td></td></tr> </table>	(F.P.)	0°	(D.T.)		(O.P.)	26°	(O.P.2)	39°	(R.P.)		(T.T.)	70° min.	(*)	50,5			 24,6mm -4,4 53,5 13-14 23-24 FP OP OT <table border="1"> <tr><td>(F.P.)</td><td>0°</td><td></td><td></td></tr> <tr><td>(O.P.)</td><td>36°</td><td></td><td></td></tr> <tr><td>(O.T.)</td><td>61° to 75°</td><td></td><td></td></tr> </table>	(F.P.)	0°			(O.P.)	36°			(O.T.)	61° to 75°			 26° 46,5° 70° (min.) 21-22 11-12 FP TT <table border="1"> <tr><td>(F.P.)</td><td>0°</td><td>(D.T.)</td><td></td></tr> <tr><td>(O.P.)</td><td>26°</td><td>(*)</td><td>46,5°</td></tr> <tr><td>(R.P.)</td><td></td><td>(O.T.)</td><td>70° min.</td></tr> </table>	(F.P.)	0°	(D.T.)		(O.P.)	26°	(*)	46,5°	(R.P.)		(O.T.)	70° min.	0,330 Nm [2.90 lb]	 A1B Side Rotary, Metal Roller
(F.P.)	0°	(D.T.)																																										
(O.P.)	26°	(O.P.2)	39°																																									
(R.P.)		(T.T.)	70° min.																																									
(*)	50,5																																											
(F.P.)	0°																																											
(O.P.)	36°																																											
(O.T.)	61° to 75°																																											
(F.P.)	0°	(D.T.)																																										
(O.P.)	26°	(*)	46,5°																																									
(R.P.)		(O.T.)	70° min.																																									
 21 mm 18 mm 17 mm 15 mm 21-22 13-14 FP OT (max.)	 21mm 17mm 15mm 13-14 23-24 FP OT (max.)	 21mm 18mm 16,5mm 15mm 21-22 11-12 FP OT (max.)	16,0 Nm [3.60 lb]	 B Top Pin Plunger																																								
 31 mm 28 mm 27 mm 25 mm 21-22 13-14 FP OT (max.) *26,2 mm	 31mm 27mm 25mm 13-14 23-24 FP OP OT (max.)	 31 mm 28 mm 26,5mm 25 mm 21-22 11-12 FP OT (max.)	16,0 Nm [3.60 lb]	 C Top Roller Plunger																																								
 39,25 35,8 34,2 32,8 21-22 13-14 FP OP	 34,2 mm 13-14 23-24 FP OP OT	 39,25mm 35,8mm 33,1mm 21-22 11-12 FP OP	9,5 Nm [2.10 lb]	 D Top Roller Lever																																								
 0° 16° 27° 35° 21-22 13-14 FP TT	 0° 27° 35° 13-14 23-24 FP OP OT (MAX)	 0° 16° 35° 21-22 11-12 FP TT (MAX)	0,1 Nm [0.90 lb]	 E7B Coil Wobble Stick																																								

04

34^

05

35^

06

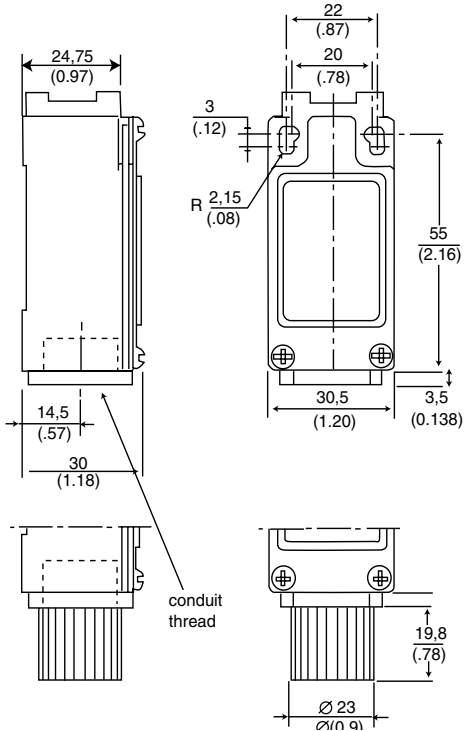
36^

XXX

GLD EN 50047 Double insulated standard

Technical data

Mechanical life	up to 15 million operations
Degree of protection	IP66, IP67 NEMA/UL type 1, 4X (indoor use), 12, 13
Temperature range	Operating : -40 °C to 85 °C [-40 °F to 185 °F] Storage : -40 °C to 85 °C -40 °F to 185 °F
Approvals	IEC/EN 60947-5-1 EN 60947-5-1 AC15 A300 DC13 Q300 UL & CSA
Vibration	10 g conforming to IEC 68-2-6
Shock	50 g conforming to IEC 68-2-27 Terminal marking to EN 50013



Conduit thread

- A** = 1/2 in NPT adaptor
- B** = PG 13,5
- C** = 20 mm

Ordering :

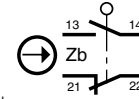
GLD

X

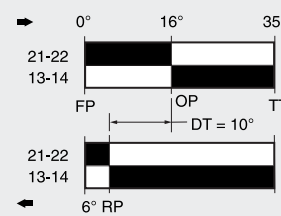
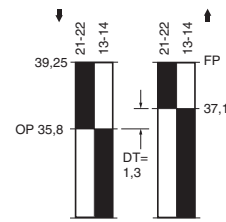
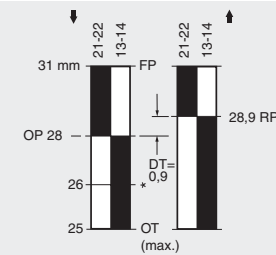
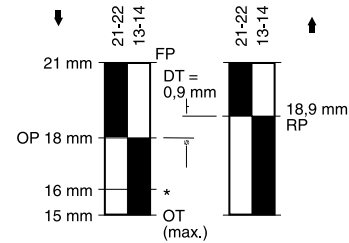
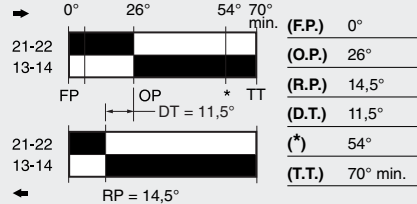
4 Honeywell • Sensing and Control

Snap-Action Contacts

1 NORMALLY CLOSED / 1 NORMALLY OPEN



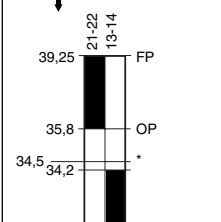
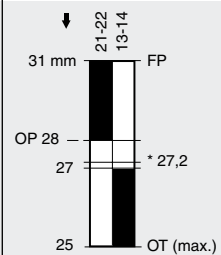
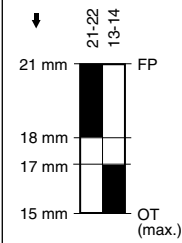
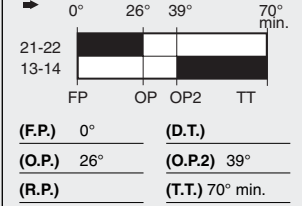
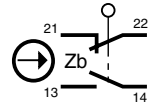
█ Circuit closed
* Positive opening to IEC/EN 60947-5-1-3



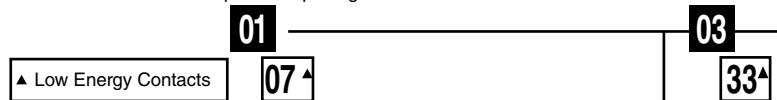
Slow-Action Contacts

BREAK-BEFORE-MAKE

1 NORMALLY CLOSED / 1 NORMALLY OPEN



* Point from which the positive opening is assured



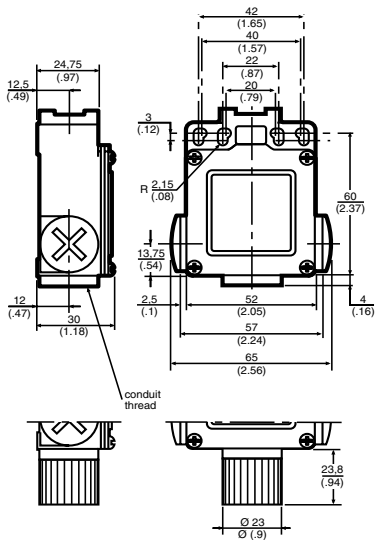
▲ Low Energy Contacts
Note: See page 9

XX

GLE EN 50047 Compatible 3 conduit metal standard

Technical data

Mechanical life	up to 15 million operations
Degree of protection	IP67 (wobble IP66) NEMA/UL type 1, 4, 12, 13
Temperature range	Operating : -40 °C to 85 °C [-40 °F to 185 °F] Storage : -40 °C to 85 °C -40 °F to 185 °F
Approvals	IEC 60947-5-1 EN 60947-5-1 AC15 A300 DC13 Q300 UL & CSA
Vibration	10 g conforming to IEC 68-2-6
Shock	50 g conforming to IEC 68-2-27 Terminal marking to EN 50013



Conduit thread

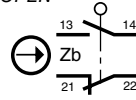
- A** = 1/2 in NPT adaptor
- B** = PG 13,5
- C** = 20 mm

Ordering :

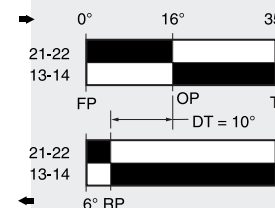
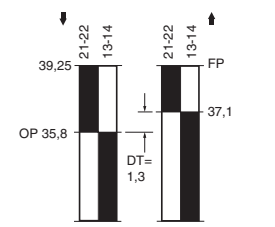
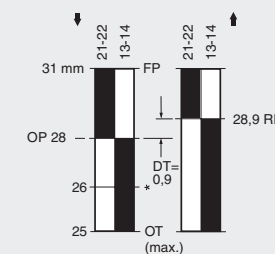
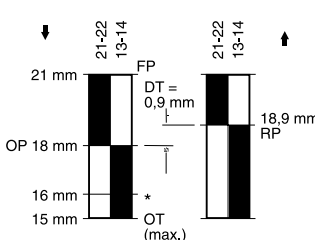
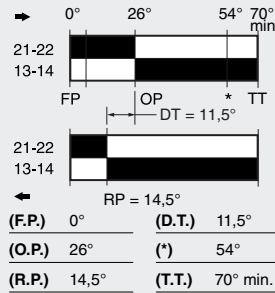
GLE **X**

Snap-Action Contacts

1 NORMALLY CLOSED/
1 NORMALLY OPEN

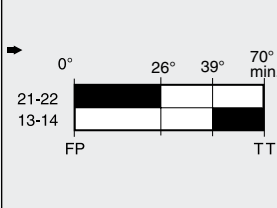
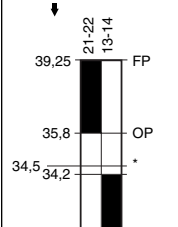
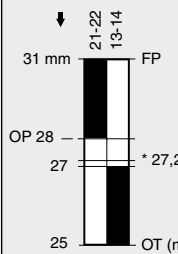
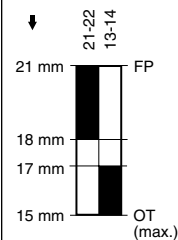
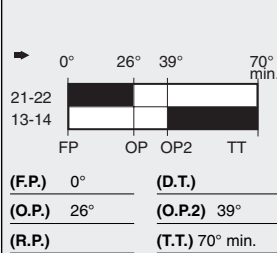
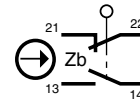


█ Circuit closed
* Positive opening to IEC/EN 60947-5-1-3



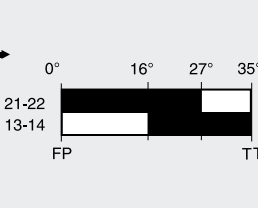
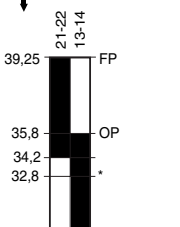
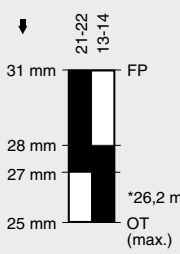
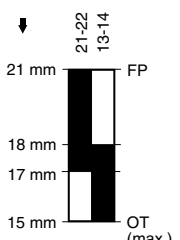
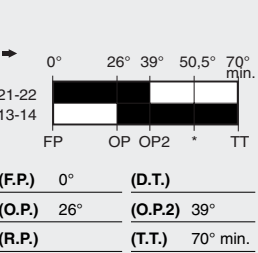
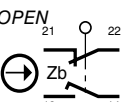
Slow-Action Contacts

BREAK-BEFORE-MAKE
1 NORMALLY CLOSED /
1 NORMALLY OPEN



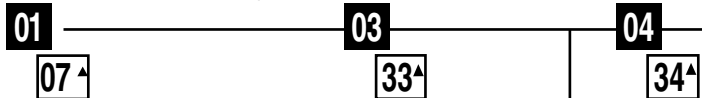
Slow-Action Contacts

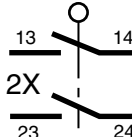
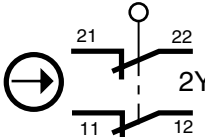
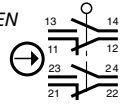
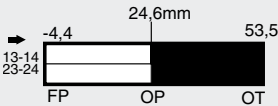
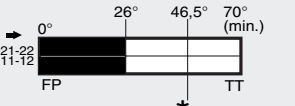
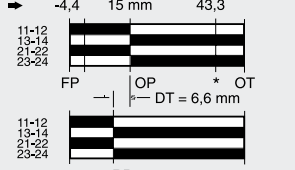
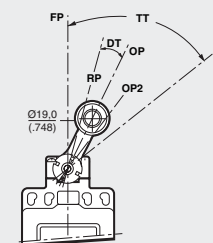
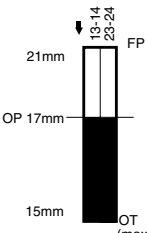
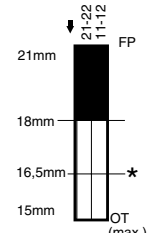
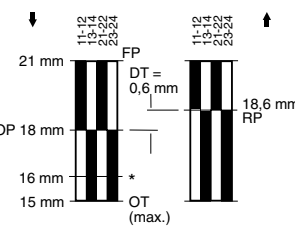
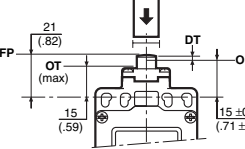
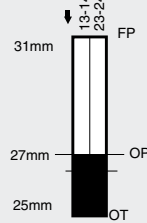
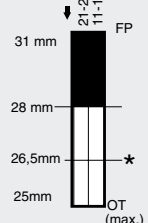
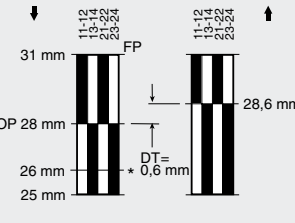
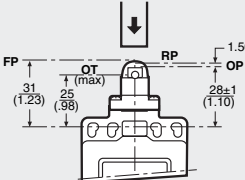
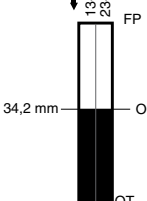
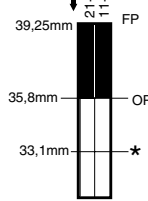
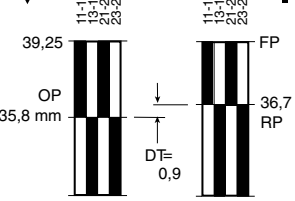
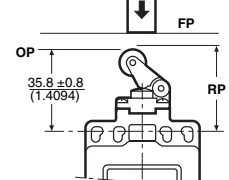
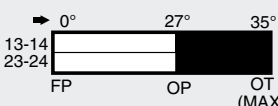
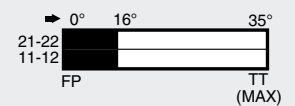
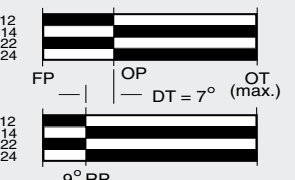
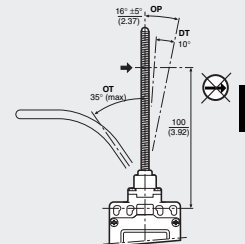
MAKE BEFORE BREAK
1 NORMALLY CLOSED/
1 NORMALLY OPEN



* Point from which the positive opening is assured

▲ Low Energy Contacts
Note: See page 9



Slow-Action Contacts 2 NORMALLY OPEN 	Slow-Action Contacts 2 NORMALLY CLOSED 	Snap-Action Contacts DOUBLE POLE 2 2 NORMALLY CLOSED/ 2 NORMALLY OPEN 	Operating torque/force SPDT DPDT	Actuator Types
 <p>(F.P.) 0° (O.P.) 36° (O.T.) 61° to 75°</p>	 <p>(F.P.) 0° (D.T.) (O.P.) 26° (*) 46.5° (R.P.) (O.T.) 70° min.</p>	 <p>(F.P.) 0° (*) 54° (O.P.) 26° (O.T.) 61° to 75° (R.P.) 180° (D.T.) 8°</p>	0,330 Nm [2.90 lb] 0,120 Nm [1.10 lb] 0,165 Nm [1.50 lb] GLE only	 <p>A1B Side Rotary, Metal Roller</p>
			16,0 Nm [3.60 lb] 16,0 Nm [3.60 lb] 13,0 Nm [2.90 lb] GLE only	 <p>B Top Pin Plunger</p>
			16,0 Nm [3.60 lb] 16,0 Nm [3.60 lb] 13,0 Nm [2.90 lb] GLE only	 <p>C Top Roller Plunger</p>
			9,5 Nm [2.10 lb] 11,0 Nm [2.4 lb] 9,0 Nm [1.9 lb] GLE only	 <p>D Top Roller Lever</p>
			0,1 Nm [0.90 lb] 1,3 Nm [0.29 lb] 1,1 Nm [0.25 lb] GLE only	 <p>E7B Coil Wobble Stick</p>

05

35^Δ

06

36^Δ

24

32^Δ

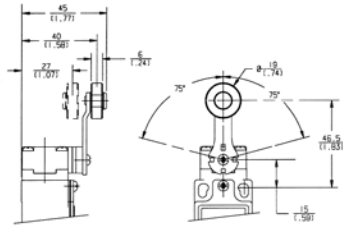
XXX

Additional lever types

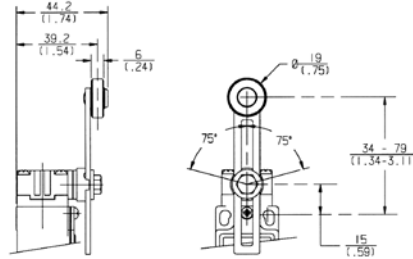
For use with all Side Rotary Head Styles.

Figure 1 illustrates miniature product lever types conforming to EN 50047 while **Figure 2** illustrates standard product lever types with conform to EN 50041. All dimensions are in mm/inches).

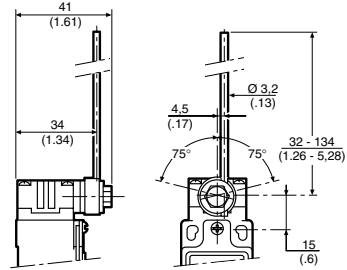
GLC, GLD, GLE (EN 50047)



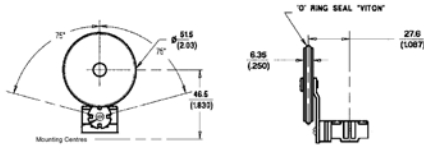
Side Rotary Roller Lever; A1A Plastic Roller
A1B Metal Roller



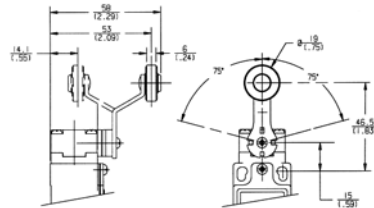
Side Rotary Adjustable Lever; A2A Plastic Roller; A2B Metal Roller



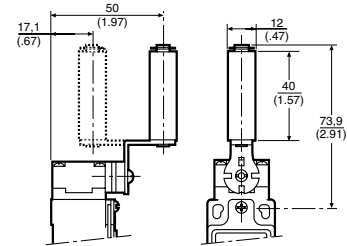
Side Rotary Adjustable Rod
A4J Metal Rod Head



A1Y Large Fixed Plastic Roller
(Suitable for Elevator Applications)



Offset Side Rotary Roller Lever; A5A Plastic Roller; A5B Metal Roller Head



Side Rotary Conveyor Lever
A9A Ceramic Roller

Replacement Parts - basic switches

Body type	Basic Switch										
	01	02	03	04	05	06	12	13	20	24	
GLC	GLZ301		GLZ303	GLZ304		GLZ306					
GLD	GLZ301		GLZ303	GLZ304		GLZ306					
GLE	GLZ301		GLZ303	GLZ304		GLZ306				GLZ324	

Sensing and Control
Honeywell
1985 Douglas Drive North
Golden Valley, MN 55422 USA
+1-815-235-6847
www.honeywell.com/sensing

107147-12-EN IL50 GLO
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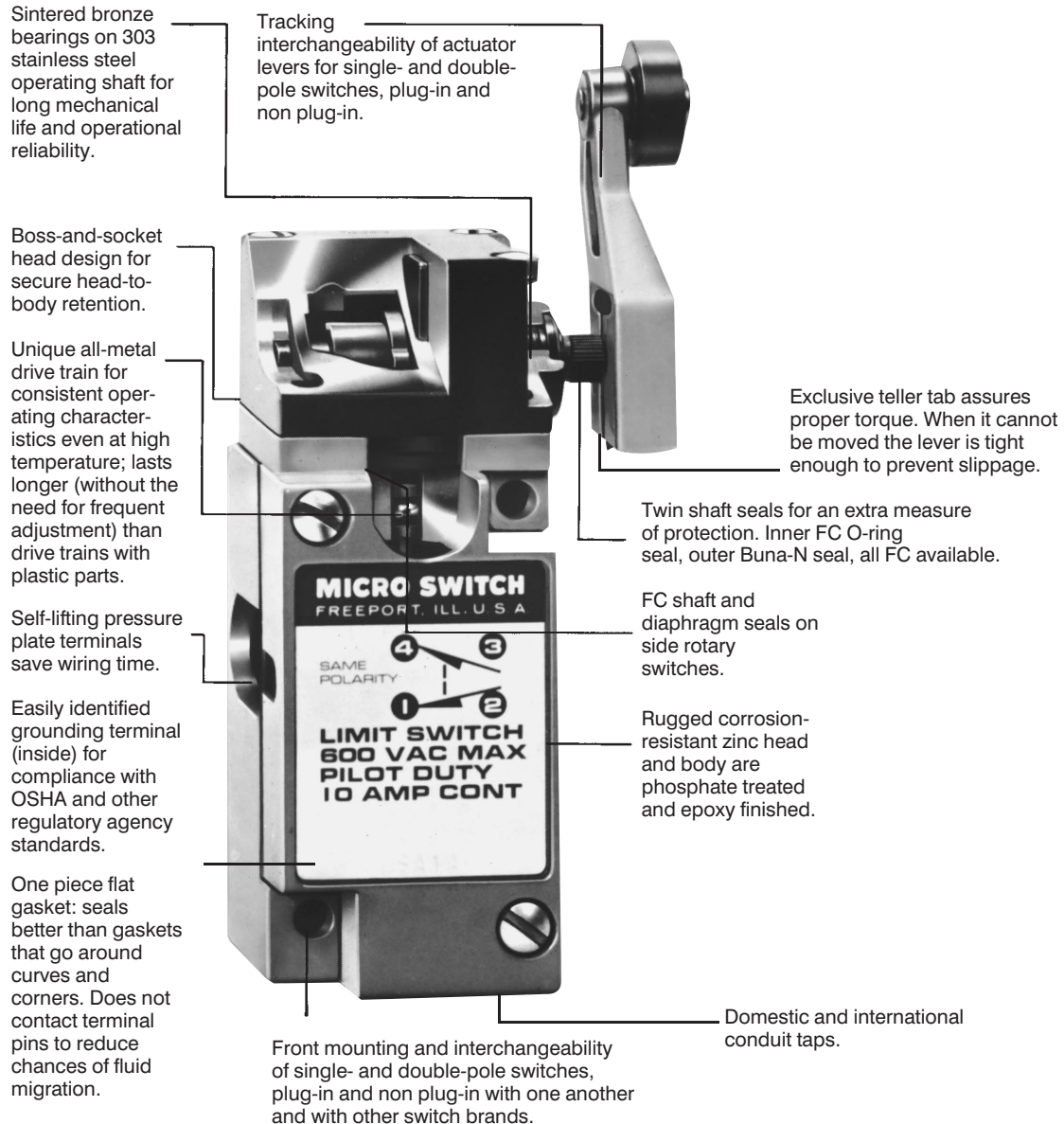


Heavy Duty Limit Switches

ADDITIONAL FEATURES AND OPTIONS

- Wide variety of operating heads
- Field adjustable operating modes, for reduced inventory
- Convenience of on-the-spot adjustment instructions
- Complete choice of circuitry and electrical rating options, including solid state switching
- Plug-in and non plug-in versions have identical operating characteristics and are dimensionally interchangeable
- Manifold (rear-wire) version
- NEMA 1, 3, 4, 4X, 6, 6P, and 13*
- UL Listed, file #E37138
- CSA Certified, file #LR57326
- Explosion-proof version page A113
- Low temperature versions to -40°F (-40°C) page A42
- Captive head and body screws
- Designed to withstand seismic shock
- Stainless steel (NEMA 4X) version page A47
- Preleaded cable or prewired connector types page A42
- Epoxy filled wash down (NEMA 6P) types page A44
- Completely fluorocarbon (FC) sealed versions page A42

* Depending on operating head, prewired connector or cable, enclosure ratings may vary. For enclosure rating information on specific catalog listings, contact the 800 number.



Heavy Duty Limit Switches

ROTARY OPERATING HEADS

The head type is designated by the first three letters in the catalog listing, i.e., **LSA1A-1A** has an **LSA** standard side rotary head. See order guides for details. All are momentary action, except the maintained contact LSN head.



Side rotary

Top rotary

SIDE ROTARY

LSA — Standard

Overtravel 60° minimum, pretravel 15° maximum, differential travel 5° (single-pole) and 7° (double-pole) maximum.

LSP — Low Differential Travel

Overtravel 68° minimum, pretravel 9° maximum, differential travel 3° (single-pole) and 4° (double-pole) maximum.

LSR — Low Operating Torque

Overtravel 60° minimum, pretravel 15° maximum, operating torque 1.7 in. lbs. (0,19 Nm) maximum.

LSH — Low Torque, Low Differential Travel

Overtravel 68° minimum, operating torque 1.7 in. lbs. (0,19 Nm) maximum, differential travel 3° (single-pole) and 4° (double-pole) maximum.

LSS — Gravity Return

Operating torque 5 in.-oz.

LST — Extra Low Torque

Operating torque 12 in.-oz.

LSL — Sequence Action

Delayed action between operation of two poles, in each direction. Overtravel 48° minimum.

LSM — Center Neutral

One set of contacts operates on clockwise rotation, another set on counterclockwise rotation. Overtravel 53° minimum.

LSN — Maintained Contact

Operation is maintained on counterclockwise rotation, reset on clockwise rotation, and vice versa. Overtravel 20° minimum.

TOP ROTARY

LSB — High Overtravel

Top rotary actuation is ideal when increased overtravel is required (100° minimum.) Uses same levers as side rotary switches.

ROTARY LEVERS

Shown below are typical lever series for side and top rotary switches. Additional versions are described in the lever order guides.

LSZ51 — Standard Roller Lever (1.5")

LSZ55 — Offset Roller Lever

LSZ53 — Yoke Roller Lever

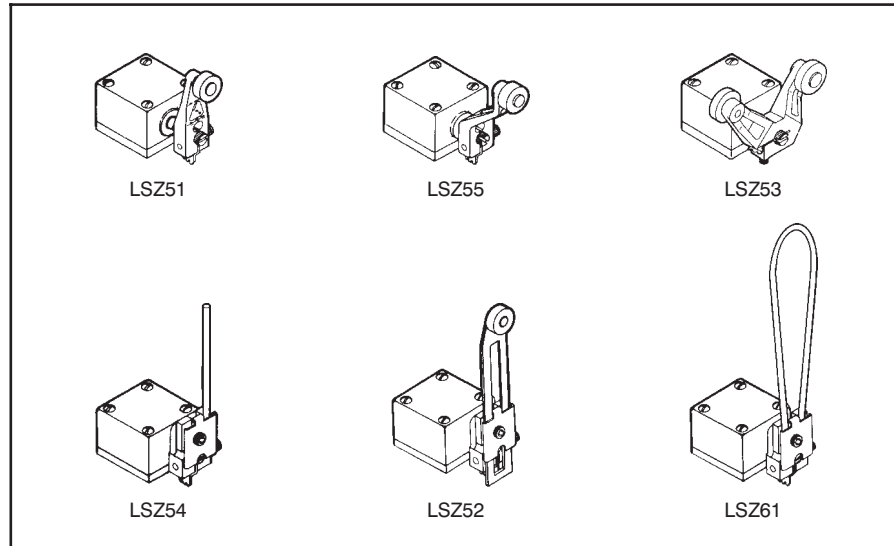
For use with LSN maintained contact switches.

LSZ52 — Adjustable Length Roller Lever

LSZ54 — Rod Lever

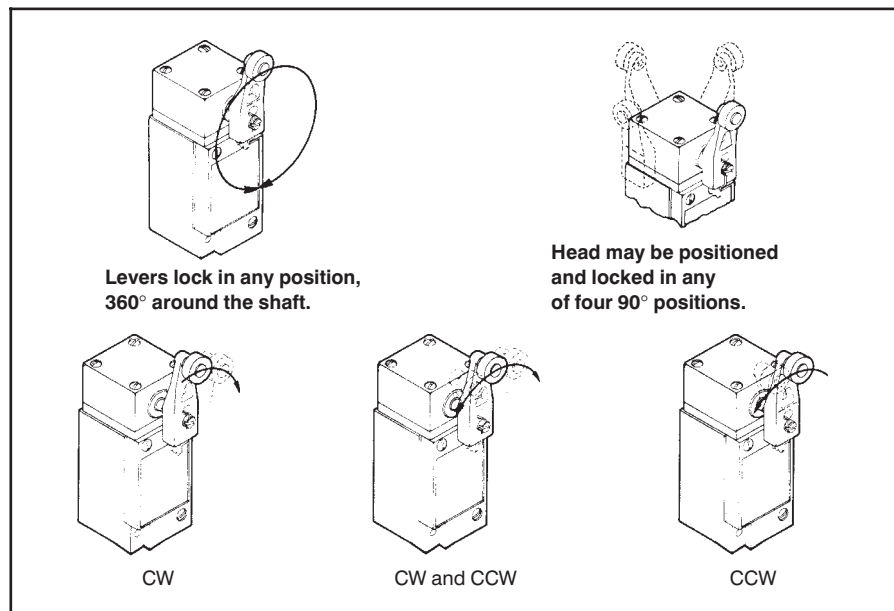
May be cut or formed by user. Available in flexible versions.

LSZ61 — Adjustable Loop Lever



Field adjustable to match application needs

Actuation is adjustable for operation clockwise, counterclockwise, or in both directions. Adjusting instructions are cast into the internal lid of side rotatory heads for convenient reference.



Limit/Enclosed

Heavy Duty Limit Switches

PLUNGER OPERATING HEADS

All plungers are momentary action, except the LSG maintained contact version. Over-travel is .190 inch (4.83 mm) minimum. The plungers are sealed with an oiltight boot. A gasket seal is between the head and housing. Plungers are corrosion resistant steel.

TOP PLUNGERS

LSC — Top Plain Plunger

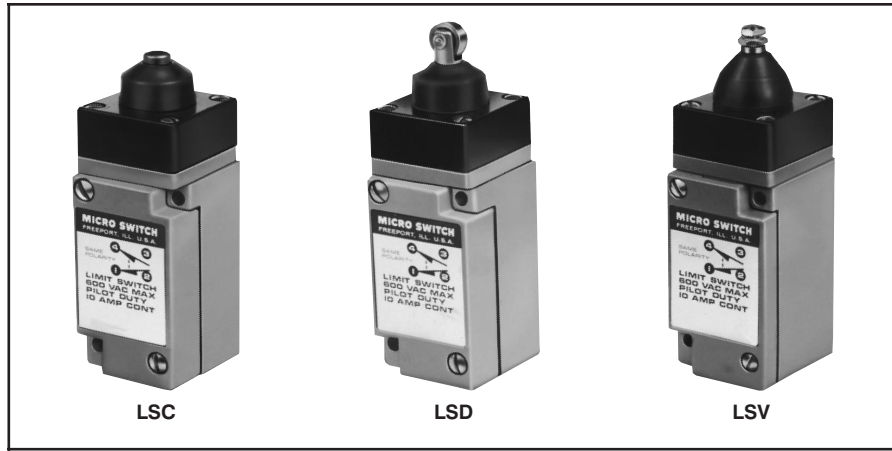
For in-line operating motion.

LSD — Top Roller Plunger

Can be set at 90° increments to accept cam or slide actuation.

LSV — Adjustable Top Plain Plunger

Simplifies installation, since switch operating point can be adjusted from 2.085 to 2.335 inch.



SIDE PLUNGERS

Side plungers fit in close quarters. The heads may be positioned to accept actuation from any of four directions, 90° apart.

LSE — Side Plain Plunger

For in-line actuating motion

LSF — Side Roller Plunger

Roller may be set in vertical or horizontal position for cam or slide actuation.

LSW — Adjustable Side Plain Plunger

Adjustable operating point, 1.615 to 1.865 inch.

LSG — Maintained Contact Side Plain Plunger

Transfer of switch contacts is maintained after either of the two plungers is operated. Operation of other plunger resets switch for next cycle.



WOBBLE LEVER OPERATING HEAD

Switches with wobble lever heads are operated by any movement, except direct pull.

LSJ1A-7M — Spring Wire Lever

May be formed by user to meet special needs.

LSJ1A-7A — Plastic Rod Lever

Use to avoid scratching or marring by actuator.

LSJ1A-7N — Flexible Cable Lever

LSK1A-8C — Stainless Steel Coil Spring Lever

LSK1A-8A — Cat Whisker

For low operating force applications

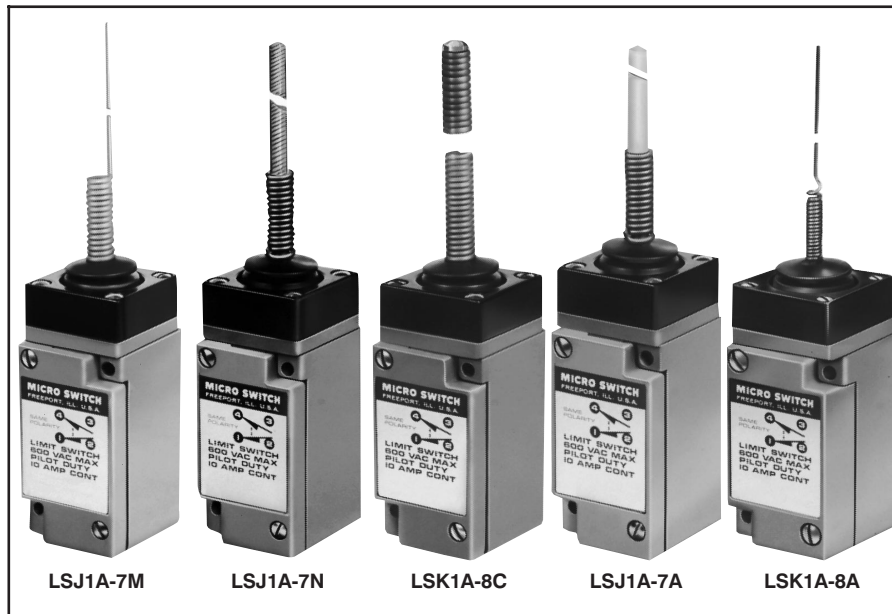
CONDUIT OPENINGS

For conduit openings other than 1/2-NPT and 3/4-NPT, substitute the following for LS in the catalog listing:

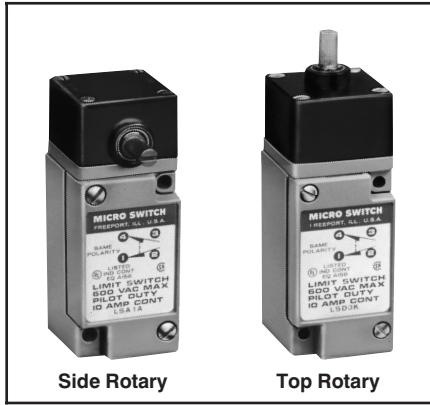
PG13,5 — LS3

2mm — LS4

PF1/2 — LS5



Rotary Actuated Switches



Order guides below and on page A35 provide specification and pricing information for side and top rotary switches.

Plug-in body style catalog listings consist of the complete plug-in base receptacle.

Lever arms are ordered separately. See pages A37-A39 for lever selection.

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

For low temperature, high temperature or preleading see page A42.

ASSEMBLED CONDITIONS

Catalog listings in order guide below are factory assembled with:

- Shaft of side rotary heads facing front of switch (label side).
- Head adjusted for both clockwise and counterclockwise operation.
- Light on indicator versions wired to N.O. circuit.

Refer to facing page to specify modifications to these assembled conditions.

PRELEADED OR CONNECTORIZED VERSIONS

Refer to page A42.

ORDER GUIDE (Momentary action. UL listed, CSA certified, CE approved. Levers not included. Order separately pages A37-A39.)

Circuitry	Electrical Rating	Body** Style	Catalog Listings					
			Side Rotary			Top Rotary		
			Standard	Low Differential	5° Pretravel	Low Torque	Low Differential Low Torque	High Overtravel
Silver contacts	A	Plug-in 1/2" Conduit	LSA1A	LSP1A	LSU1A	LSR1A	LSH1A	LSB1A
Gold cross point contacts	C	Plug-in 1/2" Conduit	LSA1J		LSU1J	—	—	LSB1J
Gold plated contacts	C		LSA1E	LSP1E	—	LSR1E	LSH1E	—
Silver contacts	A*	120 V Ind. lite Plug-In* 1/2" Conduit	LSA5A	LSP5A	LSU5A	LSR5A	LSH5A	LSB5A
	A*	240 V Ind. lite Plug-In 1/2" Conduit	LSA8A	LSP8A	LSU8A	LSR8A	LSH8A	LSB8A
MOMENTARY SPDT Double Break	A*	24 V LED lite 1.5mA max. Auto polarity Plug-in 1/2" Conduit	LSA9A	LSP9A	LSU9A	LSR9A	LSH9A	LSB9A
	A	Non plug-in 1/2" Conduit	LSA3K	LSP3K	LSU3K	LSR3K	LSH3K	LSB3K
Silver contacts	B	Plug-in 3/4" Conduit	LSA2B	LSP2B	LSU2B	LSR2B	LSH2B	LSB2B
MOMENTARY DPDT Double Break	B	Plug-in 1/2" Conduit	LSA6B	LSP6B	LSU6B	LSR6B	LSH6B	LSB6B
	B	120 V Ind. lite Plug-in 3/4" Conduit	LSA2R	LSP2R	LSU2R	LSR2R	LSH2R	LSB2R
	B	Non plug-in 3/4" Conduit	LSA4L	LSP4L	LSU4L	LSR4L	LSH4L	LSB4L
	B	Non plug-in 1/2" Conduit	LSA7L	LSP7L	LSU7L	LSR7L	LSH7L	LSB7L
SPNC Direct Acting	D	Non plug-in 1/2" Conduit	LSA3N			LSR3N		LSB3N

*Use at voltage indicated for light. Wired to N.O. circuit. Upper temperature limit for lighted units is 200°F (93°C). **Plug-in listings include base receptacle.

OPERATING CHARACTERISTICS

Pretravel (degrees max.)		15	9	5	15	9	25
Differential Travel (degrees max.)	SPDT	5	3	3	5	3	10
	DPDT	7	4	4	7	4	12
Overtravel (degrees min.)		60	66	70	60	66	110
Operating Torque (max.)	NM = Newton meters	0,45 Nm 4 in. lbs.	0,45 Nm 4 in. lbs.	0,45 Nm 4 in. lbs.	0,19 Nm 1.7 in. lbs.	0,19 Nm 1.7 in. lbs.	0,28 Nm 2.5 in. lbs.
Operating Temperature Range***		10°F to 250°F -12° to 121°C			30°F to 250°F -1° to 121°C		

***Completely fluorocarbon-sealed switches are preferred for use in temperatures above 200°F (93°C). Refer to page A42.

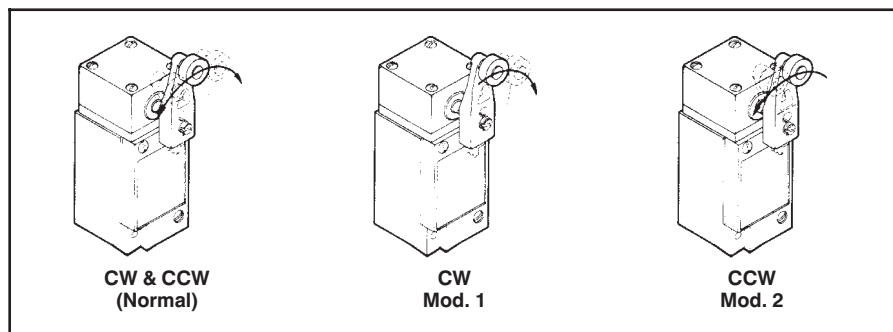
Limit/Enclosed

Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

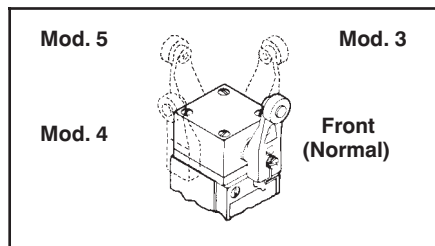
Rotary Actuated Switches

ACTUATION DIRECTION

(Drawings apply to listings on facing page only).



HEAD ORIENTATION



ASSEMBLY MODIFICATIONS

How to order

Momentary action rotary switches can be furnished in other than the normal assembled conditions described on the facing page. To specify modifications, add the number(s) shown below to the catalog listings. Prices are the same as their counterparts shown in the order guide.

Modification number suffixes are:

- 1 Clockwise operation only
- 2 Counterclockwise operation only
- 3 Shaft to right of switch front
- 4 Shaft to left of switch front
- 5 Shaft to back of switch
- 7 Indicator light wired to N.C. circuit

Examples:

Catalog Listing LSA1A23 is an LSA1A switch adjusted for counterclockwise operation only. The operating shaft is to the right side of the switch when viewing it from the front (label side). No lever.

Catalog Listing LSA8A7 is an LSA8A switch with the 240 volt indicator light wired to the N.C. circuit. No lever.

Switches with assembly modifications are not normally stocked and may extend delivery leadtimes.

LEVERS

Levers for rotary actuated switches are normally ordered as separate catalog listings. They also may be ordered by including a suffix to the switch catalog listing and adding the lever price. See pages A34-A39.

SWITCHES FOR SPECIAL APPLICATIONS

HDLS limit switches for special application needs are described on pages A42 and A43. They include: manifold mount, low temperature, complete fluorocarbon-sealed, gravity return, extra low torque and 20 Amp switches.

Adapter plates for interchanging HDLS with LS/200LS limit switches are described on page A49.

ELECTRICAL RATINGS

10 amps continuous carry (except for electrical rating "C"). Circuits on any one pole must be the same polarity.

AC Volts

Pilot duty: 600 VAC, 720VA

Electrical Rating	Circuitry	VAC	Amps at 0.35 Power Factor	
			Make	Break
A*	Single-Pole Double-Throw	120	60	6
		240	30	3
		480	15	1.5
		600	12	1.2
B	Double-Pole Double-Throw	120	30	3
		240	15	1.5
		480	7.5	0.75
		600	6	0.60
D	Single-Pole Single-Throw Normally Closed	120	60	6
		240	30	3
		480	15	1.5
		600	12	1.2
C**	Single-Pole Double-Throw	250 VAC or 60 VDC, .050 amp max.		

DC Volts

Pilot duty: 240 VDC, 30 watts

Electrical Rating	Circuitry	VDC	Make and Break Amps	
			Inductive	Resistive
A*	Single-Pole Double-Throw	120	0.25	0.8
		240	0.15	0.4
B	Double-Pole Double-Throw	120	0.25	0.8
		240	0.15	0.4
D	Single-Pole Single-Throw Normally Closed	30	4.3	4.3
		120	1.1	1.1
C**	Single-Pole Double-Throw	250 VAC or 60 VDC, .050 amp max.		

*For switches with indicator light, use only at voltage stated for indicator light.

**These switches have either gold plated or gold cross point contacts. Cross point contacts improve high reliability of contact make when particle contamination is a problem or low energy loads must be carried.

Rotary Actuated Switches

ADDITIONAL CIRCUITRY/ACTION OPTIONS



ASSEMBLY MODIFICATIONS

Switches in the order guide, below, have the operating shaft facing front. If another orientation is desired, add a number from the drawing to the catalog listing.

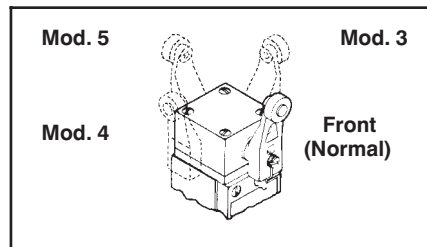
To specify the indicator light wired to the N.C. circuit, add 7 to the catalog listing.

Example:

Catalog Listing LSN5A37 is an LSN5A switch with the shaft facing right and the indicator light wired to the N.C. circuit.

HEAD ORIENTATION

(Drawing applies to this page only.)



ORDER GUIDE

Maintained, center neutral, or sequential action. UL listed, CSA certified. Levers not included (see pages A36-A39).

For low temperature, all Viton or preleaded versions see page A42.

Circuitry	Elec. Rating Page A23	Body** Style	Maintained†		Center Neutral (Pole 1 operates CCW Pole 2 operates CW)	Sequential (Pole 1 operates before Pole 2, either CW or CCW or both)
			360° Alternate Action	2 Position Standard		
<p>SPDT Double Break Maintained</p>	A	Plug-in 1/2" Conduit	LSQ300	LSN1A	<p>CENTER NEUTRAL (Momentary)</p> <p>SPDT Double Break each direction Electrical rating B</p>	<p>SEQUENCE (Momentary)</p> <p>(2) SPDT Double Break with 10° between operation Electrical rating B</p>
	A*	120V Ind. Lite Plug-in 1/2" Conduit		LSN5A		
	A*	240V Ind. Lite Plug-in 1/2" Conduit		LSN8A		
	A	Non plug-in 1/2" Conduit	LSQ310	LSN3K		
<p>DPDT Double Break Maintained</p>	B	Plug-in 3/4" Conduit		LSN2B	LSM2D	LSL2C
	B	Plug-in 1/2" Conduit		LSN6B	LSM6D	LSL6C
	B	Non plug-in 3/4" Conduit	LSQ320	LSN4L	LSM4N	LSL4M
	B	Non plug-in 1/2" Conduit		LSN7L	LSM7N	LSL7M
<p>SP Normally Closed Direct Acting</p>	D	Non plug-in 1/2" Conduit		LSN3N		

* Use at voltage indicated for light. Wired to N.O. circuit. Upper temperature for lighted units is 200°F (93°C).

** Plug-in listings include base receptacle.

† Total travel is approximately 80° max. Maintained contact switch normally used with LSZ53 yoke actuator.

OPERATING CHARACTERISTICS

Pretravel (degrees max.)	SPDT	65	Not Applicable	Not Applicable
Note: Mechanical trip before electrical trip	DPDT	65	18	1st Pole 15 2nd Pole 10 additional (max.)
Differential Travel (degrees max.)	SPDT	40	Not Applicable	Not Applicable
	DPDT	40	10	For each pole — 5 degrees
Overtravel (degrees min.)		20	57	48
Operating Torque (max.)	Nm = Newton meters	0,45 Nm 4 in. lbs.	0,45 4 in. lbs.	0,45 4 in. lbs.
Operating Temperature Range***		30°F to 250°F -1 to 121°C		10°F to 250°F -12 to 121°C

*** Completely fluorocarbon-sealed switches are preferred for temperatures above 200°F (93°C). Refer to page A42.

Limit/Enclosed

Levers for Rotary Actuated Switches

Levers for use with side or top rotary actuated switches are available in a wide choice of sizes and materials, as shown in the order guides on the following pages. Rollers may be on either side of the lever to best match the external actuating mechanism. They permit a wide range of cam tracking possibilities (see drawings below).

LSZ51 standard rollers and **LSZ55** offset roller levers have a fixed 1.5 inch (38,1 mm) radius.

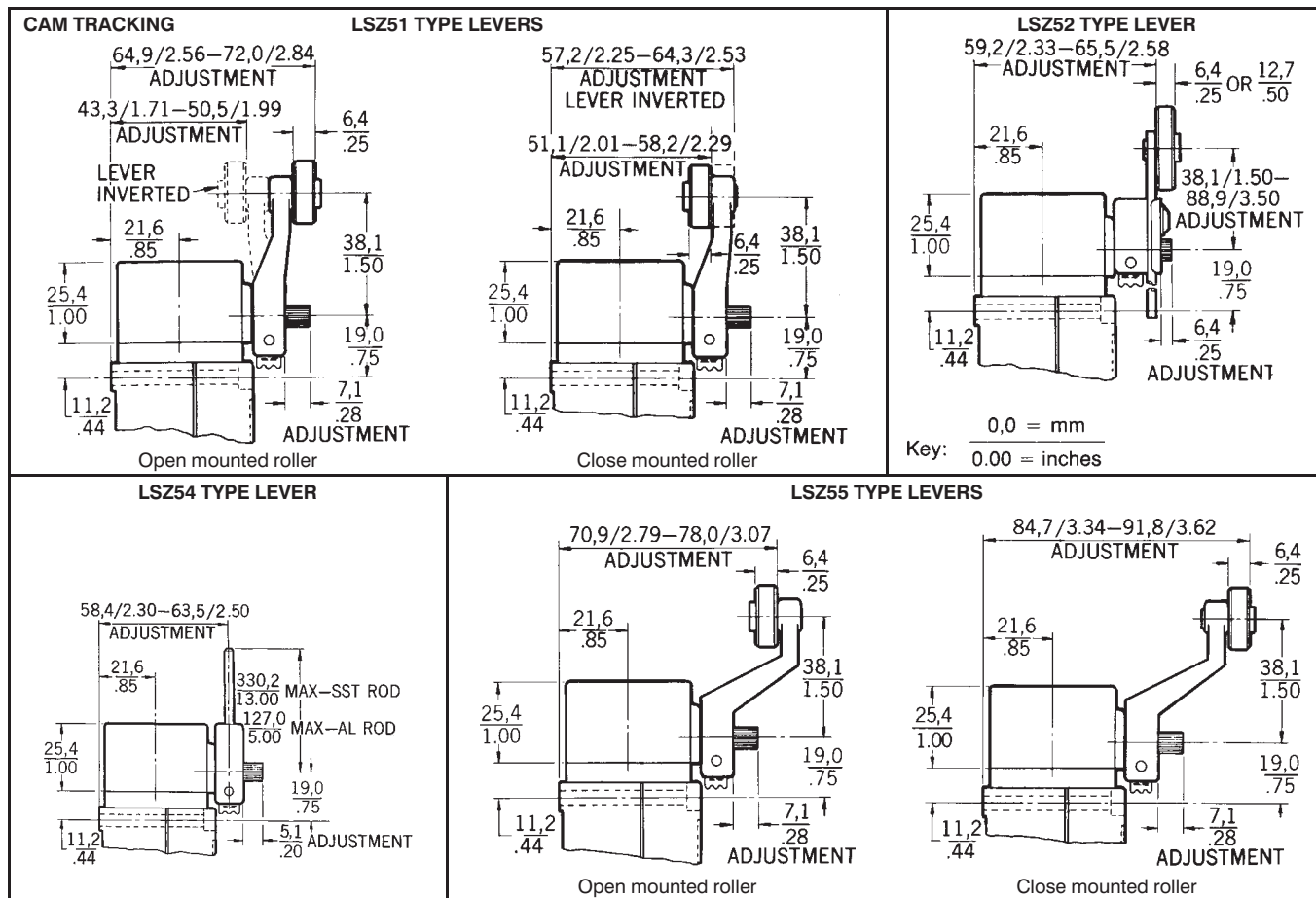
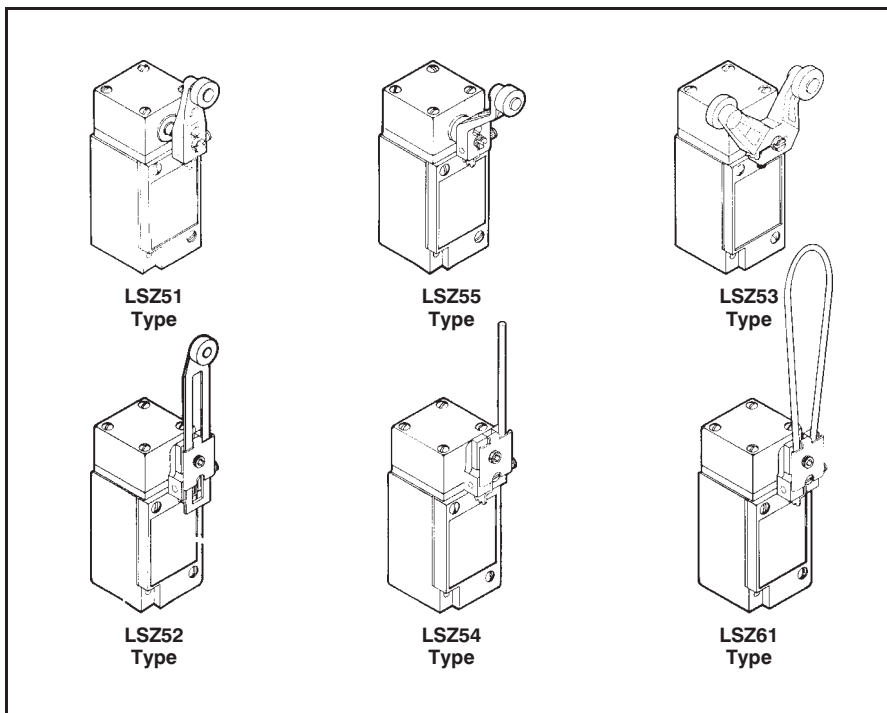
LSZ53 yoke roller levers are used with side rotary maintained switches, where a reciprocating actuator operates the switch in one direction and reverses it when moving in the other direction.

LSZ52 adjustable length roller levers are universally adaptable to many application needs.

LSZ54 rod levers may be formed by the user. The hub permits adjusting of lever length. Also available in flexible versions.

LSZ61 is an adjustable loop lever.

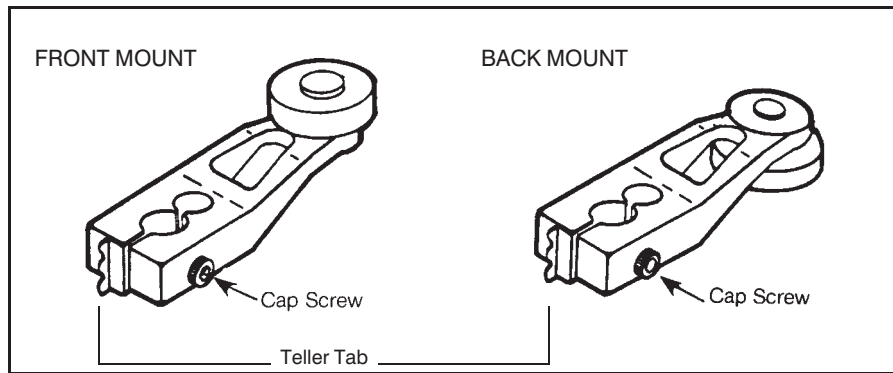
For lever order guides, refer to the following pages.



NOTE: Shaft dia. is .29 in.

Levers for Rotary Actuated Switches

Rollers may be mounted on the front or back side of the lever. (See below).



Levers shown in the order guides are furnished with cap screws which accommodate a 5/64-inch allen wrench.

Teller tab assures proper torque. When it cannot be moved, the lever is tight enough to prevent slippage.

TO ORDER LEVERS SEPARATELY

Catalog listings in the shaded column of the order guides are used when ordering levers as separate items, i.e., LSZ51A, LSZ53B, etc.

TO ORDER LEVERS WITH SWITCHES

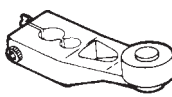
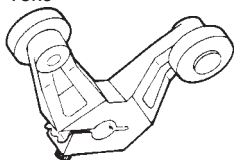

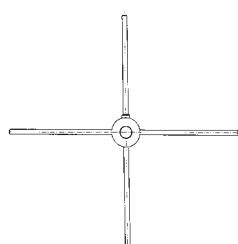
Refer to the lefthand shaded column with dash-number suffixes to order lever and switches together. Add the appropriate suffix to the switch catalog listing.

Example:

Catalog Listing LSA1A-1B is an LSA1A switch with a standard lever which has the steel roller mounted on the front side.

Limit/Enclosed

ORDER GUIDE

Type	Radius (in.)	Roller Mounted On This Side Of Lever			Material	To Order Lever With Switch, Add Suffix To Switch Catalog Listing	Use These Catalog Listings To Order Levers Separately
		Dia. in.	Width in.				
 LSZ51 Series Std. Roller Lever	1.5	Front	.75	.25	Nylon	-1A	LSZ51A
	1.5	Front	.75	.25	Steel	-1B	LSZ51B
	1.5	Back	.75	.25	Nylon	-1C	LSZ51C
	1.5	Back	.75	.25	Steel	-1D	LSZ51D
	1.5	Front	1.0	.50	Nylon	-1F	LSZ51F
	1.5	Front	1.5	.25	Nylon	-1G	LSZ51G
	1.5	Back	1.0	.50	Nylon	-1J	LSZ51J
	1.5	Back	.75	.25	Ball Bearing	-1L	LSZ51L
	1.5	Back	.75	1.30	Nylon	-1M	LSZ51M
	1.5	Back	.75	.375	Stainless	-1T	LSZ51T
	1.5	Front	.75	.50	Nylon	-1P	LSZ51P
	1.5	Front	1.59	.25	Nylon	-1R	LSZ51R
	1.5	—	—	—	Less Roller	—	LSZ51
 LSZ53 Series Yoke Back view of LSZ53E	1.5	Front-Back	.75	.25	Nylon	-3A	LSZ53A
	1.5	Front-Back	.75	.25	Steel	-3B	LSZ53B
	1.5	Front-Front	.75	.25	Steel	-3D	LSZ53D
	1.5	Back-Front	.75	.25	Nylon	-3E	LSZ53E
	1.5	Back-Back	.75	.25	Nylon	-3S	LSZ53S
	1.5	Back-Back	.75	.25	Steel	-3P	LSZ53P
	1.5	Back-Front	.75	.25	Steel	-3U	LSZ53U
	1.5	Back-Front	.75	1.25	Nylon	-3M	LSZ53M
	1.5	—	—	—	Less Rollers	—	LSZ53
 LSZ55 Series Offset	1.5	—	—	—	Less Roller	—	LSZ55
	1.5	Back	.75	.25	Nylon	-5A	LSZ55A
	1.5	Back	.75	.25	Steel	-5B	LSZ55B
	1.5	Front	.75	.25	Nylon	-5C	LSZ55C
	1.5	Front	.75	.25	Steel	-5D	LSZ55D
	1.5	Front	.75	.50	Nylon	-5E	LSZ55E
	1.5	Front	1.5	.25	Nylon	-5K	LSZ55K
1.5	Front	1.0	.50	Nylon	-5F	LSZ55F	
 LSZ69 Series* Spoke	—	—	6.0	—	Stainless (fixed)	—	LSZ69AA
	—	—	6.0	—	Stainless (spokes replaceable)	—	LSZ69BA

*For use with LSQ300 Series. Hub is aluminum. See page A59 for dimensions.

Levers for Rotary Actuated Switches

METRIC CONVERSION

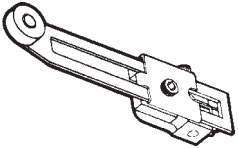
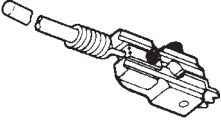
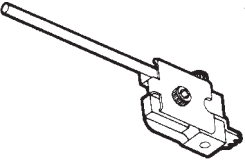

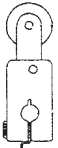
.25 in.	=	6,35 mm
.5 in.	=	12,7 mm
.625 in.	=	15,9 mm
.75 in.	=	19,1 mm
1.0 in.	=	25,4 mm
1.5 in.	=	38,1 mm
2.0 in.	=	50,8 mm
2.5 in.	=	63,5 mm
3.0 in.	=	76,2 mm
4.8 in.	=	122 mm
5.0 in.	=	127 mm
6.0 in.	=	152 mm
12.0 in.	=	305 mm

LOW TORQUE APPLICATION CONSIDERATION

When heavier levers (such as LSZ52 series and LSZ54 series, below), are used with low torque LSH, LSR, LSS and LST switches, it is desirable to mount the switch with the lever down. In this way, gravity will assist in restoring levers to the free position.

Conversely, when these switches are mounted with the lever upright, gravity tends to work to prevent lever return after switching actuation. By counterbalancing the lever or adding an auxiliary extension spring, this problem may be overcome. Contact the 800 number for application assistance.

ORDER GUIDE

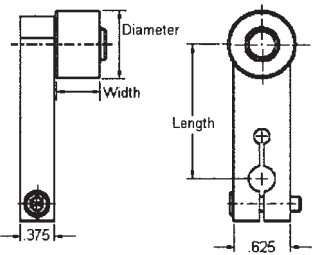
Type	Radius (in.)	Roller Mounted On This Side Of Lever				Material	To Order Lever With Switch, Add Suffix To Switch Catalog Listing	Use These Catalog Listings To Order Levers Separately
		Roller Mounted On This Side Of Lever	Dia. in.	Width in.	Material			
LSZ52 Series Adjustable Radius 	1.5-3.5	Back	.75	.25	Nylon	-2A	LSZ52A	
	1.5-3.5	Back	.75	.25	Steel	-2B	LSZ52B	
	1.5-3.5	Front	.75	.25	Nylon	-2C	LSZ52C	
	1.5-3.5	Front	.75	.25	Steel	-2D	LSZ52D	
	1.5-3.5	Front	.75	1.30	Nylon	-2E	LSZ52E	
	1.5-3.5	Front	1.0	.5	Nylon	-2J	LSZ52J	
	1.5-3.5	Front	1.5	.25	Nylon	-2K	LSZ52K	
	1.5-3.5	Front	.75	.25	Ball Bearing	-2L	LSZ52L	
	1.5-3.5	Front	2.0	.25	Nylon	-2M	LSZ52M	
	1.5-3.5	Front	.75	.5	Nylon Less Roller Hub Only	-2N	LSZ52N LSZ52 LSZ54	
LSZ68 Series Spring/Rod 	12.0	—	.25	—	Delrin Rod w/Spring	—	LSZ68	
	16.0	—	.25	—	Delrin Rod w/Spring	—	LSZ617	
LSZ54 Series Rod 	5.5	—	—	—	Aluminum	-4M	LSZ54M	
	13.0	—	—	—	Stainless Steel	-4N	LSZ54N	
	20.0	—	—	—	Delrin Rod	-4P	LSZ54P	
	12.0	—	—	—	Spring Wire	-4R	LSZ54R	
	4.8	—	—	—	Flexible Cable Hub Only	-4V	LSZ54V* LSZ54	
LSZ61 Series Flexible Loop 	6" Flexible Loop/Cap Screw					Nylatron	—	LSZ61
	9.5" Flexible Loop/Cap Screw					Hub Only	—	LSZ618 LSZ54
		(measured from center line of shaft hole to tip of actuator)						
LSZ60 Series One Way Roller Lever 	Front	Front	.75	.25	Nylon	—	LSZ60A	
	Front	Front	.75	.25	Steel	—	LSZ60B	

See page A60 for dimensions.

* Hub not available separately.

Levers for Rotary Actuated Switches

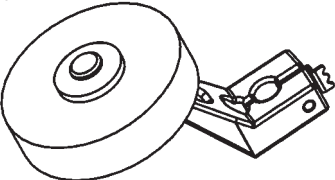
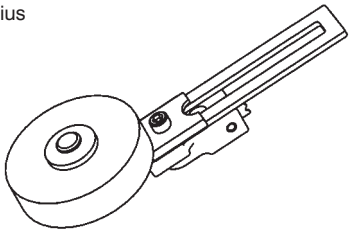
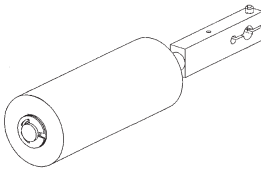
FIXED LENGTH LEVERS ORDER GUIDE

Fixed Length Levers LSZ65 Series	Lever Length (in.)	Lever Listing	For a complete listing add your choice of roller suffix				
			Roller Suffix	Dia. in.	Width in.	Material	
	.88	LSZ65A	A	.75	.25	Nylon	
	1.38	LSZ65B		B		.75	.25
	1.25	LSZ65L	C	.75	.50	Nylon	
	1.50	LSZ65C					
	1.75	LSZ65D					
	2.00	LSZ65E					
	2.50	LSZ65F					
	3.00	LSZ65G					
	4.00	LSZ65H	D	.75	1.30	Nylon	
	5.00	LSZ65J					
	6.00	LSZ65K					
	Example: LSZ65AB is a .88" long lever with a steel .75" diameter, .25" wide roller.						

RUBBER ROLLER LEVERS

Ideal for elevator or conveyor applications requiring quiet operation or protection of delicate surfaces.

ORDER GUIDE

Type	Radius (in.)	Roller Mounted On This Side Of Lever	Dia. in.	Width in.	Material	Catalog Listing
LSZ55 Series Offset 	1.5 1.5	Front Front	1.6 2.0	.50 .50	Rubber Rubber	LSZ55W LSZ55Y
LSZ52 Series Adjustable Radius 	1.5 to 3.5 1.5 to 3.5	Front Front	1.6 2.0	.50 .50	Rubber Rubber	LSZ52W LSZ52Y
LSZ67 Series Conveyor Roller 	—	—	1.5	3.8	Plastic	LSZ67AA

Limit/Enclosed

Plunger Actuated Switches

ASSEMBLED CONDITIONS

Catalog listings in order guide below are factory assembled with:

- Side plungers facing front (label side) of switch. Rollers on side plungers are in horizontal position.

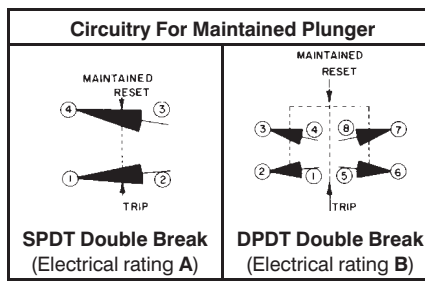
- Roller on top plungers are parallel to mounting surface.
- Lights on indicator versions are wired to N.O. circuit.

Refer to facing page to specify modifications to these assembled conditions.

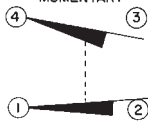
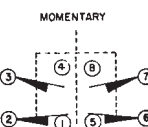

For low temperature, high temperature or preleaded versions see page A42.

ORDER GUIDE

Momentary action, except for maintained contact LSG version. UL listed, CSA certified.



Circuits on any one pole must be the same polarity.

Catalog listings in this chart are complete switches.			Catalog Listings						
			Top Plungers			Side Plungers			
Circuitry	Elec. Rating Page A34	Body** Style	Plain	Roller	Adjustable	Plain	Roller	Adjustable	Maintained (Circuitry Shown Above)
Silver contacts	A	Plug-in 1/2" Conduit	LSC1A	LSD1A	LSV1A	LSE1A	LSF1A	LSW1A	LSG1A
Gold cross pt.	C	Plug-in 1/2" Conduit	LSC1J	LSD1J	LSV1J	LSE1J	LSF1J	LSW1J	—
Gold plated	C		—	LSD1E	—	—	LSF1E	LSW1E	—
 SPDT Double Break	A*	120 V. Ind. Lite Plug-in 1/2" Conduit*	LSC5A	LSD5A	LSV5A	LSE5A	LSF5A	LSW5A	LSG5A
	A*	240 V. Ind. Lite Plug-in 1/2" Conduit*	LSC8A	LSD8A	LSV8A	LSE8A	LSF8A	LSW8A	LSG8A
	A	Non plug-in 1/2" Conduit	LSC3K	LSD3K	LSV3K	LSE3K	LSF3K	LSW3K	LSG3K
 DPDT Double Break	B	Plug-in 3/4" Conduit	LSC2B	LSD2B	LSV2B	LSE2B	LSF2B	LSW2B	LSG2B
	B	120 V Ind. Lite Plug-in 3/4" Conduit	LSC2R	LSD2R	LSV2R	LSE2R	LSF2R	LSW2R	LSG2R
	B	Plug-in 1/2" Conduit	LSC6B	LSD6B	LSV6B	LSE6B	LSF6B	LSW6B	LSG6B
	B	Non plug-in 3/4" Conduit	LSC4L	LSD4L	LSV4L	LSE4L	LSF4L	LSW4L	LSG4L
	B	Non plug-in 1/2" Conduit	LSC7L	LSD7L	LSV7L	LSE7L	LSF7L	LSW7L	LSG7L
 SPNC Direct Acting	D	Non plug-in 1/2" Conduit	—	—	—	LSE3N	LSF3N	LSW3N	LSG3N

*Use at voltage indicated for light. Upper operating temperature limit for lighted units is 200°F. Wired to N.O. circuit. ** Plug-in listings include base receptacle.

OPERATING CHARACTERISTICS

mm Pretravel (in. max.)	1,78 .070	1,78 .070	1,78 .070	2,54 .100	2,54 .100	2,54 .100	4,32 .170	
Differential mm Travel (in. max.)	SPDT		0,38 .015	0,38 .015	0,38 .015	0,64 .025	0,64 .025	2,29 .090
	DPDT		0,51 .020	0,51 .020	0,51 .020	0,89 .035	0,89 .035	2,29 .090
mm Overtravel (in. min.)	4,83 .190	4,83 .190	4,83 .190	4,83 .190	4,83 .190	4,83 .190	2,0 .080	
Newton Operating Force (lb. max.)	17,8 4	17,8 4	17,8 4	26,7 6	26,7 6	26,7 6	44,5 10	
Operating Point mm (in.)	45,8 ± 0,76 1.805 ± .030	55,9 ± 1,02 2.200 ± .040	53,0 to 59,3 2.085 to 2.335	33,0 ± 0,76 1.300 ± .030	44,1 ± 1,02 1.735 ± .040	41,0 to 47,4 1.615 to 1.865	37,6 ± 0,76 1.480 ± .030	
Operating Temperature Range	10°F to 200°F -12 to 93°C		10°F to 200°F -12 to 93°C		10°F to 200°F -12 to 93°C		30°F to 200°F -1 to 93°C	

Plunger Actuated Switches/Assembly Modifications

ASSEMBLY MODIFICATIONS

How to order

To specify other than the normal assembled conditions described on facing page, add the following modification numbers to the catalog listing in the plunger switch order guide.

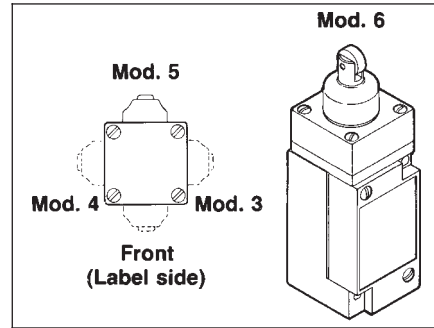
Mod.

- 3 Side plunger to right of switch front
- 4 Side plunger to left of switch front

- 5 Side plunger to back of switch
- 6 Roller on top plungers perpendicular to mounting surface
- 7 Light on indicator versions wired to N.C. circuit
- 8 Roller on side plungers in vertical position.

Example:

LSF1A3 is an LSF1A with the side roller plunger to the right side.



Wobble Actuated Switches

Wobble actuated switches have flexible levers which may be operated with any movement, except direct pull.

ORDER GUIDE

Momentary action. UL listed, CSA certified

Catalog listings in this chart are complete switches.			Catalog Listings				
			5.5"	13"	5.5"	5.5"	5.5"
Lever lengths measured from top mounting hole			Delrin Rod	Spring Wire	Cat*** Whisker	Cable	Coil Spring
Circuitry	Elec. Rating Page A34	Body** Style					
Silver contacts	A	Plug-in 1/2" Conduit	LSJ1A-7A	LSJ1A-7M	LSK1A-8A	LSJ1A-7N	LSK1A-8C
Gold cross point	C	Plug-in 1/2" Conduit	LSJ1J-7A	LSJ1J-7M	LSK1J-8A	LSJ1J-7N	LSK1J-8C
Gold plated contacts	C		—	LSJ1E-7M	—	—	—
Silver contacts MOMENTARY	A*	120 V. Ind. Lite Plug-in 1/2" Conduit*	LSJ5A-7A	LSJ5A-7M	LSK5A-8A	LSJ5A-7N	LSK5A-8C
	A*	240 V. Ind. Lite Plug-in 1/2" Conduit*	LSJ8A-7A	LSJ8A-7M	LSK8A-8A	LSJ8A-7N	LSK8A-8C
SPDT Double Break	A	Non plug-in 1/2" Conduit	LSJ3K-7A	LSJ3K-7M	LSK3K-8A	LSJ3K-7N	LSK3K-8C
Silver contacts	B	Plug-in 3/4" Conduit	LSJ2B-7A	LSJ2B-7M	LSK2B-8A	LSJ2B-7N	LSK2B-8C
	B	120 V Ind. Lite Plug-In 3/4" Conduit	LSJ2R-7A	LSJ2R-7M	LSK2R-8A	LSJ2R-7N	LSK2R-8C
	B	Plug-in 1/2" Conduit	LSJ6B-7A	LSJ6B-7M	LSK6B-8A	LSJ6B-7N	LSK6B-8C
	B	Non plug-in 3/4" Conduit	LSJ4L-7A	LSJ4L-7M	LSK4L-8A	LSJ4L-7N	LSK4L-8C
	B	Non plug-in 1/2" Conduit	LSJ7L-7A	LSJ7L-7M	LSK7L-8A	LSJ7L-7N	LSK7L-8C

OPERATING CHARACTERISTICS

mm	25,4	102	51	38	51
Pretravel (approx. in. radius)	1	4	2	1.5	2
Newton	2,78	1,39	1,39	1,95	1,95
Operating Force (oz. max.)	10	5	5	7	7
Operating Temperature Range	10°F to 200°F		12 to 93°C		

* Use at voltage indicated for light. Upper operating temperature limit for lighted units is 200°F.

** Plug-in listings include base receptacle.

*** These cat whiskers have 5 1/2 inch long levers. To specify 7 1/2 inch length, substitute **-8B** for **-8A**.

Limit/Enclosed



NOTE: LSS1H and LST1H switches are usually mounted with the lever down. Heavier levers, such as the LSZ54N (shown) and LSZ52D, should be used to enable gravity to help restore them to the free position. These levers are described on page A38.

GRAVITY RETURN SIDE ROTARY SWITCHES

LSS1H gravity return side rotary limit switches have no return spring mechanism. The weight of the actuating lever must provide the force to restore it to the free position.

The extremely light 5 in. oz. max. operating torque is useful in conveyor applications, since it enables operation by small

or lightweight objects. Because the head is unsealed, the LSS1H is classed as NEMA 1. However, the switch cavity is sealed to protect the contacts.

The LSS1H has the plug-in body style, with a ½ in. conduit opening.

Circuitry is SPDT double break. Refer to electrical rating **B**, page A34.

ORDER GUIDE (Momentary action)

Operating Torque Max.	Differential Travel Max.	Total Travel No Stop	Catalog Listing
0,035 Nm 5 in. oz.	12°	360°	LSS1H

Nm = Newton meters

EXTRA LOW TORQUE SIDE ROTARY SWITCHES

LST1H extra low torque side rotary limit switches have a low force return spring and a maximum operating torque of 12 in. oz. It is NEMA 1, because of an unsealed head. But, as with the LSS1H, the switch cavity is sealed.

The LST1H has a plug-in body style, with a ½ in. conduit opening.

Circuitry is SPDT double break. Refer to electrical rating **B**, page A34.

ORDER GUIDE (Momentary action)

Operating Torque max.	Pre-Travel max.	Over-Travel min.	Differential Travel max.	Total Travel ref.	Catalog Listing
0,085 Nm 12 in. oz.	15°	60°	5°	85° nom.	LST1H

Nm = Newton meters

SPECIFYING GUIDE FOR:

HIGH TEMPERATURE-CHEMICAL RESISTANT SWITCHES

Completely fluorocarbon (FC)-sealed HDLS limit switches have a full FC body gasket covering the switch cavity. Rotary types have an extra FC seal on the operating shaft, while plunger versions have FC boot seals.

They are for use in applications where the environment includes fire-resistant synthetic fluids. In addition to most all fluids, the FC sealed switches may be used with such industrial fluids as Cellulube, Fyrquell, Houghto-Safe, Pydraul, and other special cutting and hydraulic oils. **For seal performance chart see page A56.**

The additional FC seals also promote longer operating life for rotary actuated HDLS switches in applications where the temperatures are normally 10° to 250°F (-12 to 121°C). If prewired with cable, then temperature limits are 221°F (105°C) dry and 140°F (60°C) wet.

How to order

Insert the additional letters **Y** and **C** in the appropriate places in the standard catalog listing as shown in the example below.

Example:
LSA1A — standard side rotary plug-in switch
LSYAC1A — Completely FC-sealed version of LSA1A

LOW TEMPERATURE SWITCHES

All forms of HDLS limit switches are also available in low temperature construction.

Design changes include fluorosilicone diaphragm, shaft seals, and external boot seal (where applicable) plus a low temperature lubricant. If prewired with cable, temperature limits are 14°F (-10°C) flex and 22°F (-30°C) no flex. **The temperature ranges for specific switches see page A56.**

How to order

A low temperature version of any HDLS limit switch shown in the order guide can be specified by inserting the additional letters **Y** and **B** into the appropriate place in the standard switch listing as shown in the example below.

Example:
LSA1A — standard side rotary plug-in switch
LSYAB1A — low temperature version of LSA1A

FACTORY SEALED PRE-WIRED LIMIT SWITCHES

FEATURES

- Prewired with 6 ft STOOW-A cable or 4, 5 or 9-pin connectors (other lengths available)
- Wire entry area completely factory sealed
- (Cable version) NEMA 1, 6, 6P, 12
- (Connector version) NEMA 1, 6, 6P, 12 13

How to order

To order factory sealed switches, add the modification codes shown below to standard HDLS listings:

Circuitry	Cable	½" Connector
SPDT	C	A (4 pin mini) B (5 pin mini) DD (4 pin micro)
DPDT	M	R (9 pin)

Example: LSA1AC — LSA1A with 6 ft of 5 conductor STOOW-A cable.
LSJ2BM-7N — LSJ2B-7N with 6 ft of 9 conductor STOOW-A cable.
LSA1AB — LSA1A with 5 pin receptacle.
LSA1ADD — 4 pin micro-change connector.

NOTE: Connector versions available with ½ in. conduit tap only. Refer to page A46 for pin-out and mating connector. Refer to page A58 for dimensions.

Limit and Enclosed Switches

Switches for Special Applications

HIGH CAPACITY LIMIT SWITCH



This series has a wide gap contact block that handles a higher make/break DC load. In addition, a special lever arm has a serrated shaft hole and a capscrew with locking nut for attaching the lever to the rotary shaft. (See inset.) This assures a firm grip on the operating shaft and positive retention of the lever adjustment.

FEATURES

- High DC current ratings
- 20 amp rating at 120 VAC (single pole)
- Plug in or non-plug in
- Positive retention lever arm

The need for precise operation, coupled with severe environmental conditions places rigid demands on any control. MICRO SWITCH satisfies these demands with its high capacity Heavy Duty Limit Switch, which is designed to perform reliably under these conditions.

ORDER GUIDE INCLUDING LEVER

Catalog Listing	Description
LSQ051	Double pole, non-plug-in 3/4" Conduit opening
LSQ052	Double pole, plug-in 3/4" Conduit opening
LSQ053	Single pole, non-plug-in 1/2" Conduit opening
LSQ054	Single pole, plug-in 1/2" Conduit opening
LSZ616	Replacement lever for above listings

ELECTRICAL RATINGS

Circuitry	Voltage	Single Pole		Double Pole	
		Resistive Load	Inductive Load	Resistive Load	Inductive Load
 DPDT Double Break	125 VDC	2.0A	1.0A	1.0A	0.4A
	250 VDC	0.7A	0.4A	0.4A	0.2A
 SPDT Double Break	120 VAC	20A	20A	10A	10A
	240 VAC	15A	15A	7.5A	7.5A
	480 VAC	10A	10A	5A	5A
	600 VAC	5A	5A	2.5A	2.5A

Maximum operating rate - 15 operations per minute

Limit/Enclosed

MANIFOLD MOUNT SWITCHES



Catalog listings of plug-in HDLS switches in the order guides can be converted to specify manifold mount versions.

SINGLE-POLE CATALOG LISTINGS

Convert a single-pole, standard duty rated switch listing to specify manifold mount by changing the fifth character in the catalog listing to **F**.

Example:

LSA1A — standard side rotary plug-in switch

LSA1F — above switch in manifold mount

Convert a single-pole, electronic duty switch listing by changing the fifth character in the catalog listing to **G**.

Example:

LSA1J — standard side rotary plug-in switch

LSA1G — above switch in manifold mount

LSZ4015 — plug-in base only.

Manifold mount HDLS limit switches have an opening for the lead wires through the gasketed mounting base. The gasket maintains the oil tightness when the switch is surface mounted.

The manifold mount switches are available in either single-pole or double-pole forms of the plug-in types only. Mounting and wiring of the single-pole and double-pole forms is completely interchangeable. Any operating head type can be provided.

DOUBLE-POLE CATALOG LISTINGS

Convert double-pole catalog listings (except LSL sequential action and LSM center neutral types) to specify manifold mount by changing the fourth and fifth characters in the catalog listing to **2F**.

Example:

LSA2B — standard side rotary plug-in switch

LSA2F — above switch in manifold mount

Change the fourth and fifth characters of LSM listings to **2H**.

Example:

LSM2D — center neutral switch

LSM2H — above switch in manifold mount

Change the fourth and fifth characters of LSL listings to **2G**.

Example:

LSL2C — sequential action switch

LSL2G — above switch in manifold mount

LSZ4016 — plug-in base only.

Limit and Enclosed Switches

Harsh Duty Epoxied Limit Switch

HDLS Series



Replacement head part number is metal stamped; won't wash off

Fulfills your actuation criteria
Wide variety of operating heads

Fluorocarbon diaphragm seal

Eliminate fluid infiltration
Epoxied construction

Try your "step test"
Zinc diecast housing, head & body

Additional body seal
Fluorocarbon sealed cover

High compression ridge

Your choice of termination options

Exceeds NEMA 6P
Machine processes and their associated fluids demand **more** than the standard NEMA 6P switch provides.

The Harsh Duty Limit Switch meets the environmental challenges found in actual automotive production facilities and food and beverage lines.

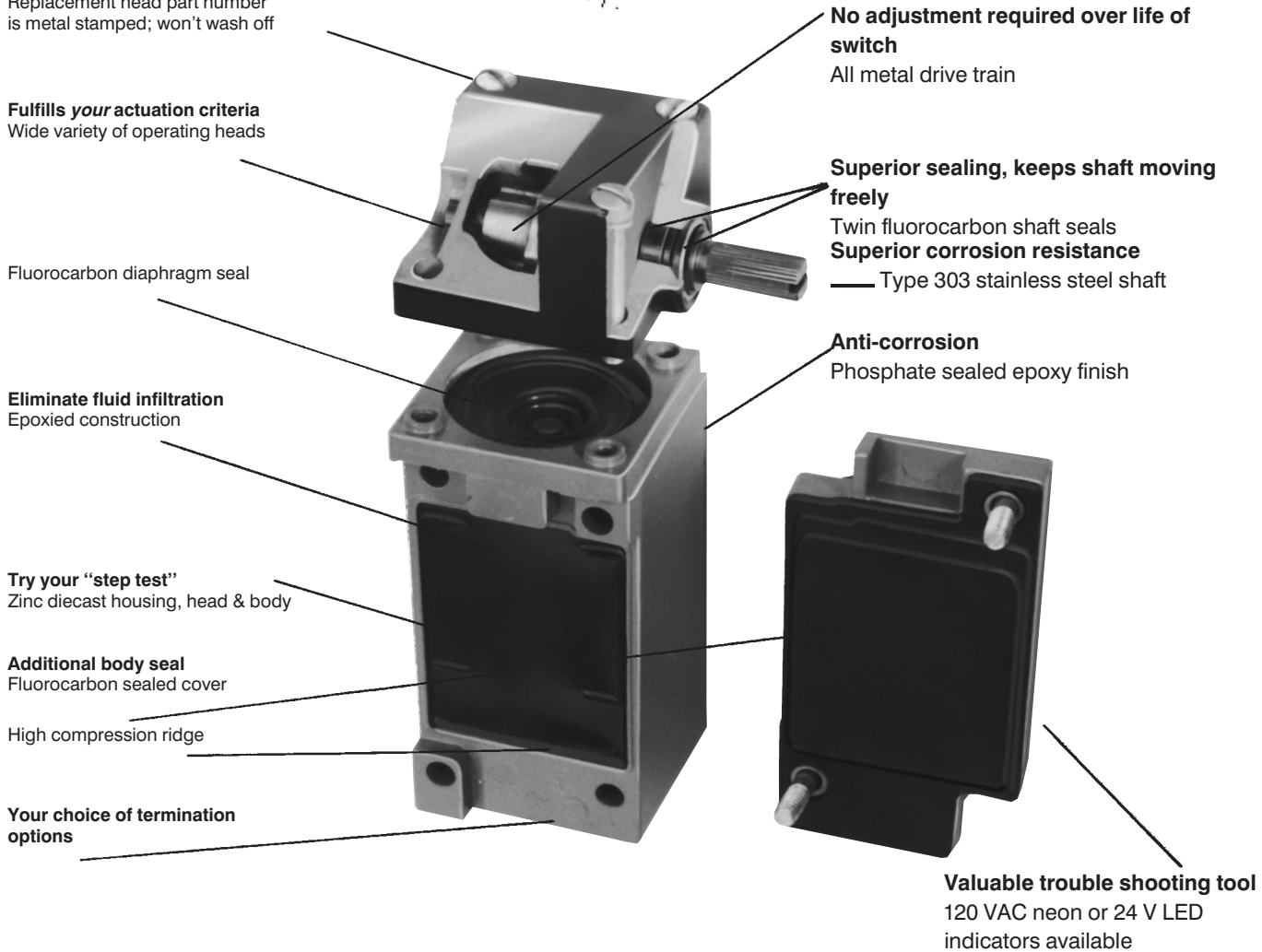
The MICRO SWITCH Harsh Duty Limit Switch is **made** for environments that surpass NEMA 6P test criteria.

No adjustment required over life of switch
All metal drive train

Superior sealing, keeps shaft moving freely
Twin fluorocarbon shaft seals
Superior corrosion resistance
Type 303 stainless steel shaft

Anti-corrosion
Phosphate sealed epoxy finish

Valuable trouble shooting tool
120 VAC neon or 24 V LED indicators available



Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

Limit and Enclosed Switches

Fully Potted Limit Switches

HDLS Series



FEATURES

- Excellent sealing capability for withstanding Harsh Duty food and beverage wash downs and severe machine tool environments.
- Switch cavity epoxy filled
- Extra diaphragm sealing
- 12' STOOW-A cable or connector version (other lengths available)
- (Cable versions) NEMA 1, 6, 6P, 12
- (Connector versions) NEMA 1, 6, 6P, 12, 13
- All fluorocarbon seals (low temp. available)
- Exceeds NEMA 6P
- UL Listed, file #E37138
- CSA Certified, file #LR57326

The Totally Potted HDLS provides an extra degree of protection in harsh environments by sealing the basic switch cavity with epoxy. These switches are the same as the non plug-in HDLS except that the entire switch cavity is filled with epoxy in addition to the conduit entrance, and the switches are preleaded, either with cable or connectors.

HOW TO ORDER

Only the non plug-in HDLS switches can be converted to a Fully-Potted HDLS.

All indicators are wired to the N.O. terminals. (N.C. indicator available page A34.)

Limit/Enclosed

ORDER GUIDE – ROTARY ACTUATED SWITCHES

Circuitry	Body Style	Catalog Listing						
		Side Rotary						
		Standard	Low D.T.	5° P.T.	Low Torque	Low D.T. Low Torque	Maintained	Top Rotary High O.T. (1)
<p>SPDT Double-Break Elect. Rating: A</p>	Preleaded w/cable	LSYAC3KP-FP	LSYPC3KP-FP	LSYUC3KP-FP	LSYRC3KP-FP	LSYHC3KP-FP	LSYNC3KP-FP	LSYBC3KP-FP
	Pre-wired w/connector	LSYAC3KQ-FP	LSYPC3KQ-FP	LSYUC3KQ-FP	LSYRC3KQ-FP	LSYHC3KQ-FP	LSYNC3KQ-FP	LSYBC3KQ-FP
	Preleaded w/cable 120 VAC Neon	LSYAC5KP-FP	LSYPC5KP-FP	LSYUC5KP-FP	LSYRC5KP-FP	LSYHC5KP-FP	LSYNC5KP-FP	LSYBC5KP-FP
	Pre-wired w/connector 120 VAC Neon	LSYAC5KQ-FP	LSYPC5KQ-FP	LSYUC5KQ-FP	LSYRC5KQ-FP	LSYHC5KQ-FP	LSYNC5KQ-FP	LSYBC5KQ-FP
<p>DPDT Double-Break Elect. Rating: B</p>	Preleaded w/cable	LSYAC4LX-FP	LSYPC4LX-FP	LSYUC4LX-FP	LSYRC4LX-FP	LSYHC4LX-FP	LSYNC4LX-FP	LSYBC4LX-FP
	Pre-wired w/connector	LSYAC7LR-FP	LSYPC7LR-FP	LSYUC7LR-FP	LSYRC7LR-FP	LSYHC7LR-FP	LSYNC7LR-FP	LSYBC7LR-FP

(1) Top rotary version

ORDER GUIDE – SIDE ROTARY (Continued)

Circuitry	Body Style	Catalog Listing
<p>SPDT Double Break each direction Electrical Rating: B</p>	Preleaded w/cable	LSYMC4NX-FP
	Pre-wired w/connector	LSYMC7NR-FP

ORDER GUIDE – SIDE ROTARY (Continued)

Circuitry	Body Style	Catalog Listing
<p>(2) SPDT Double Break with 10° between operation Electrical Rating: B</p>	Preleaded w/cable	LSYLC4MX-FP
	Pre-wired w/connector	LSYLC7MR-FP

For low temperature applications, substitute "Y_B" for the "Y_C".

See page A42 for temperature ratings.

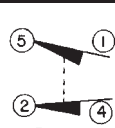
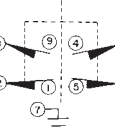
See pages A57-A63 for drawings.

See pages A33 and A35 for operating characteristics.

Other styles of fully potted limit switches are available than shown in this catalog. Consult the 800 number for further information.

Fully Potted Limit Switches

ORDER GUIDE – TOP PLUNGERS AND WOBBLE ACTUATORS

Circuitry	Body Style	Catalog Listing			
		Top Plungers			Wobble Actuators
		Plain	Roller	Adjustable	
 <p>GRD SPDT Double-Break Elect. Rating: A</p>	Preleaded w/cable	LSYCC3KP-FP	LSYDC3KP-FP	LSYVC3KP-FP	LSYJC3KP-**FP
	Pre-wired w/connector	LSYCC3KQ-FP	LSYDC3KQ-FP	LSYVC3KQ-FP	LSYJC3KQ-**FP
	Preleaded w/cable 120 VAC Neon	LSYCC5KP-FP	LSYDC5KP-FP	LSYVC5KP-FP	LSYJC5KP-**FP
	Pre-wired w/connector 120 VAC Neon	LSYCC5KQ-FP	LSYDC5KQ-FP	LSYVC5KQ-FP	LSYJC5KQ-**FP
 <p>DPDT Double-Break Elect. Rating: B</p>	Preleaded w/cable	LSYCC4LX-FP	LSYDC4LX-FP	LSYVC4LX-FP	LSYJC4LX-**FP
	Pre-wired w/connector	LSYCC7LR-FP	LSYDC7LR-FP	LSYVC7LR-FP	LSYJC7LR-**FP

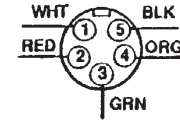
** WOBBLE ACTUATOR CODE:

		Head Style
7A	Delrin Rod	J
7M	Spring Wire	J
8A	Cat Whisker	K
7N	Cable	J
8C	Coil Spring	K

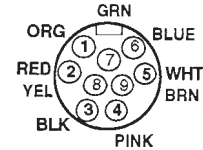
WIRING DIAGRAMS

Connectors = Numbers
Cables = Colors

Single-Pole



Double-Pole



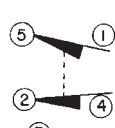
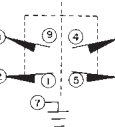
Pin numbers in wiring diagrams correspond to terminal numbers in circuitry diagrams on pages A45 and A46 only.

Electrical Ratings: Connector Versions

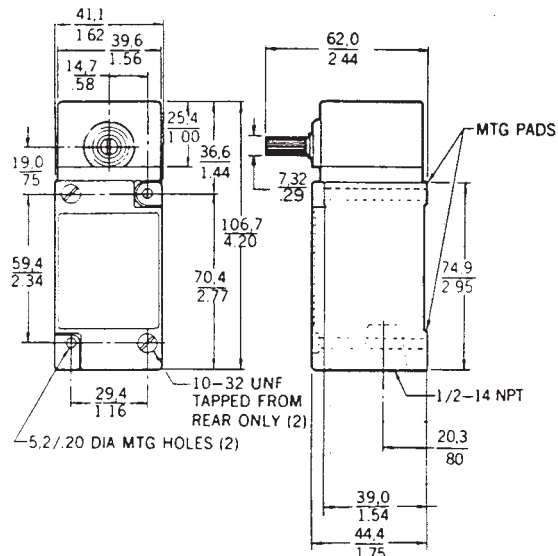
Mini	600 VAC, 7A
Micro	300 VAC, 3A

For cable versions see page A34.

ORDER GUIDE – SIDE PLUNGERS

Circuitry	Body Style	Catalog Listing			
		Side Plungers			
		Plain	Roller	Adjustable	Maintained
 <p>GRD SPDT Double-Break Elect. Rating: A</p>	Preleaded w/cable	LSYEC3KP-FP	LSYFC3KP-FP	LSYWC3KP-FP	LSYGC3KP-FP
	Pre-wired w/connector	LSYEC3KQ-FP	LSYFC3KQ-FP	LSYWC3KQ-FP	LSYGC3KQ-FP
	Preleaded w/cable 120 VAC Neon	LSYEC5KP-FP	LSYFC5KP-FP	LSYWC5KP-FP	LSYGC5KP-FP
	Pre-wired w/connector 120 VAC Neon	LSYEC5KQ-FP	LSYFC5KQ-FP	LSYWC5KQ-FP	LSYGC5KQ-FP
 <p>DPDT Double-Break Elect. Rating: B</p>	Preleaded w/cable	LSYEC4LX-FP	LSYFC4LX-FP	LSYWC4LX-FP	LSYGC4LX-FP
	Pre-wired w/connector	LSYEC7LR-FP	LSYFC7LR-FP	LSYWC7LR-FP	LSYGC7LR-FP

MOUNTING DIMENSIONS (For reference only) see page A58



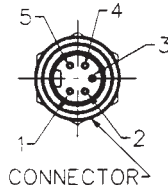
(2) All indicators wired to N.O. terminals.

Temperature Ratings:

	Dry	Wet
Connector version:	250° F (121° C)	212° F (100° C)
Cable version:	221° F (105° C)	140° F (60° C)

Mating Female Connectors

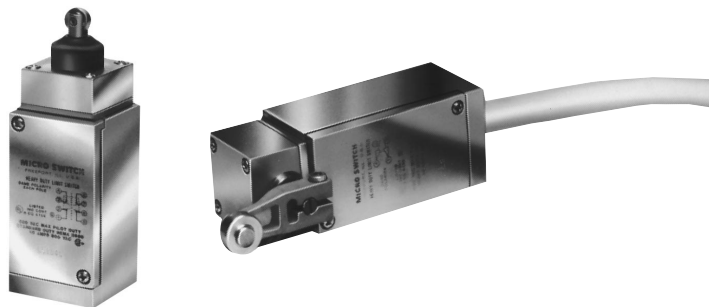
5 Pin		9 Pin
41306	3' cable	47001
41307	6' cable	47002
41308	12' cable	47003



Limit and Enclosed Switches

Stainless Steel

HDLS Series



FEATURES

- Corrosion-resistant stainless steel non-plug in body, head and rotary shaft
- Stainless steel levers
- Fluorocarbon seals
- -12°C to +121°C (10°F to +250°F)
- UL Listed, file #E37138
- CSA Certified, file #LR57326
- NEMA 1, 3, 3R, 4 4X, 6, 6P, and 13

The HDLS is available in all stainless steel versions. These switches are designed for use in highly corrosive environments such as petrochemical plants, food processing plants, shipboard, and dockside locations. The type 316 cast stainless steel body is designed to minimize crevices where food particles could become trapped. The actuator, operating head, and screws are also stainless steel. All seals are fluorocarbon to provide excellent chemical resistance and to withstand operating temperatures up to 121°C (250°F) and pressurized steam cleaning. Preleaded and epoxy filled versions are also available. Contact Freeport or nearest branch office for details. Interchangeable with standard HDLS mounting.

Limit/Enclosed

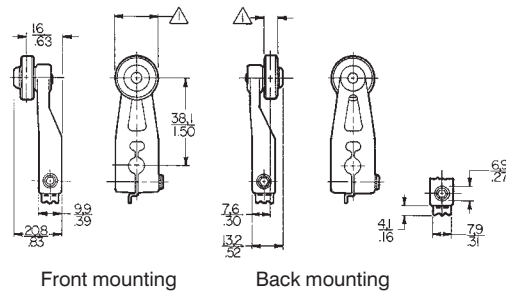
ORDER GUIDE STAINLESS STEEL SWITCHES

Head Type	Action	Circuitry	Catalog Listing*
Side rotary standard	Momentary	SPDT (1 N.O.-1 N.C.)	LS2A4K
Side rotary standard	Momentary	SPDT (1 N.O.-1 N.C.)	LS2YAB4K (Low Temp)
Side rotary low torque	Momentary	SPDT (1 N.O.-1 N.C.)	LS2H4K
Side rotary standard	Momentary	DPDT (2 N.O.-2 N.C.)	LS2A4L
Side rotary low torque	Momentary	DPDT (2 N.O.-2 N.C.)	LS2H4L
Side rotary standard	Momentary	SPNC (1 N.C. Direct Acting)	LS2A3N
Side rotary low torque	Momentary	SPNC (1 N.C. Direct Acting)	LS2H3N
Side rotary Center neutral standard	Momentary	SPDT each dir. (1 N.O.-1 N.C.) CW (1 N.O.-1 N.C.) CCW	LS2M4N
Side rotary	Maintained	SPDT (1 N.O.-1 N.C.)	LS2N3K (1/2" conduit)
Side plunger	Momentary	SPDT (1 N.O.-1 N.C.)	LS2E4K
Side plunger	Momentary	DPDT (2 N.O.-2 N.C.)	LS2E4L
Side roller plunger	Momentary	SPDT (1 N.O.-1 N.C.)	LS2F4K
Side roller plunger	Momentary	DPDT (2 N.O.-2 N.C.)	LS2F4L
Top roller plunger	Momentary	SPNC (1 N.C. Direct Acting)	LS2D3N
Top roller plunger	Momentary	SPDT (1 N.O.-1 N.C.)	LS2D4K
Top roller plunger	Momentary	DPDT (2 N.O.-2 N.C.)	LS2D4L

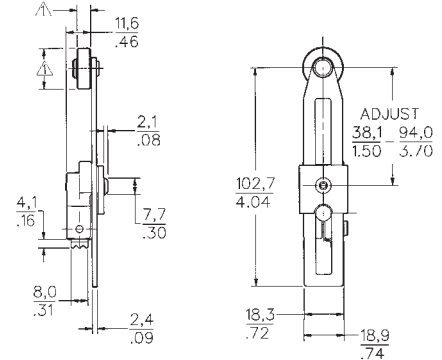
*SPDT 6 foot preleaded versions: add a **C** to the catalog listing. DPDT 6 foot preleaded versions: add **M** to the catalog listing. Example: LS2A4KC. For custom lead lengths, contact the 800 number.

ORDER GUIDE STAINLESS STEEL LEVERS

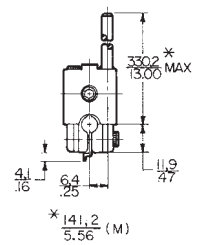
	Radius (In.)	Dia. (In.)	Width (In.)	Catalog Listing
Std. Roller Lever	1.5	.75	.25	LS2Z51B
Adjustable Radius	1.5-3.5	.75	.25	LS2Z52B
Rod	13.0	—	—	LS2Z54N



LS2Z52B



LS2Z54N



For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

Stainless Steel

OPERATING CHARACTERISTICS

	Head Type				
	Side Rotary Standard	Low Torque	Side Plunger Plain	Roller	Top Roller Plunger
Pretravel (max.)	15°	—	2,54 mm 1.00 in.	2,54 mm 1.00 in.	1,78 mm 0.70 in.
Differential Travel (max.)	SPDT 5° DPDT 7°	SPDT 3° DPDT 4°	0,64 mm .025 in.	0,64 mm .025 in.	0,38 mm .015 in.
Overtravel (min.)	60°	68°	4,83 mm .190 in.	4,83 mm .190 in.	4,83 mm .190 in.
Operating Force (max.)	—	—	26,7 Nm 6.0 lb.	26,7 Nm 6.0 lb.	17,8 Nm 4.0 lb.
Operating Torque (max.)	.45 Nm 4 in.lb.	.19 Nm 1.7 in.lb.	—	—	—
Operating Point	—	—	33 ± 76 mm 1.3 ± .03 in.	44,1 ± 1,02 mm 1.73 ± .04 in.	55,9 ± 1,02 mm 2.20 ± .04 in.

ELECTRICAL RATINGS

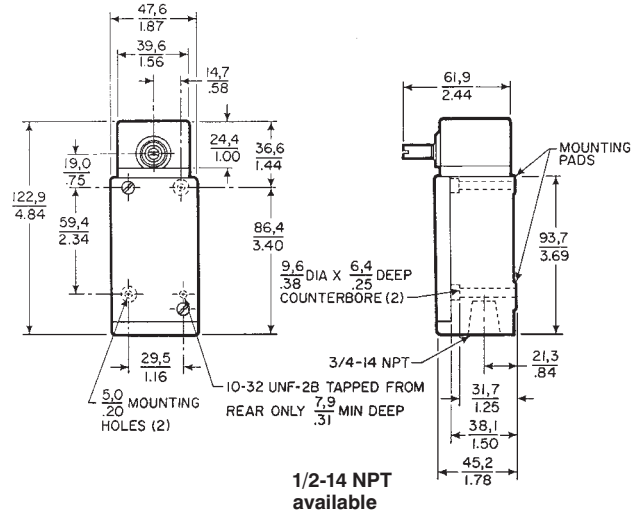
10 amps continuous carry

AC Volts

Pilot duty: 600 VAC, 720 VA

Electrical Rating	Circuitry	VAC	Amps at 0.35 Power Factor	
			Make	Break
A	Single-Pole Double-Throw	120	60	6
		240	30	3
		480	15	1.5
		600	12	1.2
B	Double-Pole Double-Throw	120	30	3
		240	15	1.5
		480	7.5	0.75
		600	6	0.60
D	Single-Pole Single-Throw Normally Closed	120	60	6
		240	30	3
		480	15	1.5
		600	12	1.2

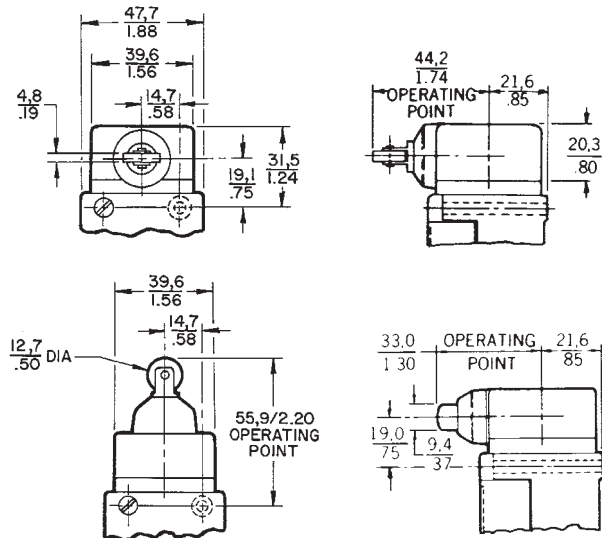
MOUNTING DIMENSIONS (For reference only)



DC Volts

Pilot duty: 240 VDC, 30 watts

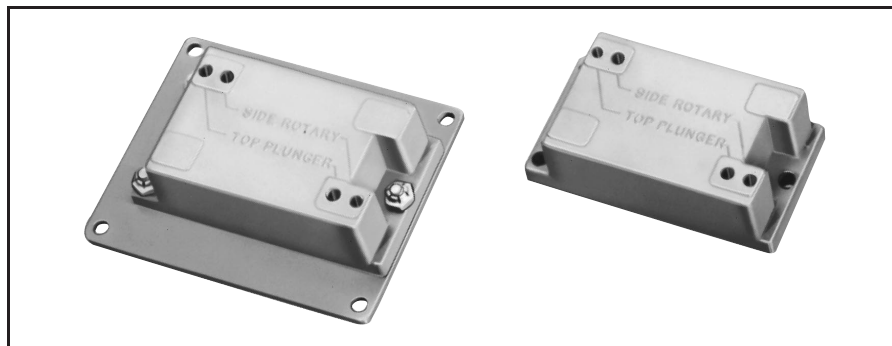
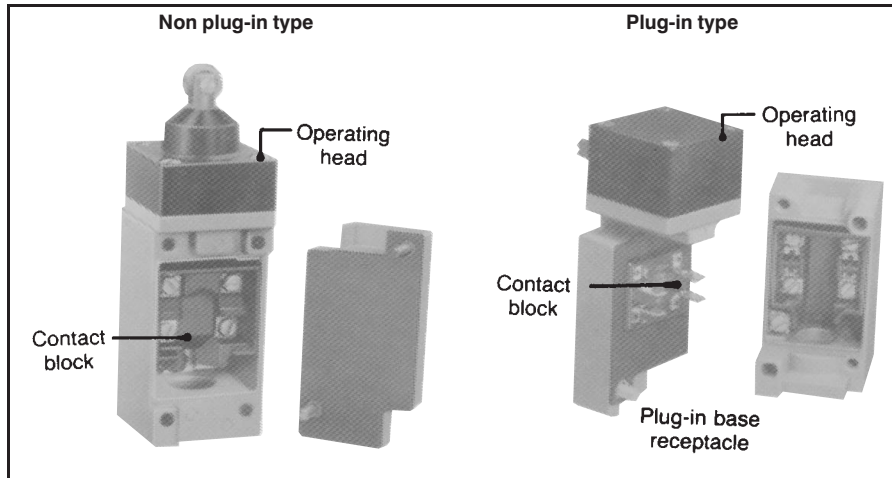
Electrical Rating	Circuitry	VDC	Make and Break Amps	
			Inductive	Resistive
A	Single-Pole Double-Throw	120	0.25	0.8
		240	0.15	0.4
B	Double-Pole Double-Throw	120	0.25	0.8
		240	0.15	0.4
D	Single-Pole Single-Throw Normally Closed	30	4.3	4.3
		120	1.1	1.1








Limit and Enclosed Switches

Modification and Replacement Parts

HDLS Series



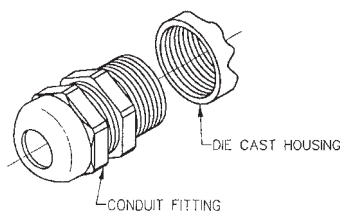
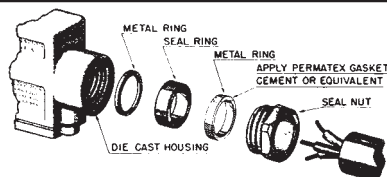
REPLACEMENT WOBBLE ACTUATORS

Catalog Listing				
				
Delrin Rod	Spring Wire	Cable	Cat Whisker	Coil Spring
LSZ4009	LSZ4010	LSZ4011	LSZ4012*	LSZ4014

*5½ inch long. For 7½" length, order LSZ4013.

MICRO SWITCH conduit sealing packets can be used with limit or enclosed switches. This includes the HDLS, Compact LS, ML, E6, V6, BAF1 or OP series switches.

The conduit sealing packets are not suitable for use with explosion-proof switches.



PLUG IN RECEPTACLES

Type	Catalog Listing
Single-Pole	LSZ4001
Double-Pole ¾ in. Conduit	LSZ4002
Double-Pole ½ in. Conduit	LSZ4006
Single-Pole Manifold Mount	LSZ4015
Double-Pole Manifold Mount	LSZ4016

ADAPTER PLATES

These adapter plates enable HDLS plug-in switches to retrofit 200LS series (single-pole) and 300LS series (double-pole) plug-in switches.

Type	Catalog Listing
Adapts 200LS series mounting to accept HDLS	LSZ4003
Adapts 300LS series mounting to accept HDLS	LSZ4004

INDICATOR LIGHTS/SEAL RING

Type	Catalog Listing
120V	LSZ4007
240V	LSZ4008

ADJUSTING TOOL KIT

This tool kit is used if readjustment of switches is necessary when heads and/or contact blocks are replaced.

Catalog Listing
LSZ4005

REPLACEMENT LEVERS

To order replacement levers, specify the same part number that is metal stamped on either the lever or lever hub.

For a complete list of HDLS replacement parts, refer to the charts on the following pages.

CONDUIT SEALING PACKETS

Catalog Listing Packet	Cable O.D. Inches
2PA6	.400" - .435"
2PA16	.435" - .470"
2PA1	.530" - .570"

LIQUID TIGHT CONDUIT FITTING

2PA17	.200" - .345" ½ NPT
2PA18	.270" - .460" ½ NPT
2PA19	.455" - .625" ¾ NPT
2PA20	.545" - .705" ¾ NPT

Limit/Enclosed

Replacement Parts

For low temperature or high temperature options, refer to example in LSA1A block.

PLUG-IN TYPE	1	2	3	4	5
Catalog Listing* On Switch Nameplate	Complete Plug-in Unit Less Base Receptacle	Plug-in Base Receptacle Only	Operating Head Only†	Contact Block Only	Actuator Only
Std. LSA1A Low Temp. LSYAB1A High Temp. LSYAC1A	LSZ7A1A LSZ7YAB1A LSZ7YAC1A	LSZ4001 LSZ4001 LSZ4001	LSZ1A LSZ1AB LSZ1AC	LSZ3A LSZ3A LSZ3A	
LSA5A	LSZ7A5A	LSZ4001	LSZ1A	LSZ3A	
LSA8A	LSZ7A8A	LSZ4001	LSZ1A	LSZ3A	
LSA1J	LSZ7A1J	LSZ4001	LSZ1A	LSZ3J	
LSA2B	LSZ7A2B	LSZ4002	LSZ1A	LSZ3B	
LSA6B	LSZ7A6B	LSZ4006	LSZ1A	LSZ3B	
LSB1A	LSZ7B1A	LSZ4001	LSZ1B	LSZ3A	
LSB1J	LSZ7B1J	LSZ4001	LSZ1B	LSZ3J	
LSB5A	LSZ7B5A	LSZ4001	LSZ1B	LSZ3A	
LSB8A	LSZ7B8A	LSZ4001	LSZ1B	LSZ3A	
LSB2B	LSZ7B2B	LSZ4002	LSZ1B	LSZ3B	
LSB6B	LSZ7B6B	LSZ4006	LSZ1B	LSZ3B	
LSC1A	LSZ7C1A	LSZ4001	LSZ1C	LSZ3A	
LSC1J	LSZ7C3J	LSZ4001	LSZ1C	LSZ3J	
LSC5A	LSZ7C5A	LSZ4001	LSZ1C	LSZ3A	
LSC8A	LSZ7C8A	LSZ4001	LSZ1C	LSZ3A	
LSC2B	LSZ7C2B	LSZ4002	LSZ1C	LSZ3B	
LSC6B	LSZ7C6B	LSZ4006	LSZ1C	LSZ3B	
LSD1A	LSZ7D1A	LSZ4001	LSZ1D	LSZ3A	
LSD1J	LSZ7D1J	LSZ4001	LSZ1D	LSZ3J	
LSD2B	LSZ7D2B	LSZ4002	LSZ1D	LSZ3B	
LSD5A	LSZ7D5A	LSZ4001	LSZ1D	LSZ3A	
LSD8A	LSZ7D8A	LSZ4001	LSZ1D	LSZ3A	
LSD6B	LSZ7D6B	LSZ4006	LSZ1D	LSZ3B	
LSE1A	LSZ7E1A	LSZ4001	LSZ1E	LSZ3A	

*Only partial listings are shown and necessary to determine replacement parts catalog listing. The listings with -7A, -7M, -7N, -8A, -8B and -8C are complete catalog listings.

Note: Complete units consist of Columns 1 and 2.

†For low temperature replacement heads add B. Example LSZ1AB. For fluorocarbon seal replacement heads add C. Example LSZ1AC.

Replacement Parts

PLUG-IN TYPE (Continued)

	1	2	3	4	5
Catalog Listing* On Switch Nameplate	Complete Plug-in Unit Less Base Receptacle	Plug-in Base Receptacle Only	Operating Head Only†	Contact Block Only	Actuator Only
LSE1J	LSZ7E1J	LSZ4001	LSZ1E	LSZ3J	
LSE2B	LSZ7E2B	LSZ4002	LSZ1E	LSZ3B	
LSE5A	LSZ7E5A	LSZ4001	LSZ1E	LSZ3A	
LSE8A	LSZ7E8A	LSZ4001	LSZ1E	LSZ3A	
LSE6B	LSZ7E6B	LSZ4006	LSZ1E	LSZ3B	
LSF1A	LSZ7F1A	LSZ4001	LSZ1F	LSZ3A	
LSF1J	LSZ7F1J	LSZ4001	LSZ1F	LSZ3J	
LSF2B	LSZ7F2B	LSZ4002	LSZ1F	LSZ3B	
LSF5A	LSZ7F5A	LSZ4001	LSZ1F	LSZ3A	
LSF8A	LSZ7F8A	LSZ4001	LSZ1F	LSZ3A	
LSF6B	LSZ7F6B	LSZ4006	LSZ1F	LSZ3B	
LSG1A	LSZ7G1A	LSZ4001	LSZ1G		
LSG5A	LSZ7G5A	LSZ4001	LSZ1G		
LSG8A	LSZ7G8A	LSZ4001	LSZ1G		
LSG2B	LSZ7G2B	LSZ4002	LSZ1G		
LSG6B	LSZ7G6B	LSZ4006	LSZ1G		
LSH1A	LSZ7H1A	LSZ4001	LSZ1H	LSZ3A	
LSH2B	LSZ7H2B	LSZ4002	LSZ1H	LSZ3B	
LSH6B	LSZ7H6B	LSZ4006	LSZ1H	LSZ3B	
LSH5A	LSZ7H5A	LSZ4001	LSZ1H	LSZ3A	
LSH8A	LSZ7H8A	LSZ4001	LSZ1H	LSZ3A	
LSJ1A-7A	LSZ7J1A-7A	LSZ4001	LSZ1JGA**	LSZ3A	LSZ4009
LSJ1A-7M	LSZ7J1A-7M	LSZ4001	LSZ1JGM**	LSZ3A	LSZ4010

Limit/Enclosed

*Only partial listings are shown and necessary to determine replacement parts catalog listing. The listings with -7A, -7M, -7N, -8A, -8B and -8C are complete catalog listings.

**Includes actuator

Note: Complete units consist of Columns 1 and 2.

† For low temperature replacement heads add B. Example LSZ1AB. For fluorocarbon seal replacement heads add C. Example LSZ1AC.

Replacement Parts

PLUG-IN TYPE (Continued)

	1	2	3	4	5
Catalog Listing* On Switch Nameplate	Complete Plug-in Unit Less Base Receptacle	Plug-in Base Receptacle Only	Operating Head and Actuator†	Contact Block Only	Actuator Only
LSJ5A-7M	LSZ7J5A-7M	LSZ4001	LSZ1JGM	LSZ3A	LSZ4010
LSJ8A-7M	LSZ7J8A-7M	LSZ4001	LSZ1JGM	LSZ3A	LSZ4010
LSJ2B-7A	LSZ7J2B-7A	LSZ4002	LSZ1JGM	LSZ3B	LSZ4009
LSJ2B-7M	LSZ7J2B-7M	LSZ4002	LSZ1JGM	LSZ3B	LSZ4010
LSJ6B-7M	LSZ7J6B-7M	LSZ4006	LSZ1JGM	LSZ3B	LSZ4010
LSJ5A-7A	LSZ7J5A-7A	LSZ4001	LSZ1JGA	LSZ3A	LSZ4009
LSJ8A-7A	LSZ7J8A-7A	LSZ4001	LSZ1JGA	LSZ3A	LSZ4009
LSJ6B-7A	LSZ7J6B-7A	LSZ4006	LSZ1JGA	LSZ3B	LSZ4009
LSJ1A-7N	LSZ7J1A-7N	LSZ4001	LSZ1JGN	LSZ3A	LSZ4011
LSJ1J-7N	LSZ7J1J-7N	LSZ4001	LSZ1JGN	LSZ3J	LSZ4011
LSJ5A-7N	LSZ7J5A-7N	LSZ4001	LSZ1JGN	LSZ3A	LSZ4011
LSJ8A-7N	LSZ7J8A-7N	LSZ4001	LSZ1JGN	LSZ3A	LSZ4011
LSJ2B-7N	LSZ7J2B-7N	LSZ4002	LSZ1JGN	LSZ3B	LSZ4011
LSJ6B-7N	LSZ7J6B-7N	LSZ4006	LSZ1JGN	LSZ3B	LSZ4011
LSK1A-8A	LSZ7K1A-8A	LSZ4001	LSZ1KHA	LSZ3A	LSZ4012
LSK1J-8A	LSZ7K1J-8A	LSZ4001	LSZ1KHA	LSZ3J	LSZ4012
LSK2B-8A	LSZ7K2B-8A	LSZ4002	LSZ1KHA	LSZ3B	LSZ4012
LSK5A-8A	LSZ7K5A-8A	LSZ4001	LSZ1KHA	LSZ3A	LSZ4012
LSK8A-8A	LSZ7K8A-8A	LSZ4001	LSZ1KHA	LSZ3A	LSZ4012
LSK6B-8A	LSZ7K6B-8A	LSZ4006	LSZ1KHA	LSZ3B	LSZ4012
LSK1A-8C	LSZ7K1A-8C	LSZ4001	LSZ1KHC	LSZ3A	LSZ4014
LSK1A-8B	LSZ7K1A-8B	LSZ4001	LSZ1KHB	LSZ3A	LSZ4013
LSK5A-8C	LSZ7K5A-8C	LSZ4001	LSZ1KHC	LSZ3A	LSZ4014
LSK8A-8C	LSZ7K8A-8C	LSZ4001	LSZ1KHC	LSZ3A	LSZ4014
LSK2B-8C	LSZ7K2B-8C	LSZ4002	LSZ1KHC	LSZ3B	LSZ4014
LSK6B-8C	LSZ7K6B-8C	LSZ4006	LSZ1KHC	LSZ3B	LSZ4014

*Only partial listings are shown and necessary to determine replacement parts catalog listing. The listings with -7A, -7M, -7N, -8A, -8B and -8C are complete catalog listings.

Note: Complete units consist of Columns 1 and 2.

† For low temperature replacement head and actuators add **B** between the fifth and sixth characters. Example: LSZ1KBHA. For fluorocarbon seals add **C**. Example LSZ1KCHA.

Replacement Parts

PLUG-IN TYPE (Continued)

	1	2	3	4	5
Catalog Listing* On Switch Nameplate	Complete Plug-in Unit Less Base Receptacle	Plug-in Base Receptacle Only	Operating Head Only†	Contact Block Only	Actuator Only
LSL2C	LSZ7L2C	LSZ4002	LSZ1L	LSZ3C	
LSL6C	LSZ7L6C	LSZ4006	LSZ1L	LSZ3C	
LSM2D	LSZ7M2D	LSZ4002	LSZ1M	LSZ3C	
LSM6D	LSZ7M6D	LSZ4006	LSZ1M	LSZ3C	
LSN1A	LSZ7N1A	LSZ4001	LSZ1N		
LSN2B	LSZ7N2B	LSZ4002	LSZ1N		
LSN5A	LSZ7N5A	LSZ4001	LSZ1N		
LSN8A	LSZ7N8A	LSZ4001	LSZ1N		
LSN6B	LSZ7N6B	LSZ4006	LSZ1N		
LSP1A	LSZ7P1A	LSZ4001	LSZ1P	LSZ3A	
LSP1J	LSZ7P1J	LSZ4001	LSZ1P	LSZ3J	
LSP2B	LSZ7P2B	LSZ4002	LSZ1P	LSZ3B	
LSP5A	LSZ7P5A	LSZ4001	LSZ1P	LSZ3A	
LSP8A	LSZ7P8A	LSZ4001	LSZ1P	LSZ3A	
LSP6B	LSZ7P6B	LSZ4006	LSZ1P	LSZ3B	
LSR1A	LSZ7R1A	LSZ4001	LSZ1R	LSZ3A	
LSR2B	LSZ7R2B	LSZ4002	LSZ1R	LSZ3B	
LSR6B	LSZ7R6B	LSZ4006	LSZ1R	LSZ3B	
LSR5A	LSZ7R5A	LSZ4001	LSZ1R	LSZ3A	

Limit/Enclosed

*Only partial listings are shown and necessary to determine replacement parts catalog listing. The listings with -7A, -7M, -7N, -8A, -8B and -8C are complete catalog listings.

Note: Complete units consist of Columns 1 and 2.

† For low temperature replacement heads add B. Example LSZ1AB. For fluorocarbon seal replacement heads add C. Example LSZ1AC.

Replacement Parts

PLUG-IN TYPE (Continued)

	1	2	3	4	5
Catalog Listing* On Switch Nameplate	Complete Plug-in Unit Less Base Receptacle	Plug-in Base Receptacle Only	Operating Head Only†	Contact Block Only	Actuator Only
LSR8A	LSZ7R8A	LSZ4001	LSZ1R	LSZ3A	
LSS1H	LSZ7S1H	LSZ4001	LSZ1S	LSZ3H	
LSU1A	LSZ7U1A	LSZ4001	LSZ1U	LSZ3A	
LST1H	LSZ7T1H	LSZ4001	LSZ1T	LSZ3H	
LSU5A	LSZ7U5A	LSZ4001	LSZ1U	LSZ3A	
LSV1A	LSZ7V1A	LSZ4001	LSZ1V	LSZ3A	
LSV1J	LSZ7V1J	LSZ4001	LSZ1V	LSZ3J	
LSV5A	LSZ7V5A	LSZ4001	LSZ1V	LSZ3A	
LSV8A	LSZ7V8A	LSZ4001	LSZ1V	LSZ3A	
LSV2B	LSZ7V2B	LSZ4002	LSZ1V	LSZ3B	
LSV6B	LSZ7V6B	LSZ4006	LSZ1V	LSZ3B	
LSW1A	LSZ7W1A	LSZ4001	LSZ1W	LSZ3A	
LSW1J	LSZ7W1J	LSZ4001	LSZ1W	LSZ3J	
LSW5A	LSZ7W5A	LSZ4001	LSZ1W	LSZ3A	
LSW8A	LSZ7W8A	LSZ4001	LSZ1W	LSZ3A	
LSW2B	LSZ7W2B	LSZ4002	LSZ1W	LSZ3B	
LSW6B	LSZ7W6B	LSZ4006	LSZ1W	LSZ3B	

NON PLUG-IN TYPE (These parts will not form a complete switch)

Catalog Listing* On Switch Nameplate	Operating Head Only†	Contact Block Only	Actuator Only
LSA3K	LSZ1A	LSZ3K	
LSA4L	LSZ1A	LSZ3L	
LSA7L	LSZ1A	LSZ3L	
LSB3K	LSZ1B	LSZ3K	
LSB4L	LSZ1B	LSZ3L	
LSB7L	LSZ1B	LSZ3L	
LSC3K	LSZ1C	LSZ3K	
LSC4L	LSZ1C	LSZ3L	

Catalog Listing* On Switch Nameplate	Operating Head and Actuator‡	Contact Block Only	Actuator Only
LSJ7L-7A	LSZ1JGA	LSZ3L	LSZ4009
LSJ7L-7M	LSZ1JGM	LSZ3L	LSZ4010
LSJ4L-7N	LSZ1JGN	LSZ3L	LSZ4011
LSJ7L-7N	LSZ1JGN	LSZ3L	LSZ4011
LSK3K-8A	LSZ1KHA	LSZ3K	LSZ4012
LSK4L-8A	LSZ1KHA	LSZ3L	LSZ4012
LSK7L-8A	LSZ1KHA	LSZ3L	LSZ4012
LSK3K-8C	LSZ1KHC	LSZ3K	LSZ4014

*Only partial listings are shown and necessary to determine replacement parts catalog listing. The listings with -7A, -7M, -7N, -8A, -8B and -8C are complete catalog listings.

Note: Complete units consist of Columns 1 and 2.

‡ For low temperature replacement head and actuators add **B** between the fifth and sixth characters. Example LSZ1KBHA. For fluorocarbon seals add **C**. Example LSZ1KCHA.

Replacement Parts

NON PLUG-IN TYPE

Catalog Listing* On Switch Nameplate	Operating Head Only†	Contact Block Only	Actuator Only
LSC7L	LSZ1C	LSZ3L	
LSD3K	LSZ1D	LSZ3K	
LSD4L	LSZ1D	LSZ3L	
LSD7L	LSZ1D	LSZ3L	
LSE3K	LSZ1E	LSZ3K	
LSE4L	LSZ1E	LSZ3L	
LSE7L	LSZ1E	LSZ3L	
LSF3K	LSZ1F	LSZ3K	
LSF4L	LSZ1F	LSZ3L	
LSF7L	LSZ1F	LSZ3L	
LSG3K	LSZ1G		
LSG4L	LSZ1G		
LSG7L	LSZ1G		
LSH3K	LSZ1H	LSZ3K	
LSH4L	LSZ1H	LSZ3L	
LSH7L	LSZ1H	LSZ3L	

Catalog Listing* On Switch Nameplate	Operating Head and Actuator‡	Contact Block Only	Actuator Only
LSJ3K-7A	LSZ1JGA	LSZ3K	LSZ4009
LSJ3K-7M	LSZ1JGM	LSZ3K	LSZ4010
LSJ3K-7N	LSZ1JGN	LSZ3K	LSZ4011
LSJ4L-7A	LSZ1JGA	LSZ3L	LSZ4009
LSJ4L-7M	LSZ1JGM	LSZ3L	LSZ4010
LSK4L-8C	LSZ1KHC	LSZ3L	LSZ4014
LSK7L-8C	LSZ1KHC	LSZ3L	LSZ4014

‡ For low temperature replacement head and actuators add **B** between the fifth and sixth characters. Example: LSZ1KBHA. For fluorocarbon seals add **C**. Example LSZ1KCHA.

Catalog Listing* On Switch Nameplate	Operating Head Only†	Contact Block Only	Actuator Only
LSL4M	LSZ1L	LSZ3M	
LSL7M	LSZ1L	LSZ3M	
LSM4N	LSZ1M	LSZ3M	
LSM7N	LSZ1M	LSZ3M	
LSN3K	LSZ1N		
LSN4L	LSZ1N		
LSN7L	LSZ1N		
LSP3K	LSZ1P	LSZ3K	
LSP4L	LSZ1P	LSZ3L	
LSP7L	LSZ1P	LSZ3L	
LSR3K	LSZ1R	LSZ3K	
LSR4L	LSZ1R	LSZ3L	
LSR7L	LSZ1R	LSZ3L	
LSV3K	LSZ1V	LSZ3K	
LSV4L	LSZ1V	LSZ3L	
LSV7L	LSZ1V	LSZ3L	
LSW3K	LSZ1W	LSZ3K	
LSW4L	LSZ1W	LSZ3L	
LSW7L	LSZ1W	LSZ3L	

Limit/Enclosed

REPLACEMENT PARTS FOR STAINLESS STEEL HDLS

Listing	Operating Head	Contact Block
LS2A3N	LS2Z1A	N/A
LS2A4K	LS2Z1A	LSZ3K
LS2A4L	LS2Z1A	LSZ3L
LS2D4K	LS2Z1D	LSZ3K
LS2D4L	LS2Z1D	LSZ3L
LS2E4K	LS2Z1E	LSZ3K
LS2E4L	LS2Z1E	LSZ3L
LS2F4K	LS2Z1F	LSZ3K
LS2F4L	LS2Z1F	LSZ3L
LS2H3K	LS2Z1H	LSZ3K
LS2H4K	LS2Z1H	LSZ3K
LS2H4L	LS2Z1H	LSZ3L
LS2M4N	LS2Z1M	LSZ3M
LS2N3K	LS2Z1N	LSZ3K

*Only partial listings are shown and necessary to determine replacement parts catalog listing. The listings with -7A, -7M, -7N, -8A, -8B and -8C are complete catalog listings.

† For low temperature replacement heads add **B**. Example LSZ1AB. For fluorocarbon seal replacement heads add **C**. Example LSZ1AC.

Limit and Enclosed Switches

HDLS Series

Temperature and Performance Data

TABLE 1—TEMPERATURE LIMITS

	Standard HDLS				Low Temperature HDLS				High Temperature HDLS (Fluorocarbon Sealed*)		
	Low Limit		High Limit		Low Limit		High Limit		Low Limit	High Limit	
	10°F -12°C	30°F -1°C	200°F 93°C	250°F 121°C	-40°F -40°C	-20°F -29°C	200°F 93°C	250°F 121°C	10°F -12°C	30°F -1°C	250°F 121°C
LSA—Side Rotary Momentary	X			X	X			X	X		X
LSB—Top Rotary		X		X		X		X		X	X
LSC—Top Plain Plunger	X		X			X	X		X		X
LSD—Top Roller Plunger	X		X			X	X		X		X
LSE—Side Plain Plunger	X		X			X	X		X		X
LSF—Side Roller Plunger	X		X			X	X		X		X
LSG—Side Plunger Maintained		X	X			X	X			X	X
LSH—Side Rotary, Low P.T., Low Torque		X		X		X		X		X	X
LSJ—Wobble Stick	X		X		X			X	X		X
LSK—Cat Whisker	X		X			X		X	X		X
LSL—Side Rotary Sequence	X			X	X			X	X		X
LSM—Side Rotary Center Neutral		X		X	X			X		X	X
LSN—Side Rotary Maintained		X		X		X		X		X	X
LSP—Side Rotary, Low Pretravel	X			X	X			X	X		X
LSR—Side Rotary, Low Torque		X		X		X		X		X	X
LSV—Top Adjustable Plunger	X		X			X	X		X		X
LSW—Side Adjustable Plunger	X		X			X	X		X		X

*For HDLS application wherein the upper temperature limit is normally above 200°F (93°C), much longer switch life can be obtained by using completely fluorocarbon-sealed switches rather than the standard HDLS.

TABLE 2—ENVIRONMENTAL SEAL PERFORMANCE

Std. Seals	Cellulube	Detergent	5 Star	ASTM #1	ASTM #2	ASTM #3	ASTM #4	Houghto Safe 260, 271	Houghto Safe 1010, 1055, 1120	Mineral Oil	Petr. Oil Crude	Silicon Gr. & Oil	Sunsafe	Beer	Stoddard Solv.	Chlorinated Solvents	Citric Acids	Di-ester Syn. Lubricant	Ozone	Pydraul	Pyroguard	Petr. Base Hydraulic Oil	Lard Oil	Silicate Esters
LSA	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSB	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSC	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSD	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSE	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSF	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSG	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSH	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSJ	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSK	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSL	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSM	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSN	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSP	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSR	4	1	1	1	1	1	2	1	4	1	1	1	1	1	1	4	1	2	4	4	4	1	1	2
LSV	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2
LSW	4	2	2	1	2	4	4	2	4	2	2	1	2	1	2	4	1	4	3	4	4	2	2	2

All HDLS with seals of:

Fluorisilicone (Low Temp. HDLS)	4	1	1	1	1	1	2	2	4	1	1	1	1	1	1	1	1	2	1	4	4	1	1	1
Fluorocarbon (High Temp. HDLS)	1*	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

*Fluorocarbon seals good for all Cellulubes Except A60.CODE:

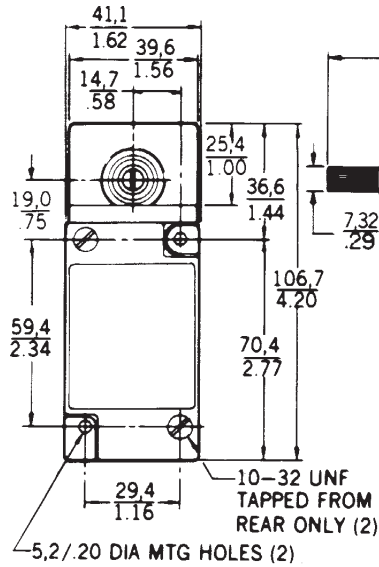
1 = Satisfactory
2 = Fair
3 = Doubtful
4 = Unsatisfactory

Limit and Enclosed Switches

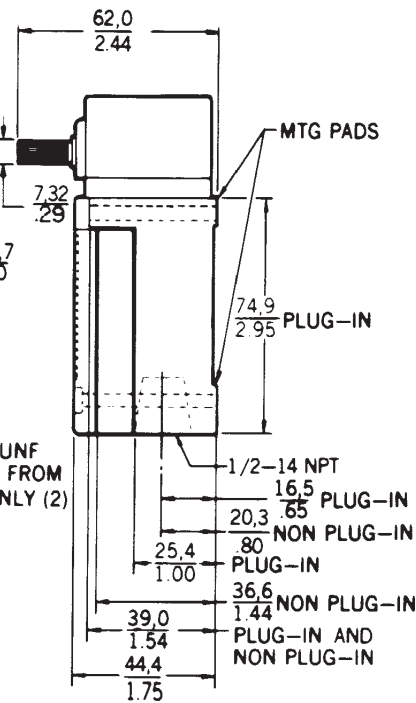
Mounting Dimensions (For reference only)

HDLS Series

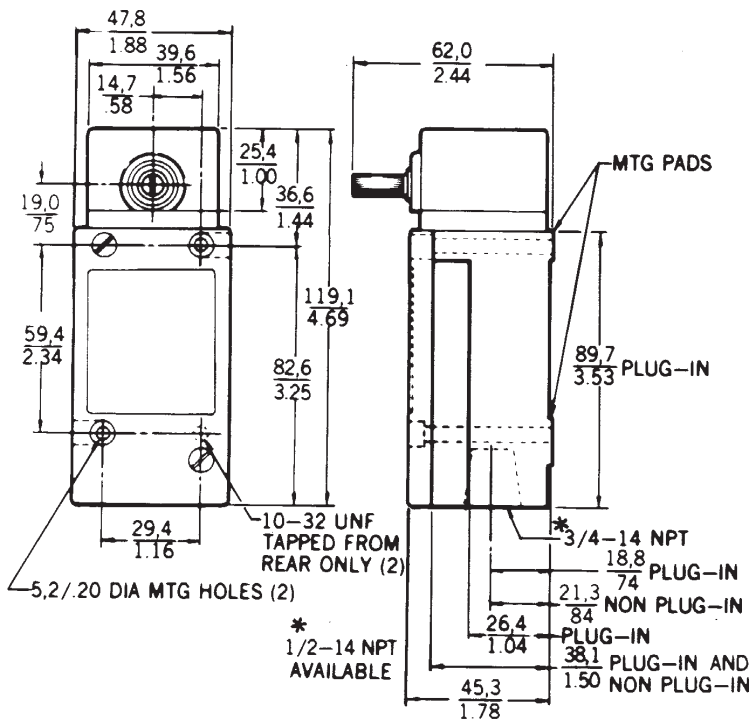
SIDE ROTARY



Single-pole



Double-pole



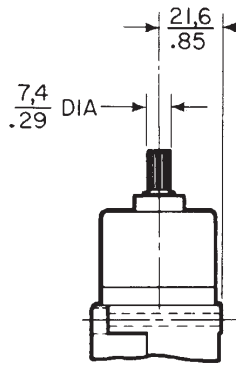
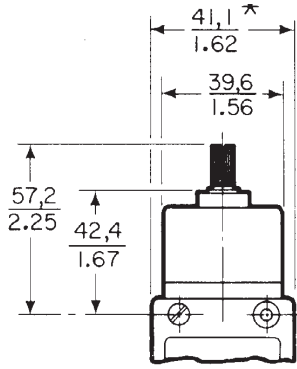
Limit/Enclosed

Limit and Enclosed Switches

Mounting Dimensions (For reference only)

HDLS Series

TOP ROTARY Single-pole

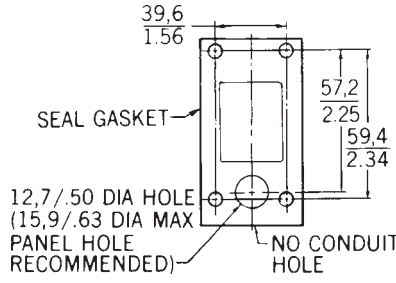


✱ 47.5
1.87

Single-Pole

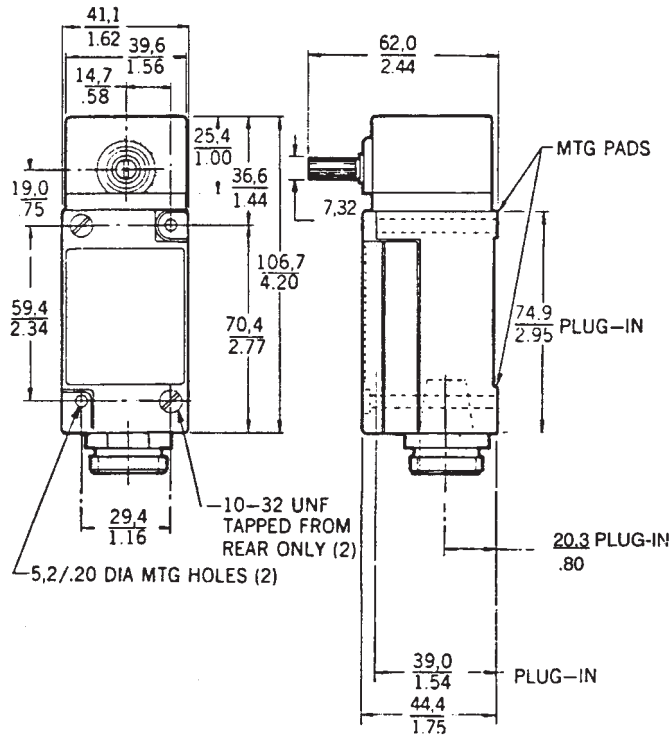
Double-Pole Dimension

MANIFOLD MOUNT (Plug-in only) Single-pole and double-pole



NEMA 6P PRE-WIRED SIDE ROTARY

Single-pole

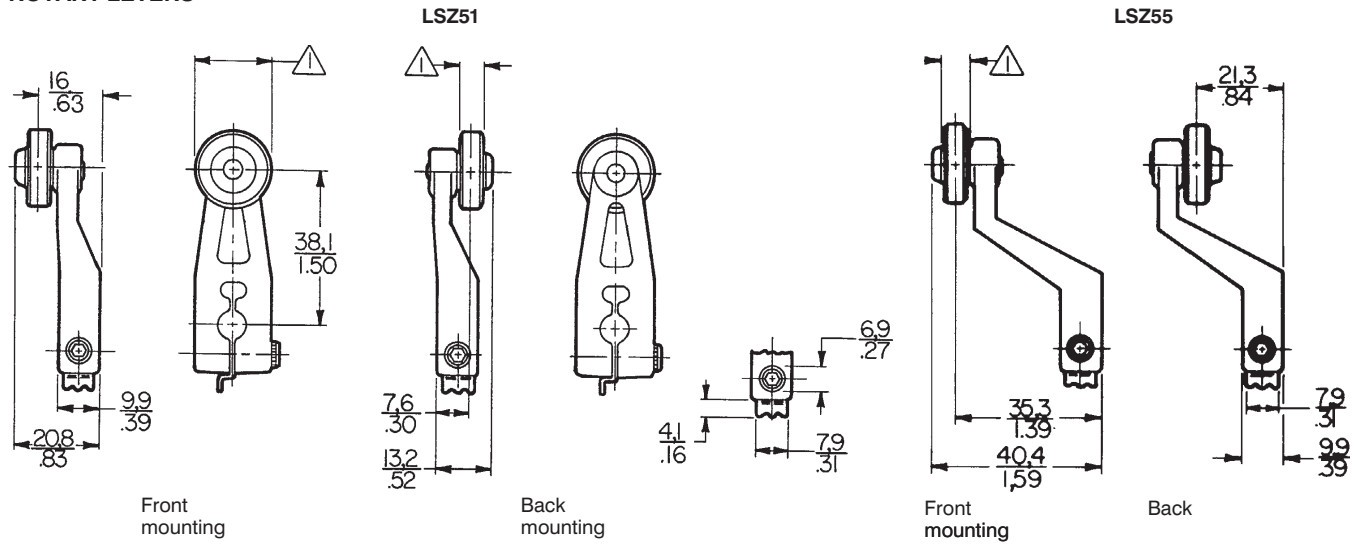


Limit and Enclosed Switches

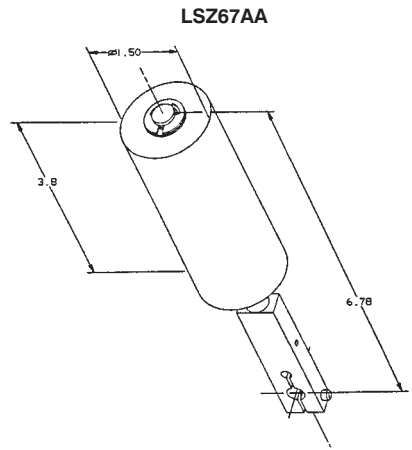
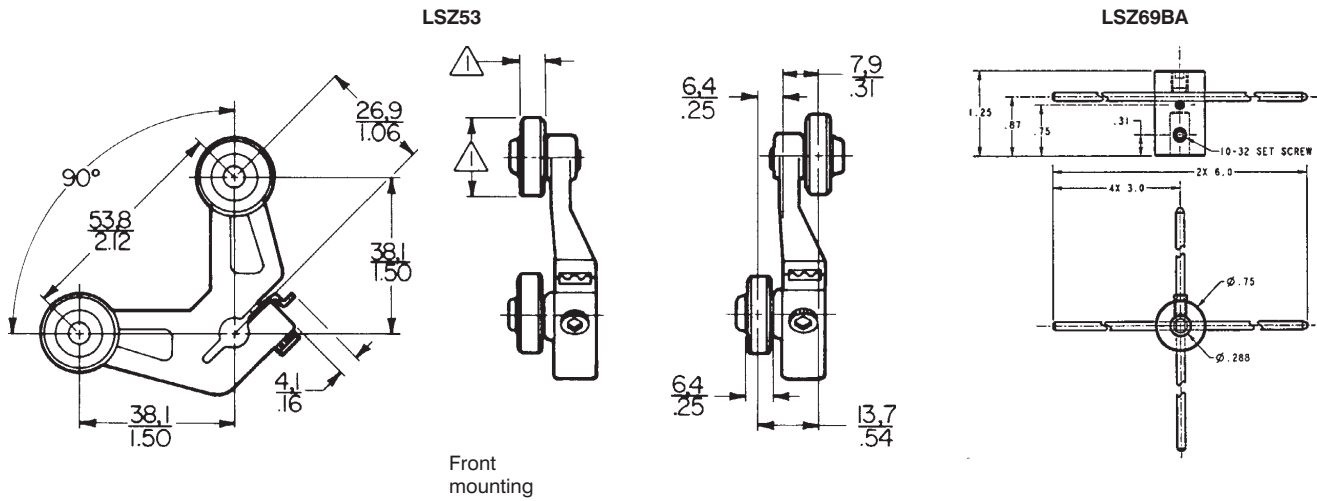
HDLS Series

Mounting Dimensions (For reference only)

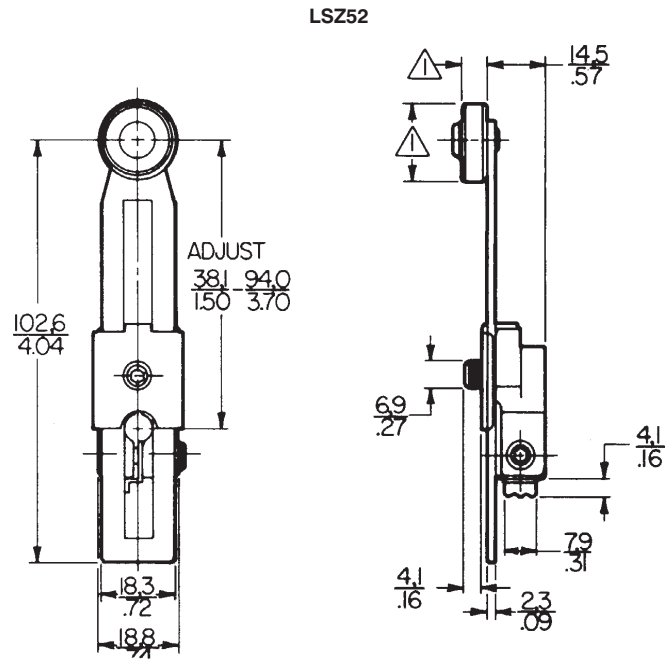
ROTARY LEVERS



Limit/Enclosed



⚠ See order guides for roller dimensions.

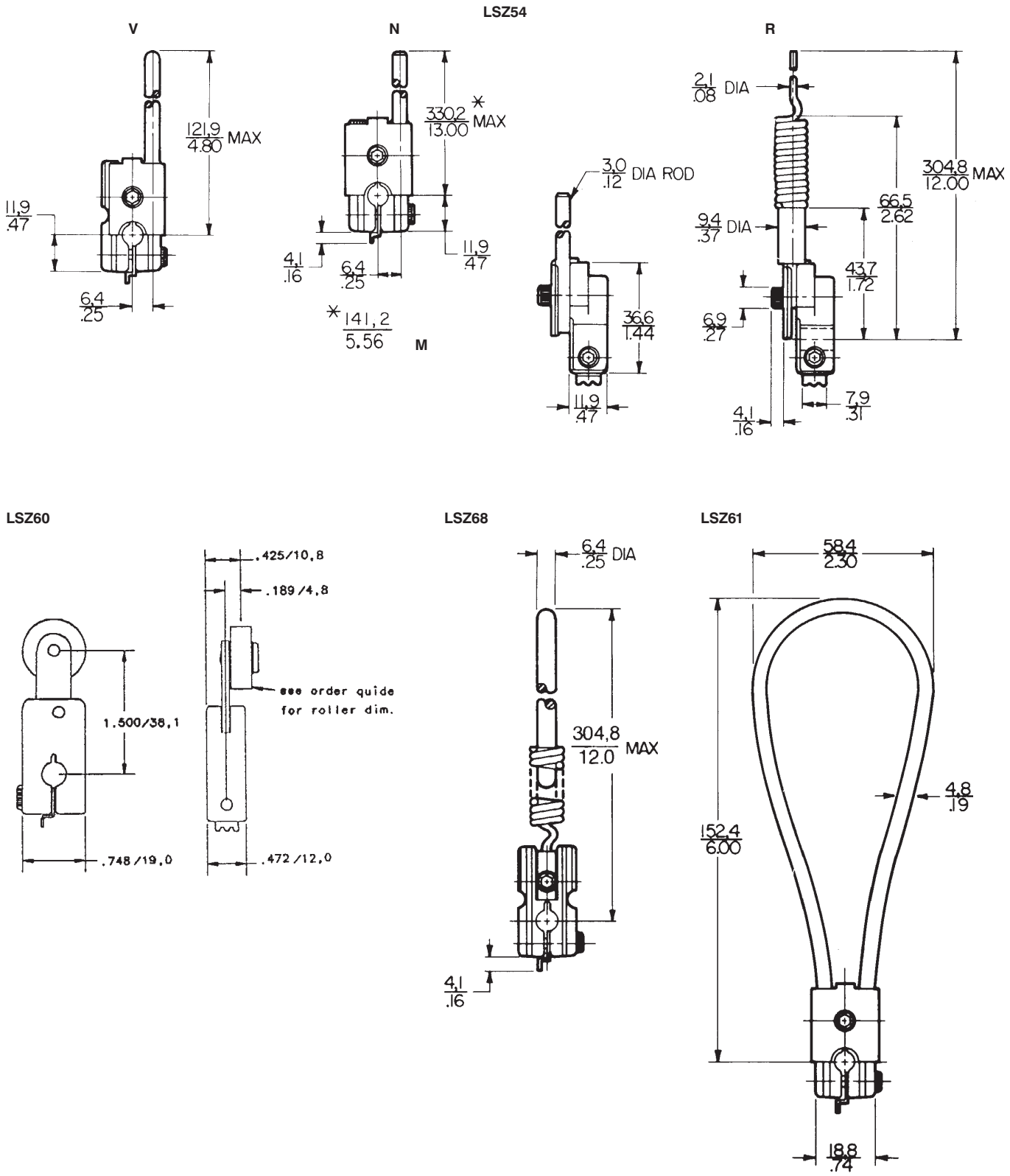


Limit and Enclosed Switches

HDLS Series

Mounting Dimensions (For reference only)

ROTARY LEVERS



Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

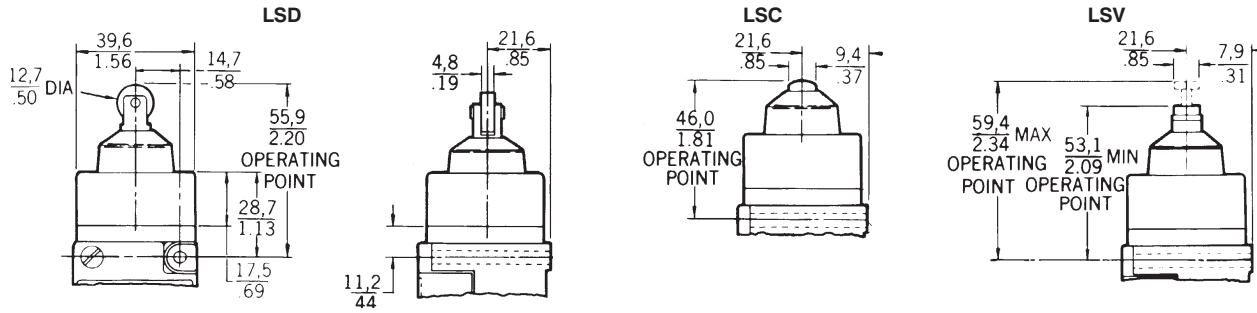
Limit and Enclosed Switches

HDLS Series

Mounting Dimensions (For reference only)

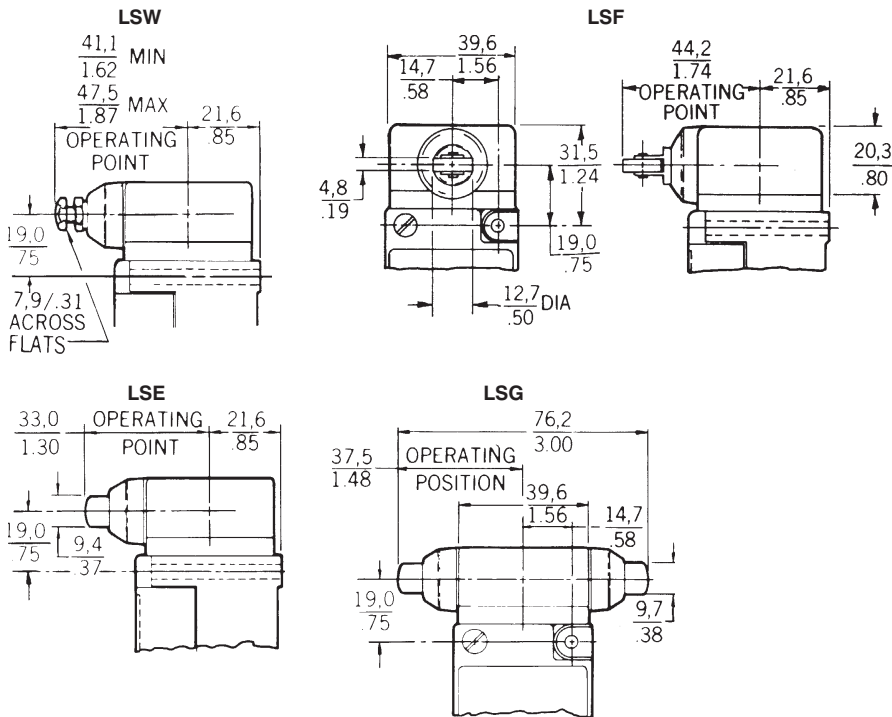
TOP PLUNGERS

Single-pole and double-pole



SIDE PLUNGERS

Single-pole and double-pole



Key: 0,0 = mm
0.00 = inches

Limit/Enclosed

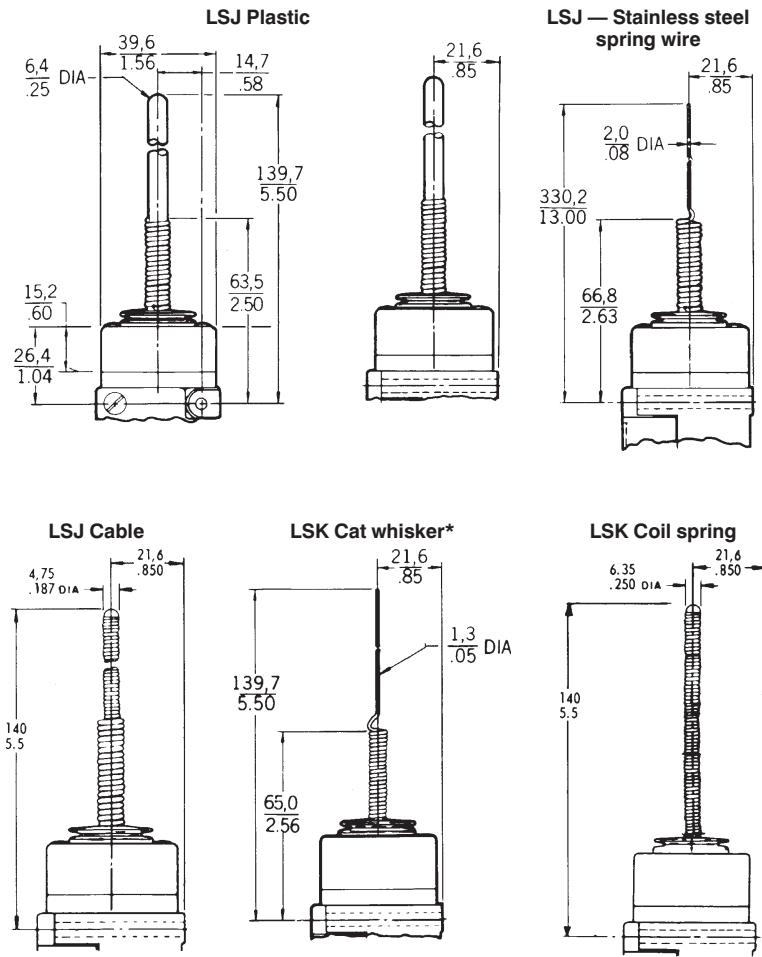
Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

Limit and Enclosed Switches

HDLS Series

Mounting Dimensions (For reference only)

WOBBLE LEVERS



* Also available with 7½" actuator.

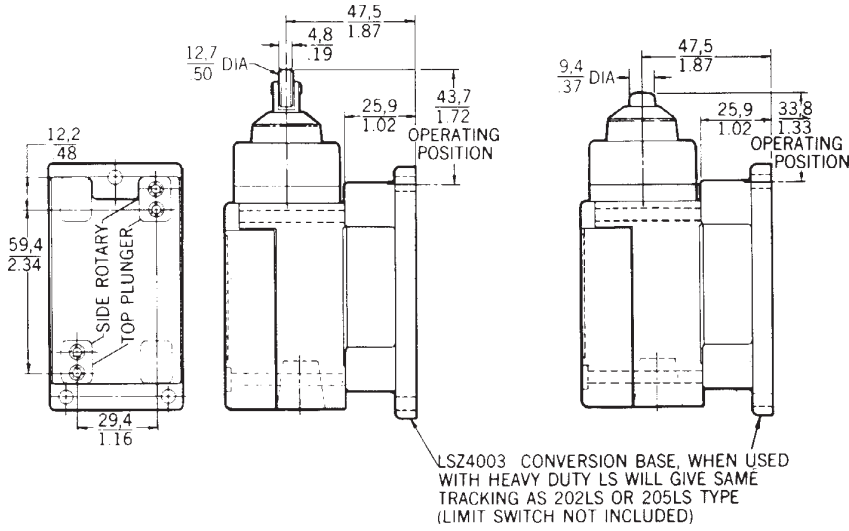
Key: 0,0 = mm
0.00 = inches

Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

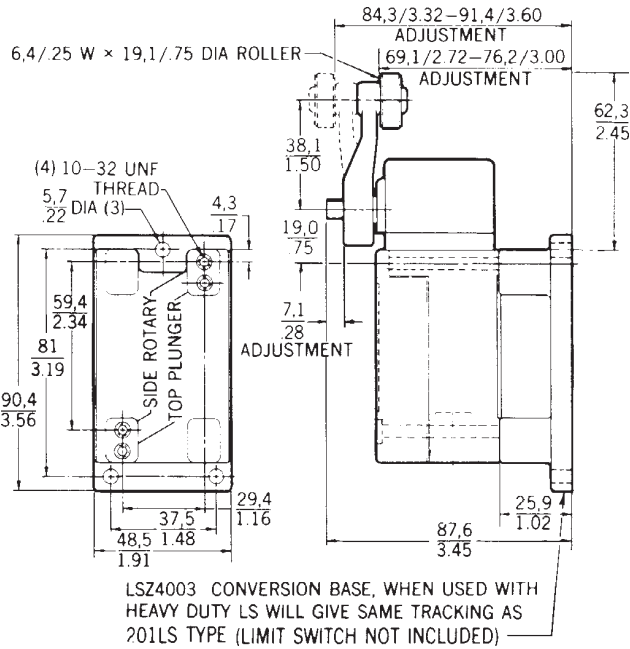
Mounting Dimensions (For reference only)

CONVERSION BASES

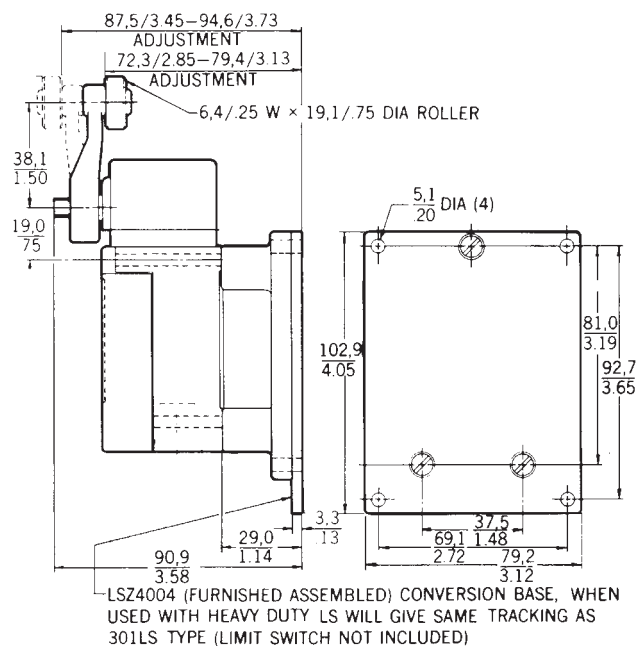
**SINGLE-POLE TOP PLUNGER
LSZ4003**



**SINGLE-POLE SIDE ROTARY
LSZ4003**



**DOUBLE-POLE SIDE ROTARY
LSZ4004**



Limit/Enclosed

LS/200LS Cross-Reference

The following cross-reference between compact LS/plug-in 200LS switches and HDLS switches applies to style, but not necessarily operating characteristics. When replacing LS/200LS with HDLS switches, the new characteristics should be considered.

essarily operating characteristics. When replacing LS/200LS with HDLS switches, the new characteristics should be considered.

The HDLS requires an adapter plate to interchange with 200LS (see page A41).

NON PLUG-IN

LS	HDLS	(Consisting Of)
1LS1	LSA3K-1D	(LSA3K + LSZ51D)
1LS1-L	LSA3K-1D	(LSA3K + LSZ51D)
1LS1-N	LSA3K-1C	(LSA3K1 + LSZ51C)
1LS1-NA	LSA3K1-1C	(LSA3K1 + LSZ51C)
1LS2	LSA3K	—
1LS3	LSA3K-2C	(LSA3K + LSZ52C)
1LS3-L	LSA3K-2C	(LSA3K + LSZ52C)
1LS5	LSR3K-1C	(LSR3K + LSZ51C)
1LS6	LSR3K-1D	(LSR3K + LSZ51D)
1LS9	LSP3K	—
1LS10	LSR3K-4M	(LSR3K + LSZ54M)
1LS10-L	LSR3K-4M	(LSR3K + LSZ54M)
1LS19	LSR3K-1D	(LSP3K + LSZ51D)
1LS23	LSR3K	—
1LS27	LSP3K5	—
1LS34	LSR3K-1C	(LSR3K + LSZ51C)
1LS47	LSH3K-4M	(LSH3K + LSZ54M)
1LS58	LSP3K-2C	(LSP3K + LSZ52C)
1LS59	LSH3K-2C	(LSH3K + LSZ52C)
1LS128	LSA3K-2K	(LSA3K + LSZ52K)
1LS131	LSH3K-1D	(LSH3K + LSZ51D)
1LS139	LSR3K-4M	(LSR3K + LSZ54M)
1LS145	LSH3K-2M	(LSH3K + LSZ52M)
1LS156	LSA3K-1C	(LSA3K + LSZ51C)
1LS165-L	LSA3K4-2C	(LSA3K4 + LSZ52C)
1LS212	LSH3K	—
1LS213	LSH3K	—
2LS1	LSC3K	—
2LS1-L	LSC3K	—
2LS7	LSC3K	—

LS	HDLS	(Consisting Of)
3LS1	LSF3K	—
3LS1-L	LSF3K	—
3LS5	LSF3K4	—
4LS1	LSE3K	—
4LS1-L	LSE3K	—
5LS1	LSD3K	—
5LS1-L	LSD3K	—
5LS6	LSD3K6	—
5LS6-L	LSD3K6	—
5LS7	LSD3K6	—
5LS8	LSD3K	—
6LS1	LSN3K-3B	(LSN3K + LSZ53B)
6LS1-L	—	—
6LS2	LSN3K	—
6LS2-L	LSN3K	—
6LS3	LSN3K-3S	(LSN3K + LSZ53S)
8LS1	LSJ3K-7N	—
8LS1-L	LSJ3K-7N	—
8LS4	LSK3K-8B	—
8LS125	LSK3K-8B	—
11LS1	LSA7L-1D	(LSA7L + LSZ51D)
11LS2	LSA7L	—
11LS3	LSA7L-2C	(LSA7L + LSZ52C)
11LS10	LSR7L-4M	(LSR7L + LSZ54M)
11LS156	LSA7L-1D	(LSA7L + LSZ51D)
12LS1	LSC7L	—
13LS1	LSF7L	—
14LS1	LSE7L	—
14LS3	LSE7L5	—
15LS1	LSD7L	—
15LS8	LSD7L	—

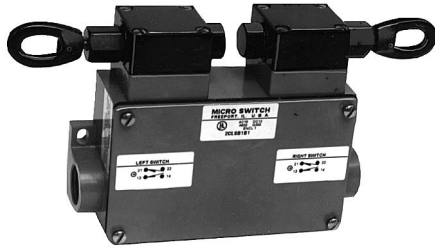
PLUG-IN

200LS*	HDLS	(Consisting Of)
201LS1	LSA1A-1D	(LSA1A + LSZ51D)
201LS1-N	LSA1A1-1C	(LSA1A1 + LSZ51C)
201LS2	LSA1A	—
201LS3	LSA1A-2C	(LSA1A + LSZ52C)
201LS6	LSR1A-1D	(LSR1A + LSZ51D)
201LS9	LSP1A	—
201LS10	LSR1A-4M	(LSR1A + LSZ54M)
201LS19	LSP1A-1D	(LSP1A + LSZ51D)
201LS23	LSR1A	—
201LS47	LSH1A-4M	(LSH1A + LSZ54M)
201LS143	LSA1A-2D	(LSA1A + LSZ52D)
201LS501	LSA5A-1D	(LSA5A + LSZ51D)
201LS501-A1	LSA8A-1D	(LSA8A + LSZ51D)
201LS502	LSA5A	—
201LS503	LSA5A-2C	(LSA5A + LSZ52C)
201LS503-A1	LSA8A-2C	(LSA8A + LSZ52C)
201LS510	LSR5A-4M	(LSR5A + LSZ54M)
202LS1	LSC1A	—
202LS7	LSC1A	—
202LS8	—	—

200LS/300LS*	HDLS	(Consisting Of)
203LS1	LSF1A	—
203LS501	LSF5A	—
204LS1	LSE1A	—
204LS501	LSE5A	—
205LS1	LSD1A	—
205LS7	LSD1A3	—
205LS8	LSD1A	—
205LS501	LSD5A	—
206LS1	LSN1A-3B	(LSN1A + LSZ53B)
206LS2	LSN1A	—
208LS1	LSJ1A-7N	—
208LS125	LSK1A-8B	—
208LS501	LSJ5A-7N	—
208LS525	LSK5A-8B	—
301LS1	LSM2D-1D	(LSM2D + LSZ51D)
301LS2	LSM2D	—
301LS3	LSM2D-2C	(LSM2D + LSZ52C)
301LS5	LSM2D-4N	(LSM2D + LSZ54N)
301LS8	LSA2B-1D	(LSA2B + LSZ51D)
301LS28	LSA2B	—

* Require terminal block (18PA1 for 200 series, 18PA3 for 300 series), which must be ordered separately.

Momentary Cable Pull Limit Switches: For Signaling Applications



MOMENTARY (CONTACT SWITCH) OPERATING HEAD

Momentary CLS Series Cable Pull Limit Switches are designed for signaling applications; they are not to be used as emergency stop devices. (For emergency stop applications, see the Maintained Cable Pull Limit Switches in the Safety Products catalog.)

When using direct acting contacts, Momentary Cable Pull Limit Switches provide a means to manually force disconnection of a normally closed control circuit by pulling on an attached cable. Momentary switches cause contact transfer if the cable is manually pulled and held. When the cable is released, switch contacts return to their original state. Momentary switches have either direct-acting contacts or snap-action contacts.

Cable length may be up to 200 ft. in a straight line for Single Head switches, and up to 400 ft. (200 ft. in each direction) for Duplex Head switches.

FEATURES

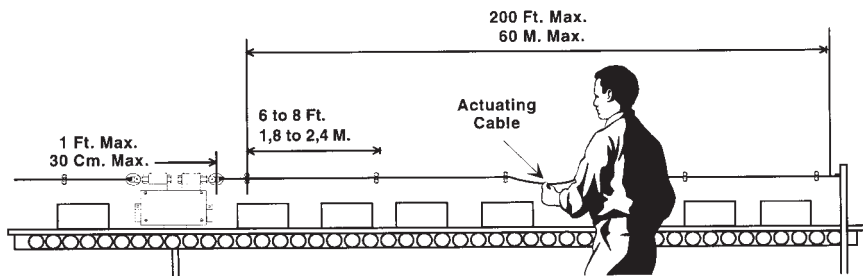
- Offered in Single Head and Duplex Head versions
- Optional direct acting contacts enhance reliability
- Duplex Head switches cover up to 400 ft. cable spans (200 ft. in each direction)
- Single Head switches have one normally open auxiliary contact, while Duplex Head switches have up to three normally open and two normally closed auxiliary contacts
- Four conduit opening thread size options: 1/2-14 NPT, 20mm, PF1/2 and PG13.5
- Compact size of Single Head switches fits into tight spaces
- Sealed to NEMA 1, 3, 4 and 13
- Smart Distributed System output available on Duplex version for monitoring only
- UL listed
- CSA certified
- CE certified
- Temperature range: -1° to 70°C (30° to 158°F)
- Available with indicators
- Duplex versions available with high visibility pilot light

Limit/Enclosed

TYPICAL APPLICATIONS

- Conveyors
- Packaging machinery
- Assembly lines
- Process equipment
- Transfer lines

TYPICAL DUPLEX HEAD SWITCH INSTALLATION



Momentary Cable Pull Limit Switches: For Signaling Applications

TECHNICAL DATA CLS SERIES SPECIFICATIONS

Electrical	
Rate thermal current	$I_{th} = 10 \text{ A}$
Rate insulation voltage	$U_i = 660 \text{ VAC}/660 \text{ VDC}$
Impulse voltage	$U_{imp} = 2.5 \text{ kV}$
Contact resistance	< 25 milliohms
Operating rating	AC15 $U = 600 \text{ V}; I = 1.2 \text{ A}$
	$U = 240 \text{ V}; I = 3 \text{ A}$
	DC13 $U = 120 \text{ V}; I = 6 \text{ A}$
	$U = 250 \text{ V}; I = 0.27 \text{ A}$
	$U = 24 \text{ V}; I = 2.8 \text{ A}$
UL/CSA	A600/Q300
Mechanical	
Protection class	NEMA 1, 3, 4 and 13
Mechanical life	10 ⁵ operations maximum
Temperature Range	-1° to 70°C (30° to 158°F)
Terminal identification	Numbering to EN50013
Head/housing material	Zinc die cast

CABLE PULL SWITCH CHARACTERISTICS

Momentary Cable Pull Limit Switches are offered with a black operating head and a blue body. There is a choice of four different conduit openings: 1/2-14 NPT, 20mm, PF 1/2, and PG13.5. Duplex switches have 3 standard conduit openings with two conduit plugs provided.

All switches come with a 1NO auxiliary contact as standard.

An additional auxiliary switch is also available in the Duplex. This auxiliary switch may be configured as 1NO - 1NC direct acting, 2NO - 2NC snap action (monitoring only) or 1NO - 1NC with Smart Distributed System output (monitoring only).

Neon and LED indicators are available. A 6 watt incandescent pilot light is available on the Duplex for high visibility at long distances.

SMART DISTRIBUTED SYSTEM OUTPUT VERSION

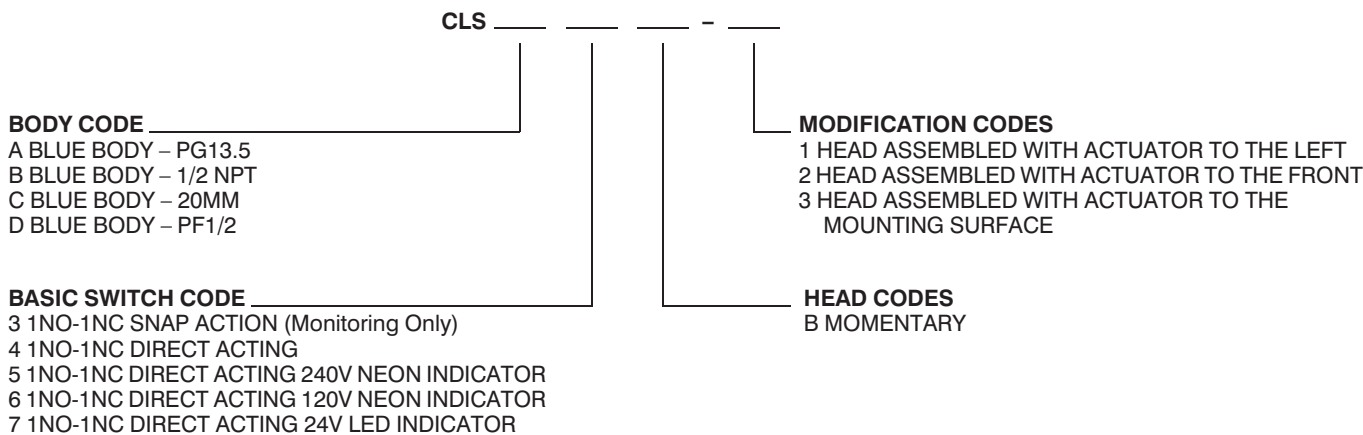
The Smart Distributed System Output Version provides Smart Distributed System compatible switch status messaging. The primary contact block (NC) must be wired to the control current. The auxiliary contact block has been replaced with the Smart Distributed System circuitry.

NOTICE

Snap action contact blocks and the Smart Distributed Output Version should be used for monitoring only. These types of switches should not be used in control circuits.

Momentary Cable Pull Limit Switches: For Signaling Applications

SINGLE HEAD CLS ORDER GUIDE



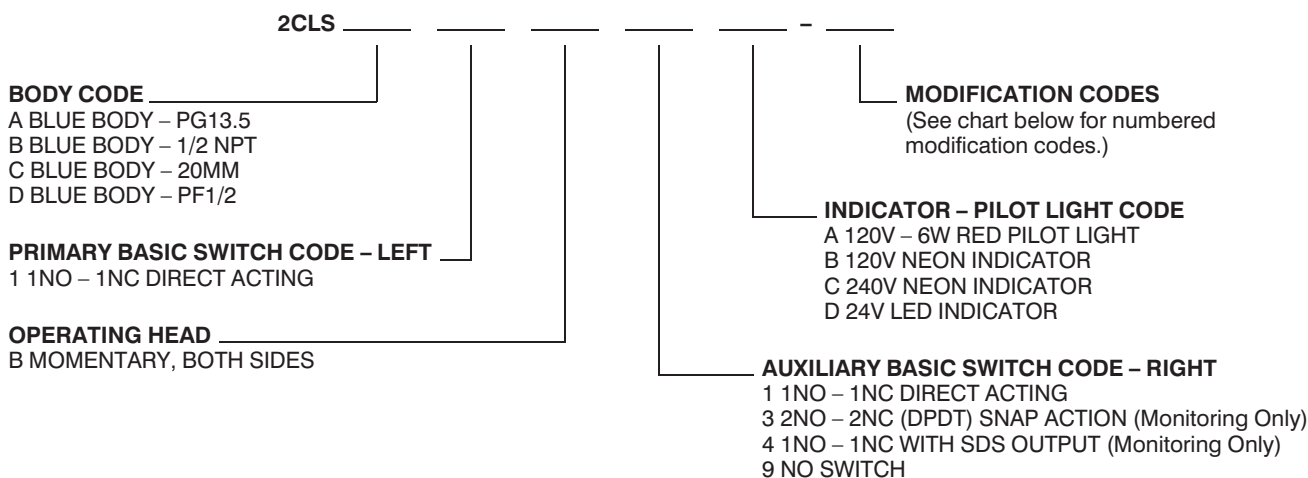
Notes:

- Leave the MODIFICATION CODE blank if a modification is not required.
- Standard head orientation is with actuator to the right.
- Unit may be field modified.

EXAMPLE CATALOG LISTING

Catalog Listing	Description
CLSD4B-1	Single Head Cable Pull Limit Switch, Blue Body – PF 1/2, 1NO - 1NC Direct Acting, Momentary, Head assembled with actuator to the left

DUPLEX HEAD 2CLS ORDER GUIDE



Notes:

- No numbered modification code indicates both heads oriented to side (Duplex Head).
- Standard Conduit openings are left, center, and right with two conduit plugs furnished.
- Leave the INDICATOR – PILOT LIGHT CODE blank if a pilot light is not required.
- Leave the HEAD ORIENTATION NUMBERED MODIFICATION CODE blank if not required. Do not enter zero.

EXAMPLE CATALOG LISTING

Catalog Listing	Description
2CLSB1B1-3	Duplex Head Cable Limit Switch, Blue Body – 1/2 NPT, 1NO – 1NC Direct Acting, Momentary – Both Sides, 1NO – 1NC Direct Acting, No Pilot Light, Left Head Front – Right Head Side

HEAD ORIENTATION NUMBERED MOD CODES		
MOD CODE	LEFT HEAD	RIGHT HEAD
1	FRONT	FRONT
2	FRONT	REAR
3	FRONT	SIDE
4	REAR	FRONT
5	REAR	REAR
6	REAR	SIDE
7	SIDE	FRONT
8	SIDE	REAR

Limit/Enclosed

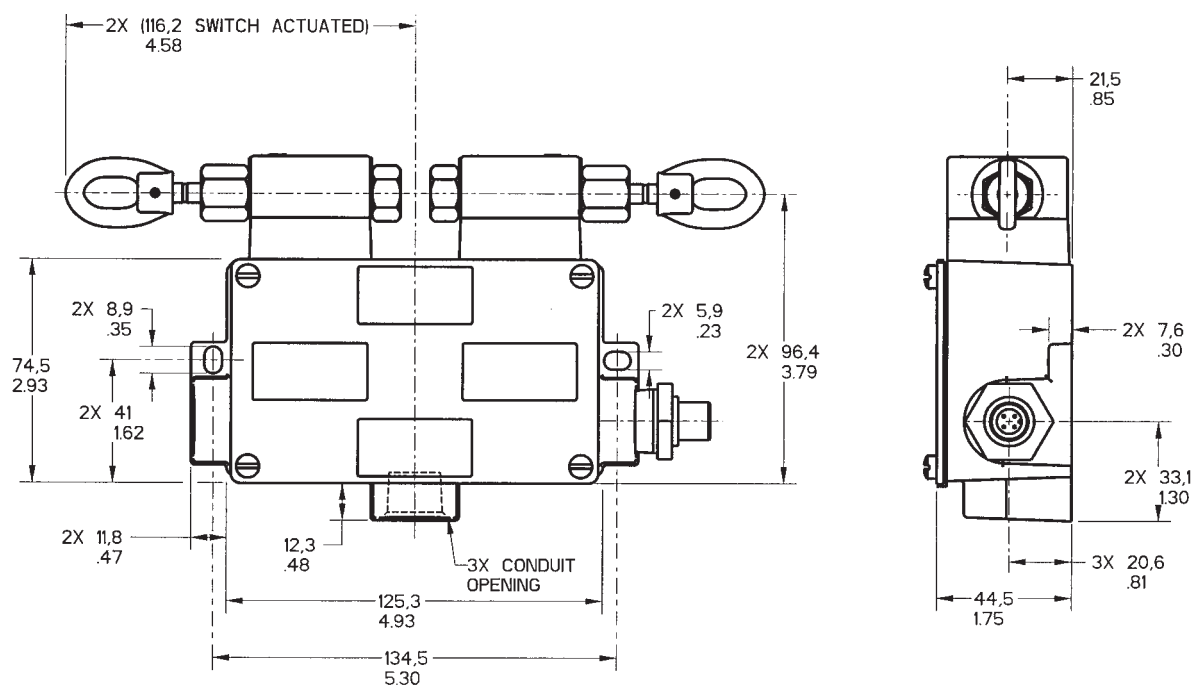
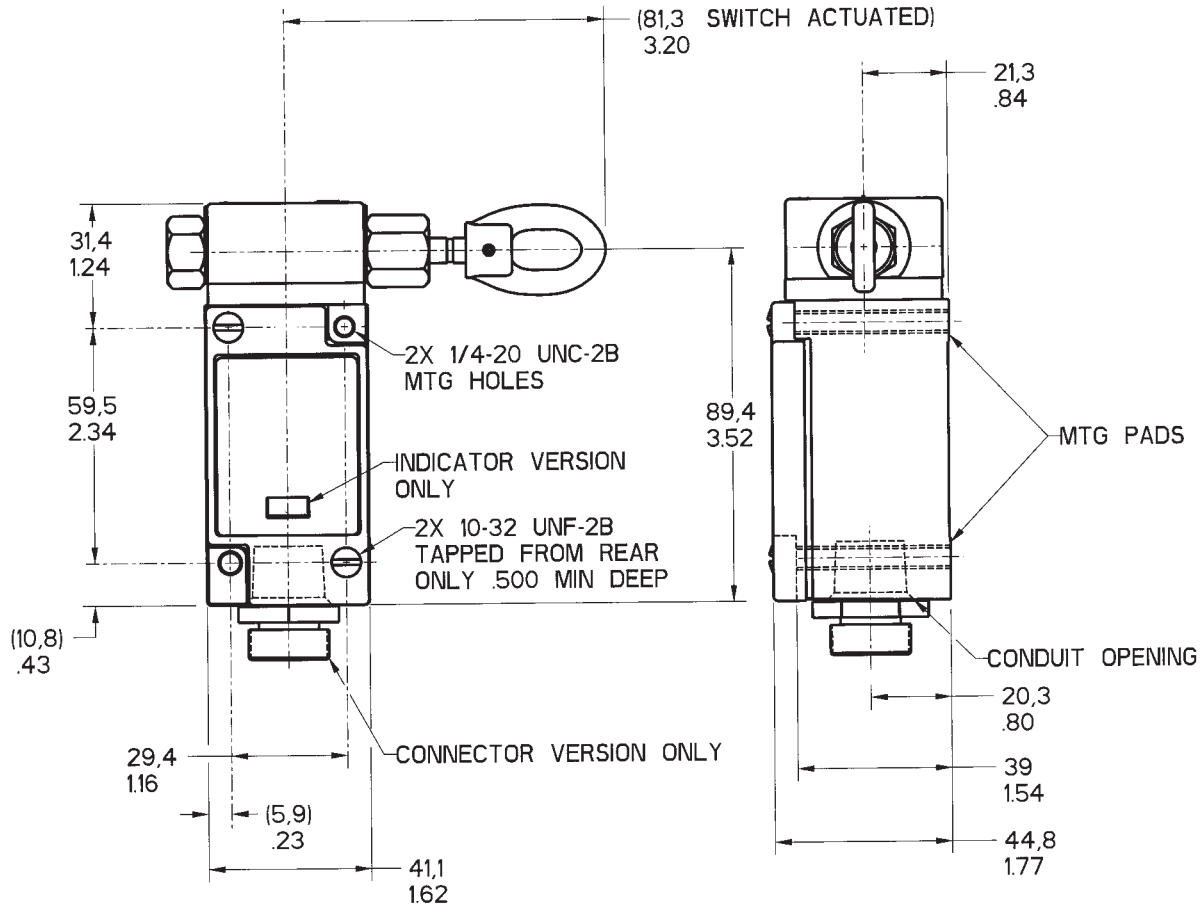
Limit and Enclosed Switches

CLS Series

Momentary Cable Pull Limit Switches: For Signaling Applications

MOUNTING DIMENSIONS

(For reference only)



Momentary Cable Pull Limit Switches: For Signaling Applications



INSTALLATION HARDWARE

- Aircraft cable precut to 25, 50, 100, 150 and 200 feet lengths
- Lockout attachment
- End springs for long cable spans to compensate for temperature variations
- Installation hardware kit supports cable installations of 25 ft. and 50 ft.

INSTALLATION HARDWARE ORDER GUIDE

Catalog Listings	Description
CLSZC1	25 ft. Red Aircraft Cable, finished cable dia. 0.187 in
CLSZC2	50 ft. Red Aircraft Cable, finished cable dia. 0.187 in
CLSZC3	100 ft. Red Aircraft Cable, finished cable dia. 0.187 in
CLSZC4	150 ft. Red Aircraft Cable, finished cable dia. 0.187 in
CLSZC5	200 ft. Red Aircraft Cable, finished cable dia. 0.187 in
CLSZ1S	End Spring
CLSZ00	Installation Kit includes: 4 thimbles, 8 wire rope clamps, 1 turnbuckle (w/lock nuts), 9 eyebolts (w/hardware), 1 endspring, 1 conduit fitting

Notes:

1. Eyebolts should be spaced 1.8 to 2.4 m (6 to 8 ft.) apart.
2. One used for each 7.5 m (25 ft.) of cable span.

Limit/Enclosed

Compact Limit Switches

FEATURES

- Mode of operation is field adjustable.
- NEMA 1, 3, 4, 6 and 13.
- Wide choice of heads and actuators.
- Variety of operating characteristics.
- Optional indicator light.
- Captive screws.
- UL Recognized, file #E12252
- CSA Certified, file #LR57325

FIELD ADJUSTABLE

Rotary motion roller lever and rod actuators are adjustable through 360°. They may be set for operation clockwise, counter-clockwise, or in both directions.

Operating heads may be positioned in any of four 90° positions.

UL/CSA LS SWITCHES

Several UL recognized and CSA certified LS compact limit switches are in the order guides.

Other listings can be furnished in the UL version. Contact the 800 number for information.

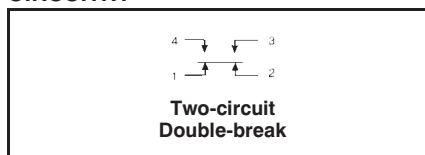
For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

Compact LS and plug-in 200LS limit switches have a long record of successful performance in industrial applications.

The LS fits in many places too small for any other fully adjustable limit switch.

The 200LS switches are the original plug-in concept for reducing downtime by making changeover simple and fast.

CIRCUITRY



ELECTRICAL RATINGS

A	10 amps, 120, 240 or 480 VAC; 1/3 hp, 120 VAC; 3/4 hp, 240 VAC; 0.8 amp, 115 VDC**; 0.4 amp, 230 VDC**; 0.1 amp, 550 VDC**; Pilot Duty, 600 VAC max.	APPLICATION NOTE: Silver Cadmium Oxide Contacts – Designed for use with inductive loads such as relays, contactors, motors and solenoids. Honeywell MICRO SWITCH does <i>not</i> recommend the use of silver cadmium oxide switch contacts in non- arcing loads. Non-arcing loads are gen- erally loads less than 12 volts and/or 0.5 amp.
B	10 amps, 120, 240 or 480 VAC; 1/4 hp, 120 VAC; 1/2 hp, 240 VAC. Pilot Duty, 600 VAC max.	
C	10 amps, 120 VAC; 1/3 hp, 120 VAC.	
D	10 amps, 120, 240, 480 VAC; 1/4 hp, 120 VAC; 1/2 hp, 240 VAC; 0.8 amp, 115 VDC**; 0.4 amp, 230 VDC**; 0.1 amp, 550 VDC**; Pilot Duty, 600 VAC max.	
E	10 amps, 120, 240 or 480 VAC; 1/3 hp, 120 VAC; 3/4 hp, 240 VAC. Pilot Duty, 600 VAC max.	
F	UL Rating: 10 amps, 125, 250, or 480 VAC; 1/3 hp, 125 VAC; 3/4 hp, 250 VAC; 0.8 amp, 125 VDC**; 0.4 amp, 250 VDC**	Fine Silver Contacts
G	UL Rating: 10 amps, 125, 250 or 480 VAC; 1/4 hp, 125 VAC; 1/2 hp, 250 VAC; 0.8 amp, 125 VDC**; 0.4 amp, 250 VDC**	

** Resistive Rating

NOTE: The terminals of two-circuit double-break switches must be wired to equal voltage sources and the same polarity. The loads should be on the same side of the line.

ROLLER LEVER ROTARY ACTUATED SWITCHES

(To order switches and levers separately, refer to pages A73 and A74 or A37 and A38.)

ORDER GUIDE

Momentary action. Steel rollers.



Compact



Plug-in*

Description	Rating	Catalog Listing		O.F. max.	P.T. max.	O.T. min.	D.T. max.
		Compact	Plug-in				
Standard	A	1LS1	201LS1*	13,3 N 3 lb.	20°	30°	12°
20° Pretravel UL/CSA	F	1LS1-L	—	13,3 N 3 lb.	20°	30°	12°
Low Pretravel 5°	B	1LS19	201LS19*	13,3 N 3 lb.	5°	30°	4°
Low Operating Force 5° Pretravel	B	1LS131	—	5,0 N 18 oz.	5°	30°	4°
Standard with indicator light 120 VAC only	C	1LS501	201LS501*	13,3 N 3 lb.	20°	30°	12°
Low Operating Force	A	1LS6	201LS6*	5,0 N 18 oz.	20°	30°	12°
Cavity Mount version of 1LS1	A	7LS1	—	13,3 N 3 lb.	20°	30°	12°

*Require Terminal Block (**18PA1** for 200LS switches) which must be ordered separately. Unless damaged, it is not necessary to replace terminal block when replacing switch.

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

Compact Limit Switches

MAINTAINED CONTACT YOKE ROLLER LEVER ROTARY ACTUATED SWITCHES

Compact



ORDER GUIDE

Maintained contact

Description	Electrical Rating Page A70	Catalog Listing		O.F. max.	P.T. max.	O.T. min.	D.T. max.
		Compact	Plug-in				
Steel rollers on opposite sides of arm	A	6LS1	206LS1*	8,9 N 2 lb.	55°	35°	20°
Nylon rollers on same side of arm	A	6LS3	—	8,9 N 2 lb.	55°	35°	20°

ADJUSTABLE LENGTH ROLLER LEVER ROTARY ACTUATED SWITCHES

Compact



ORDER GUIDE

Length adjustable 1.2 to 3.5 in. (30.6 to 88.9 mm)

Momentary action. Nylon rollers.

Description	Electrical Rating Page A70	Catalog Listing		O.F.† max.	P.T. max.	O.T. min.	D.T. max.
		Compact	Plug-in				
Standard Pretravel 20° UL/CSA	A	1LS3	201LS3*	13,3 N 3 lb.	20°	30°	12°
	F	1LS3-L	—				
Low pretravel 5°	B	1LS58	—	13,3 N 3 lb.	5°	30°	4°
Low pretravel 5° and low operating force	B	1LS59	—	5,0 N 18 oz.	5°	30°	4°

†at 1.5" length

LOW FORCE ROD ROTARY ACTUATED SWITCHES

Compact



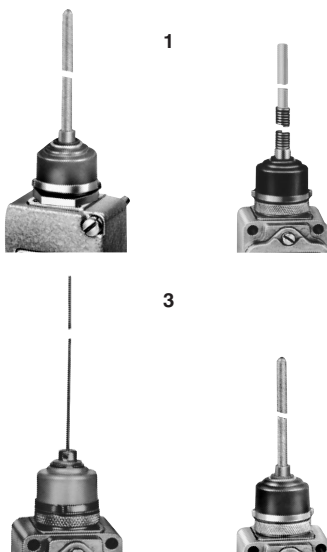
ORDER GUIDE

Momentary action, 5-inch (127mm) aluminum rod.

Description	Electrical Rating Page A70	Catalog Listing		O.F.** max.	P.T. max.	O.T. min.	D.T. max.
		Compact	Plug-in				
Standard Pretravel 20° UL/CSA	A	1LS10	201LS10*	1,39 N 5 oz.	20°	30°	12°
	F	1LS10-L	—				
Low pretravel 5°	B	1LS47	201LS47*	1,39 N 5 oz.	5°	30°	4°
Low pretravel 5° and low operating force	B	1LS53	201LS51*	0,83 N 3 oz.	5°	30°	4°

**Rod fully extended

WOBBLE LEVER ACTUATED SWITCHES



ORDER GUIDE

Momentary action.

Description	Electrical Rating Page A70	Catalog Listing		O.F. max.	P.T. max.
		Compact	Plug-in		
Flexible cable actuator ¹ UL/CSA	D	8LS1	208LS1*	1,39 N 5 oz.	28,6 1.125
	G	8LS1-L	—		
Combination spring-rod ²	D	8LS3	208LS3*	1,39 N 5 oz.	28,6 1.125
Low force steel wire ³	D	8LS125	208LS125*	0,28 N 1 oz.	63,5 2.5
Coil spring ⁴ Stainless steel	D	8LS152	208LS152*	1,39 N 5 oz.	28,6 1.125

*Require Terminal Block (18PA1 for 200LS Switches) which must be ordered separately. Unless damaged, it is not necessary to replace terminal block when replacing switch.

Limit/Enclosed

Compact Limit Switches TOP PLUNGER ACTUATED SWITCHES

Compact



ORDER GUIDE

Momentary action.

Description	Electrical Rating Page A70	Catalog Listing		O.F. max. N lb.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
		Compact	Plug-in				
Standard top plunger	A	2LS1	202LS1*	31,1 7	1,65 .065	6,35 .250	0,51 .020
UL/CSA	F	2LS1-L	—	31,1 7	1,65 .065	6,35 .250	0,51 .020
Low operating force top plunger	E	2LS111	202LS111*	10 36 oz.	1,65 .065	5,56 .219	0,23 .009

TOP ROLLER PLUNGER ACTUATED SWITCHES

Plug-in*



ORDER GUIDE

Momentary action.

Description	Electrical Rating Page A70	Catalog Listing		O.F. max. N lb.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
		Compact	Plug-in				
Standard top roller Plunger	A	5LS1	205LS1*	31,1 7	1,65 .065	5,56 .219	0,51 .020
Steel roller	F	5LS1-L	—	31,1 7	1,65 .065	5,56 .219	0,51 .020

SIDE PLUNGER ACTUATED SWITCHES

Compact



ORDER GUIDE

Momentary action. Assembled with plunger facing front (label side).

Description	Electrical Rating Page A70	Catalog Listing		O.F. max. N lb.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
		Compact	Plug-in				
Standard side roller	A	4LS1	204LS1*	40 9	2,77 .109	6,35 .250	1,02 .040

SIDE ROLLER PLUNGER ACTUATED SWITCHES

Plug-in*



ORDER GUIDE

Momentary action. Assembled with plunger facing front (label side).

Description	Electrical Rating Page A70	Catalog Listing		O.F. max. N lb.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
		Compact	Plug-in				
Standard side roller plunger Steel Roller	A	3LS1	203LS1*	40 9	2,77 .109	5,56 .219	1,02 .040

* Require Terminal Block (18PA1 for 200LS Switches) which must be ordered separately. Unless damaged, it is not necessary to replace terminal block when replacing switch.

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

N = Newton

Roller may be turned in any position through 360°.

Compact Limit Switches

ROTARY ACTUATED SWITCHES — WITHOUT LEVERS

The following compact LS and plug-in 200LS limit switches are sold without actuating levers. Levers are ordered separately from the order guide below and on the facing page.

Plug-in*



Compact



ORDER GUIDE

Momentary action, except where noted.

Description	Electrical Rating Page A70	Catalog Listing		O.Tq. max.	P.T. max.	O.T. min.	D.T. max.
		Compact	Plug-in				
Standard 20° pretravel	A	1LS2	201LS2*	0,51 Nm 4.5 in. lb.	20°	30°	12°
	F	1LS2-L	—				
Low pretravel 5°	B	1LS9	201LS9*	0,51 Nm 4.5 in. lb.	5°	30°	4°
Standard pretravel 20° Low operating force	A	1LS23	201LS23*	0,21 Nm 30 in. oz.	20°	30°	12°
	B	1LS56	201LS56*				
Low pretravel 5° Low operating force	A	6LS2	206LS2*	0,34 Nm 3 in. lb.	55°	35°	20°
	F	6LS2-L	—				

* Require Terminal Block (18PA1 for 200LS Switches).
Note 1 — Yoke lever actuators normally used.

Characteristics:
O.Tq. — Operating Torque; P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel

Limit/Enclosed

AUXILIARY ROTARY LEVERS

ORDER GUIDE

	Type	Catalog Listing
	Roller arm, with nylon, steel, or ball bearing roller.	Nylon 6PA71
		Steel 6PA121
		Ball bearing 6PA144
	Yoke roller lever with nylon or steel rollers.	Steel 6PA80
	Rollers on same side.	Steel 6PA82
		Nylon 6PA102

60mm radius levers Part # PA-J11

Limit and Enclosed Switches

LS/200LS Series

Compact Limit Switches

AUXILIARY ROTARY LEVERS

ORDER GUIDE

	Type	Catalog Listing
	Adjustable aluminum rod.	LSZ54M
	Adjustable stainless steel rod.	6PA63
	Adjustable spring rod.	6PA69
	Hand operated aluminum button on stainless steel lever.	6PA57
	Adjustable roller arm with steel or nylon rollers. .75 dia. roller	Steel LSZ52D
	.75 dia. roller	Nylon LSZ52C
	1.00 dia. roller	Nylon LSZ52J
	1.50 dia. roller	Nylon LSZ52K
	2.00 dia. lever	Nylon LSZ52M

Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

Replacement Parts

REPLACEMENT PARTS

Except where noted, all operating heads are furnished with actuators.

Catalog Listing	Contact Block		Operating Head	Actuator Only
	Compact	Plug-In		
1LS1-L	2MN1-L	2MN6	9PA15	6PA121
1LS1 201LS1	2MN1			
1LS2-L	2MN1-L	2MN6	9PA16†	Note 1
1LS2 201LS2	2MN1			
1LS3-L	2MN1-L	2MN6	9PA16†	LSZ52C
1LS3 201LS3	2MN1			
1LS6 201LS6	2MN1	2MN6	9PA50	6PA121
1LS9 201LS9	2MN8	2MN13	9PA16†	Note 1
1LS10-L	2MN1-L	2MN6	9PA40	6PA43
1LS10 201LS10	2MN1			
1LS19 201LS19	2MN8	2MN13	9PA15	6PA121
1LS23 201LS23	2MN1	2MN6	9PA68†	Note 2
1LS47 201LS47	2MN8	2MN13	9PA40	6PA43
1LS53 201LS51	2MN8	2MN13	9PA48	6PA43
1LS56 201LS56	2MN8	2MN13	9PA74†	Note 2
1LS58	2MN8	—	9PA16†	LSZ52C
1LS131	2MN8	—	9PA50	6PA121
1LS501 201LS501	2MN1	2MN14	9PA15	6PA121

†Furnished without actuator.

Note 1—Any auxiliary actuator shown can be used with these listings.

Note 2—6PA43, 6PA63, 6PA71 or 6PA121 auxiliary actuators only are recommended for these listings.

Note 3—Yoke lever actuators normally used.

CONDUIT SEALING PACKETS

Packet	Cable O.D. Inches
2PA6	.400"-.435"
2PA16	.435"-.470"
2PA1	.530"-.570"

(See page A49 for description)

Catalog Listing	Contact Block		Operating Head	Actuator Only
	Compact	Plug-In		
2LS1-L	2MN1-L	2MN6	9PA32	None
2LS1 202LS1	2MN1			
2LS111 202LS111	2MN3	2MN7	9PA71	None
3LS1 203LS1	2MN11	2MN9	9PA45	None
4LS1 204LS1	2MN11	2MN9	9PA44	None
5LS1-L	2MN1-L	2MN6	9PA33	None
5LS1 205LS1	2MN1			
6LS1 206LS1	2MN1	2MN6	9PA46	6PA80
6LS2-L	2MN1-L	2MN6	9PA47†	Note 3
6LS2 206LS2	2MN1			
6LS3	2MN1	—	9PA47†	6PA102
7LS1	2MN1	—	9PA15	6PA121
8LS1-L	2MN11-L	2MN9	9PA58	None
8LS1 208LS1	2MN11			
8LS3 208LS3	2MN1	2MN6	9PA49	None
8LS125 208LS125	2MN11	2MN9	9PA54	None
8LS152 208LS152	2MN1	2MN6	9PA42	None

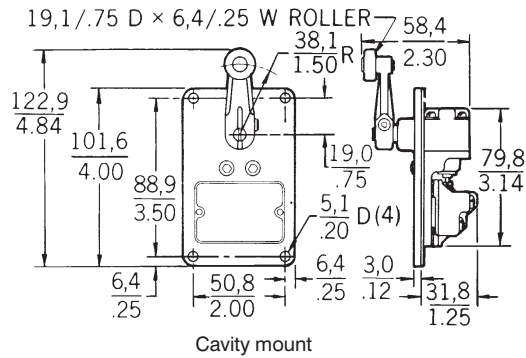
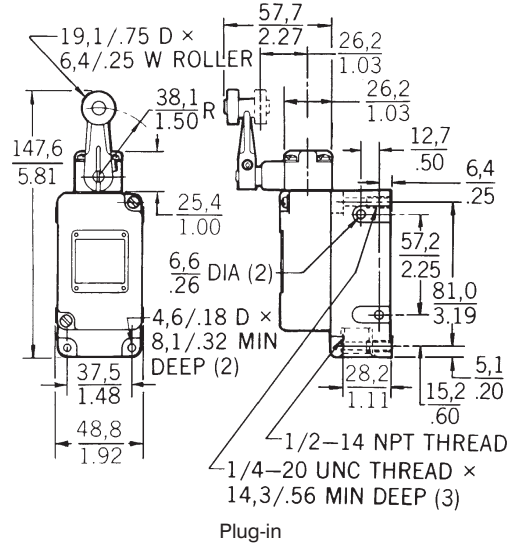
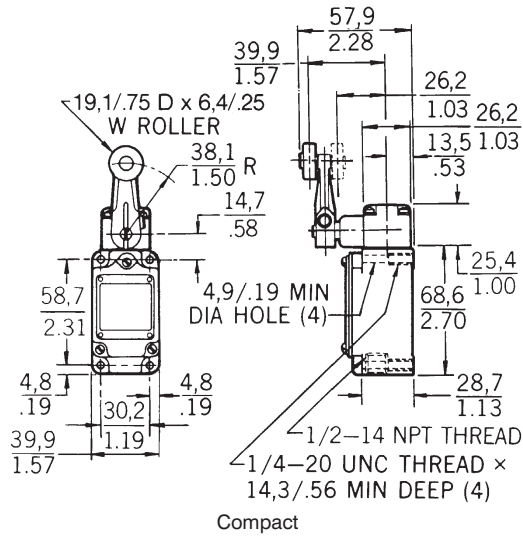
Limit/Enclosed

Limit and Enclosed Switches

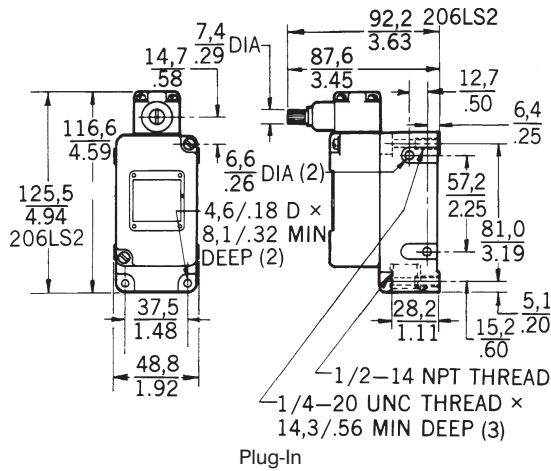
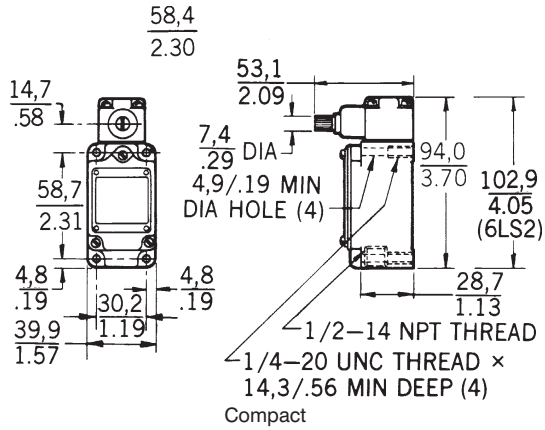
LS/200LS Series

Mounting Dimensions (For reference only)

ROLLER LEVER

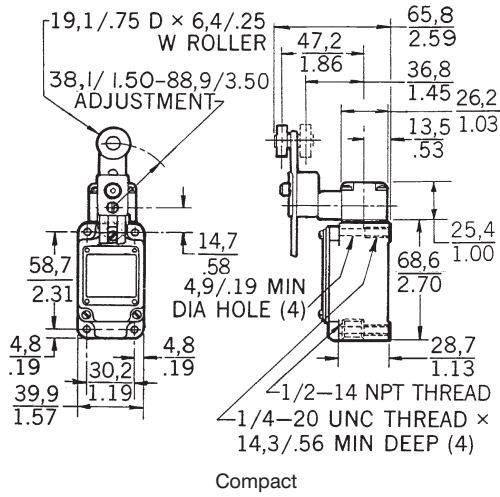


SWITCH WITHOUT LEVER

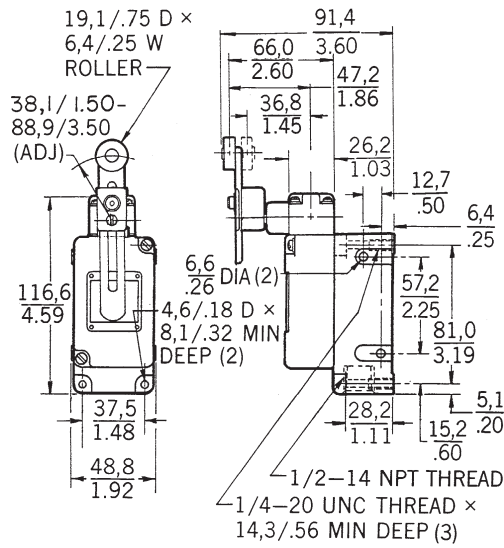


Mounting Dimensions (For reference only)

ADJUSTABLE LENGTH ROLLER LEVER

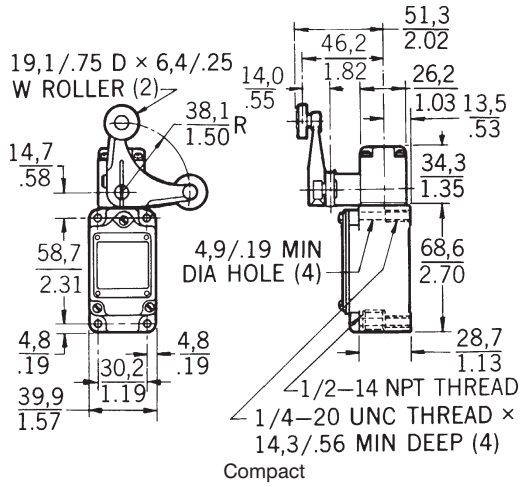


Compact

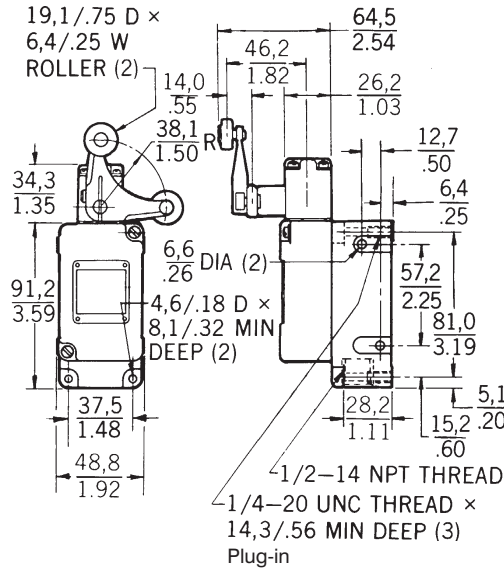


Plug-in

YOKE ROLLER LEVER

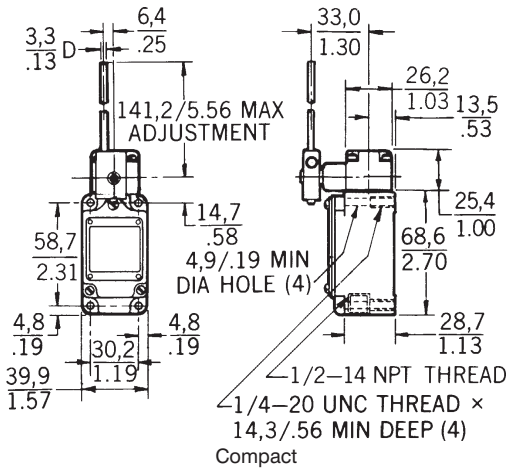


Compact

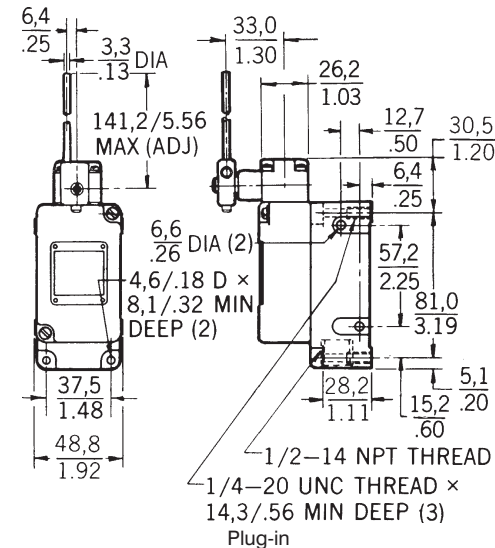


Plug-in

ADJUSTABLE LENGTH ROD



Compact



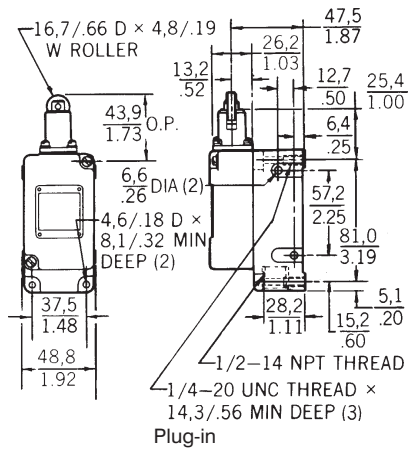
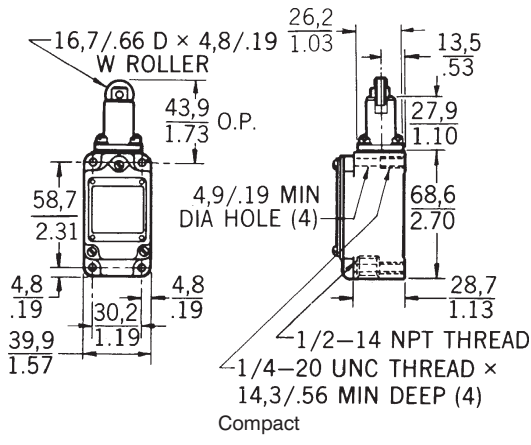
Plug-in

Limit/Enclosed

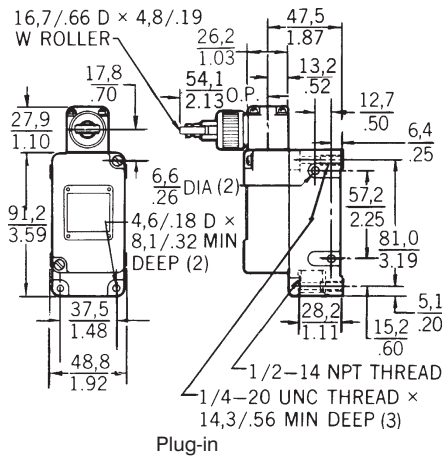
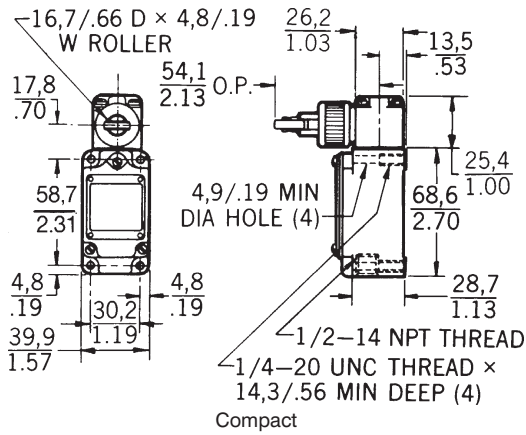
Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

Mounting Dimensions (For reference only)

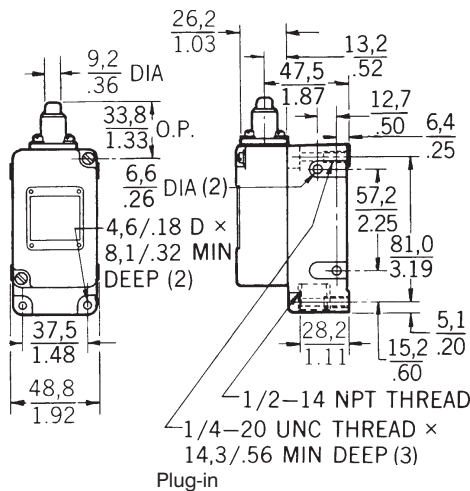
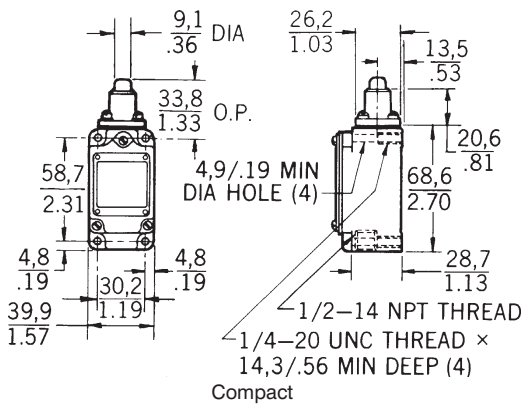
TOP ROLLER PLUNGER



SIDE ROLLER PLUNGER



TOP PLUNGER



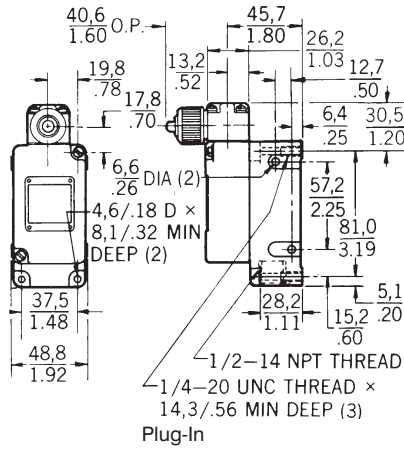
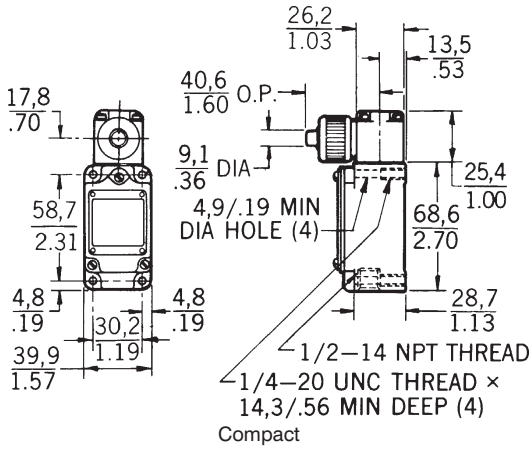
Key: 0,0 = mm
0.00 = inches

Limit and Enclosed Switches

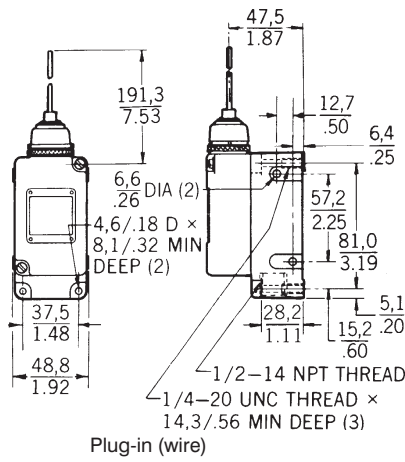
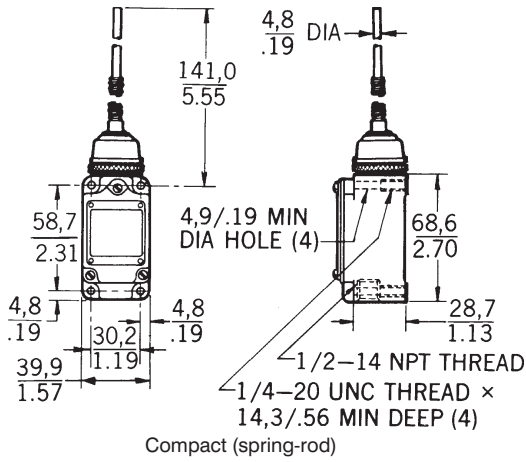
LS/200LS Series

Mounting Dimensions (For reference only)

SIDE PLUNGER



WOBBLE LEVER



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

Limit/Enclosed

Limit and Enclosed Switches

International Compact Limit Switches

LS Series



FEATURES

- Ideal source of replacement parts for imported machine tools or transplant factories.
- Made in Honeywell factories in Europe and Japan.
- Mode of operation is field adjustable
- NEMA 1, 3, 3R, 4, 6, 12, and 13
- Optional indicator light with Neon lamp or LED
- Rugged cast aluminum housing
- Temperature range -20° to 70°C (-2° to 158°F)
- Gold plated contacts available

CIRCUITRY

<p>Two-Circuit Double-Break</p>	10A – 125, 250, 480 VAC 0.8A – 125 VDC, 0.4A – 250 VDC ½ HP – 125 VDC, 1 HP – 250 VAC
---------------------------------	---

INTERNATIONAL LISTINGS ORDER GUIDE

Description	Honeywell Europe	Yamatake	O.F. max.	P.T. max.	O.T. max.	D.T. max.
Standard	ILS1-4PG	ILS1-J	1360g	20°	30°	12°
Low Pretravel	ILS19-4PG	ILS19-J	1360g	7°	30°	3°

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

ORDER GUIDE

Description	Catalog Listing	O.F. max.	P.T. max.	O.T. min.	D.T. max.
High Overtravel	1LS-J50	3.43 kg-cm	30°	60°	15°
High Overtravel	1LS-J500	3.43 kg-cm	20°	55°	12°
High Overtravel Low Pretravel	1LS-J550	3.43 kg-cm	10°	62°	5°

HIGH OVERTRAVEL SWITCH WITH ACTUATOR



TOP BALL PLUNGER



ORDER GUIDE

Description	Catalog Listing	O.F. max.	P.T. max.	O.T. min.	D.T. max.
Top Ball Plunger	2LS-J6	2,720 g	1.7mm	4.0mm	0.15mm
Replacement Head	9PA-J66				
Contact Block	2MN11-J				

OPTIONAL INDICATOR

Limit switch cover with indicator module can be ordered separately or as a complete switch by adding "E", "EC" or "E5" to catalog listings (ex. 1LS1-JE).



ORDER GUIDE

Voltage	Catalog Listing	Additional Letter for Complete Switch
100/200 VAC Neon	LS-29PA1	E ex. 1LS1-JE
24 VAC/DC LED	LS-29PA5	E5 ex. 1LS1-JE5
12 to 125 VAC/DC LED	LS-29PAEC	EC ex. 1LS1-JEC

Note: The lamp module on back of cover can be easily rotated to monitor either the N.O. or the N.C. contacts.

Limit and Enclosed Switches

LS Series

International Compact Limit Switches

DOUBLE SEAL TYPE

- Housing unit and switching unit are sealed
- Switching unit plunger has a boot seal, and epoxy-sealed seams



SWITCH UNIT



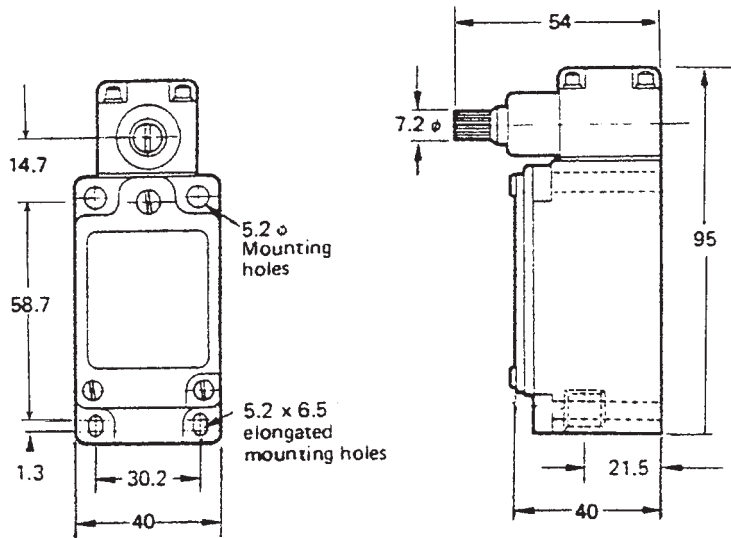
ORDER GUIDE

Available Catalog Listing	
1LS1-JS	Standard roller lever - side rotary
1LS19-JS	Low pretravel side rotary roller lever
1LS-J500S	High overtravel side rotary roller lever
1LS-J550S	High overtravel - low pretravel side rotary
5LS1-JS	Top roller plunger

MOUNTING DIMENSIONS

(For reference only)

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



Conduit Thread

“PG” specifies PG 13,5 thread e.g. 1LS1-4PG

“C” specifies 20 mm thread e.g. 1LS1-4C

(Minimum order quantities may be required for optional conduit threads.)

Limit/Enclosed

Limit and Enclosed Switches

LD Series

Multiple Plunger Limit Switches



FEATURES

- Ideal source of replacement parts for imported machine tools or transplant factories
- Up to 15A capacity
- Variety of switch units
- Roller and chisel plunger are available
- Operating points are precisely factory-adjusted
- Easy mounting and wiring
- NEMA 6, 13 and IEC IP 67 sealing
- Temperature range -10 to +70°C (+14 to +158°F)

One LD series multi-plunger limit switch can replace several individual switches in many machine tooling applications, and on welding and transfer machines in automobile plants.

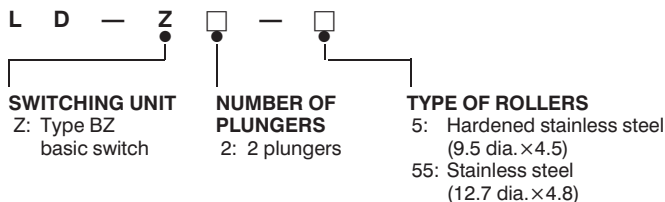
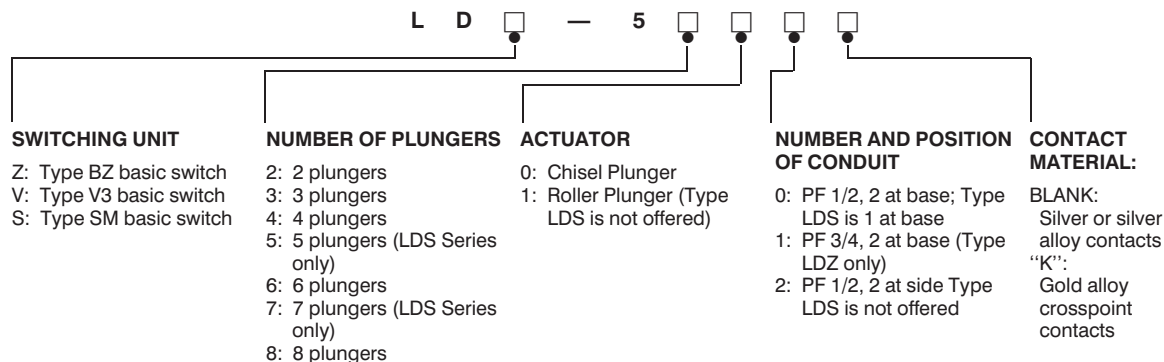
Numerous conduit arrangements are possible, making switch wiring and maintenance simple and inexpensive.

	Catalog Listing	LDS-5000K Series	LDV-5000 Series	LDZ-5000 Series	LD-Z Series
Electrical Specifications	Max. current at max. voltage ratings	5A at 125, 250VAC K series; 0.1A at 125VAC 0.1A at 30VDC	10A at 125, 250VAC 0.5A at 125VDC 0.25A at 250VDC	15A at 125, 250, 480VAC 0.5A at 125VDC 0.25A at 250VDC	15A at 125, 250, 480VAC 0.5A at 125VDC 0.25A at 250VDC
Single Pole Double Throw	Circuitry	SPDT	SPDT	SPDT	SPDT
Operating Characteristics	Plunger Number	2,3,4,5,6,7,8	2,3,4,6,8	2,3,4,6,8,10,12	2
	Pitch	8 ± 0.15mm	12 ± 0.2mm	19 ± 0.2mm	18 ± 0.25mm
	Type	Chisel-shaped	Chisel-shaped roller	Chisel-shaped roller	Roller
	O.F. max. - N/lb.	10/2.2	14.74/3.3	19.75/4.4	14.74/3.3
	P.T. max. - mm/in.	1.5/0.06	1.5/0.06	1.5/0.06	1.5/0.06
	O.T. min. - mm/in.	2/0.99	3/0.12	3/0.12	3/0.12
	D.T. - mm/in.	0.2/0.008 max.	0.1-0.32 0.004-0.013	0.01-0.05 0.0005-0.002	0.01-0.05 0.0005-0.002

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

ORDER GUIDE

(For identification of existing listings only. Not for generating new listings.)



REPLACEMENT SWITCH UNITS

Switches	Replacement
LDS-5000	AS-J212
LDS-5000K	AS-J212K
LDZ-5000	AS-J209
LDZ-5000K	AS-J209K
LDV-5000	AS-J215
LDV-5000K	AS-J215K
REPLACEMENT HEADS - LDZ ONLY	
Bevel	9PA-J68
Roller	9PA-J67

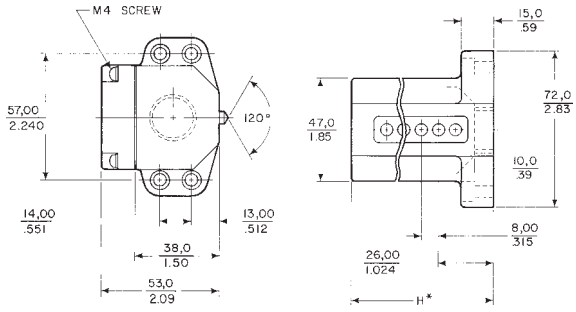
Limit and Enclosed Switches

LD Series

Multiple Plunger Limit Switches

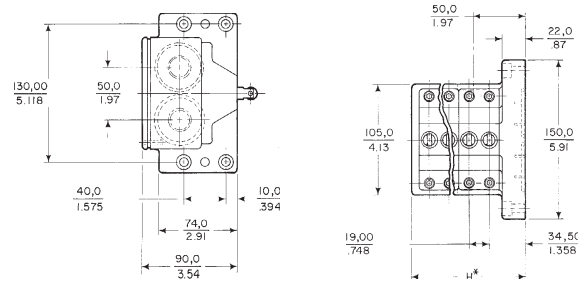
MOUNTING DIMENSIONS $\frac{0.0 \text{ mm}}{0.00 \text{ inches}}$
(For reference only)

LDS-5000 and LDS-5000K



*NUMBER OF PLUNGERS 2 4 6 8
DIMENSION "H" 50 mm 66 mm 82 mm 98 mm

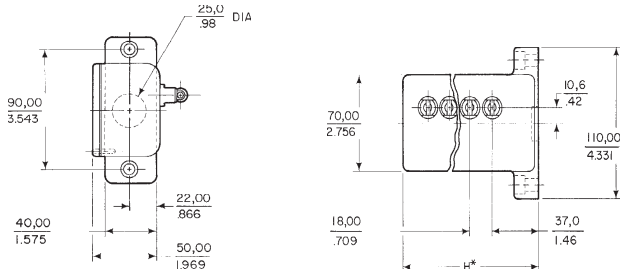
LDZ-5000



*NUMBER OF PLUNGERS 2 4 6 8
DIMENSION "H" 70 mm 108 mm 146 mm 184 mm

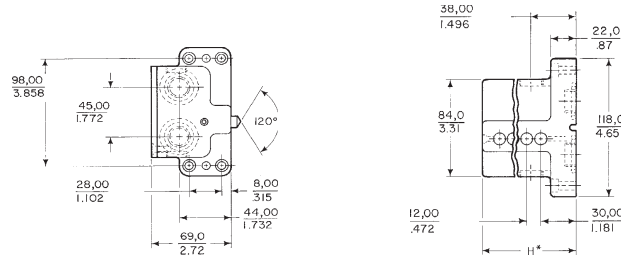
Limit/Enclosed

LD-Z



*NUMBER OF PLUNGERS 2 4 6
DIMENSION "H" 75 mm 110 mm 145 mm

LDV-5000



*NUMBER OF PLUNGERS 2 3 4 6
DIMENSION "H" 58 mm 70 mm 82 mm 106 mm

Limit and Enclosed Switches

Compact Limit Switches

SL1 Series



FEATURES

- Ideal source of replacement parts for imported machine tools or transplant factories
- NEMA 3,4, 13 and IEC IP 67 sealing
- Smaller size saves space
- Rugged Zinc diecast housing
- Wide product selection to suit many applications
- Snap-in terminal enclosure makes mounting and wiring easy
- Temperature ranges: Standard -10 to +70°C (14 to 158°F); Low temp. with roller lever -40 to +70°C (-40 to 158°F); Low temp. with roller plunger -50 to 70°C (-60 to +158°F)

SL1 series compact limit switches are sealed, sensitive, and have a long life. The compact size makes them suitable for the total miniaturization of machinery or equipment.

Versions are available with: gold-clad cross-point contacts, prewiring, lamp indications, seal boots with roller plungers, and a variety of actuating possibilities.

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

Note: Conduit will seal to cable diameters from 5.8mm to 9.6mm.

CIRCUITRY AND ELECTRICAL RATING

	Listing	Rating	Contact
 Single-Pole Double-Throw	SL1-□	5A-125, 250VAC	Silver
	SL1-□ K	0.1A-125VAC 0.1A-30VDC	Gold Clad Cross Point

ORDER GUIDE AND MOUNTING DIMENSIONS

UL/CSA listings available by adding "2" to catalog listing. Example: SL1-A2

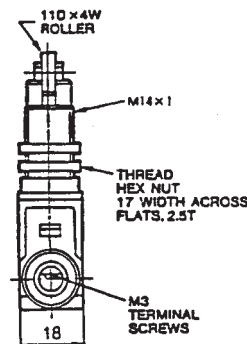
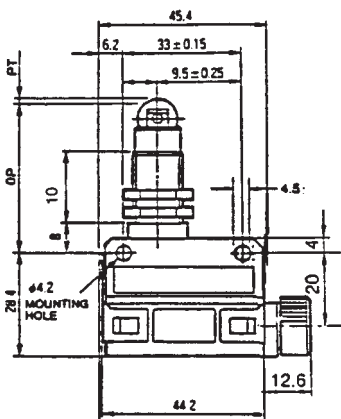
UL Recognized, file #E37559

CSA Certified, file #LR61344, LR21098, LR47132, LR61643

ROLLER PLUNGER

Catalog Listing	SL1-A
	SL1-AK

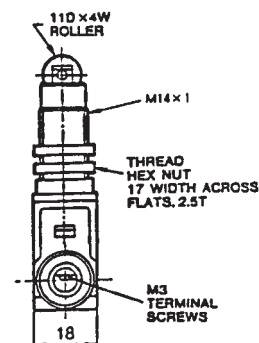
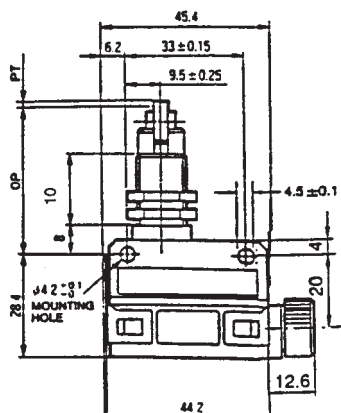
O.F. (max.)	1,200 g
R.F. (min.)	500 g
P.T. (max.)	1.5 mm
O.T. (min.)	3 mm
D.T. (max.)	0.1 mm
O.P.	31.4 mm



CROSS ROLLER PLUNGER

Catalog Listing	SL1-D
	SL1-DK

O.F. (max.)	1,200 g
R.F. (min.)	500 g
P.T. (max.)	1.5 mm
O.T. (min.)	3 mm
D.T. (max.)	0.1 mm
O.P.	31.4 mm



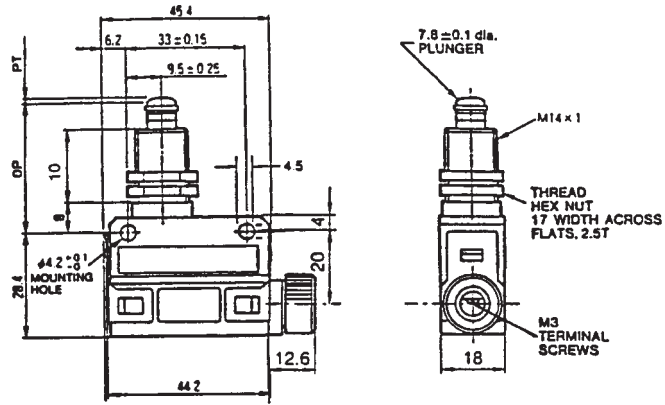
Characteristics: O.F. - Operating Force; R.F. - Release Force; P.T. - Pretravel; O.T. - Overtravel; D.T. - Differential Travel; N - Newtons

Limit/Enclosed

STRAIGHT PLUNGER

Catalog Listing	SL1-H
	SL1-HK

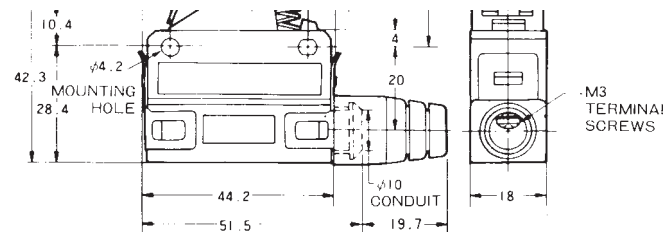
O.F. (max.)	1,200 g
R.F. (min.)	500 g
P.T. (max.)	1.5 mm
O.T. (min.)	3 mm
D.T. (max.)	0.1 mm
O.P.	25.4 mm



ROLLER LEVER

Catalog Listing	SL1-P
	SL1-PK

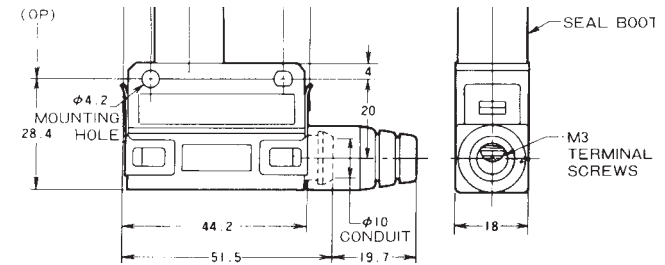
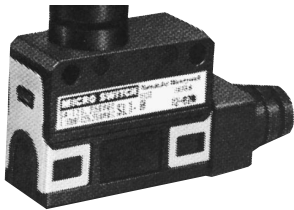
O.F. (max.)	400 g
R.F. (min.)	80 g
P.T. (max.)	2 mm
O.T. (min.)	4 mm
D.T. (max.)	0.3 mm
O.P.	23.1 mm



ROLLER PLUNGER WITH SEAL BOOT

Catalog Listing	SL1-B
	SL1-BK

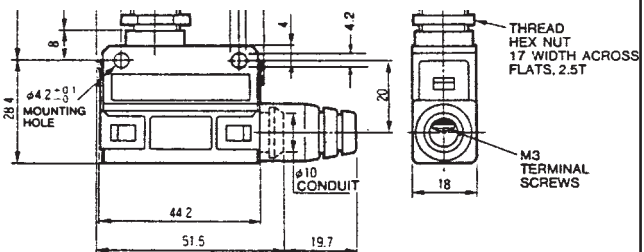
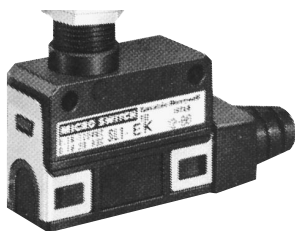
O.F. (max.)	1,200 g
R.F. (min.)	500 g
P.T. (max.)	1.5 mm
O.T. (min.)	3 mm
D.T. (max.)	0.1 mm
O.P.	41.4 mm



LONG ROLLER PLUNGER

Catalog Listing	SL1-E
	SL1-EK

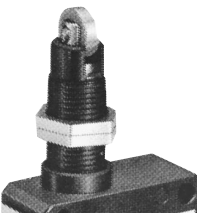
O.F. (max.)	1,200g
R.F. (min.)	500g
P.T. (max.)	1.5 mm
O.T. (min.)	3 mm
D.T. (max.)	0.1 mm
O.P.	41,4 mm



Limit and Enclosed Switches

Compact Limit Switches

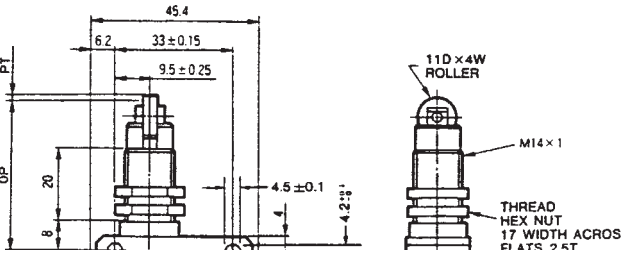
SL1 Series



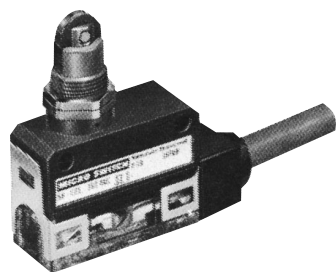
**LONG CROSS ROLLER
PLUNGER**

Catalog Listing	
	SL1-K
	SL1-KK

O.F. (max.)	1,200g
R.F. (min.)	500g
P.T. (max.)	1.5mm
O.T. (min.)	3mm
D.T. (max.)	0.1mm
O.P.	41,4mm



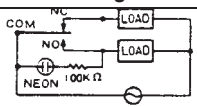
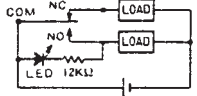
COMPACT LIMIT SWITCHES WITH LAMP INDICATION



FEATURES

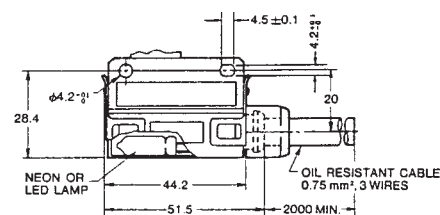
- Available with neon lamp for 100-250 VAC. Available with LED lamp for 24 VDC
- Lamp indication clearly visible from most angles through the rugged transparent nylon enclosure
- Provided with oil resistant vinyl cabtyre cable

ORDER GUIDE

Specification	Catalog Listing	Wiring
<ul style="list-style-type: none"> • Neon lamp • 100 to 250 VAC • Silver contact 	SL1-□ EXG2	
<ul style="list-style-type: none"> • LED lamp • 24 VDC • Gold clad 	SL1-□ KFXG2	

MOUNTING DIMENSIONS

(For reference only) Dimensions - mm



General Purpose Compact Limit Switches

VL Series

FEATURES

- Gold plated silver contacts
- Compact design for small mounting space.
- Special design for easy wiring with ample wiring space
- Two-circuit double-break
- Diecast base and plastic cover
- Standard mounting dimensions
- Long mechanical life
- 5Amp current capacity
- Ambient Temp range: -20 to 60 Degrees Celsius [-4 to 140 degrees Fahrenheit]
- C-UL, CE approved

TYPICAL APPLICATIONS

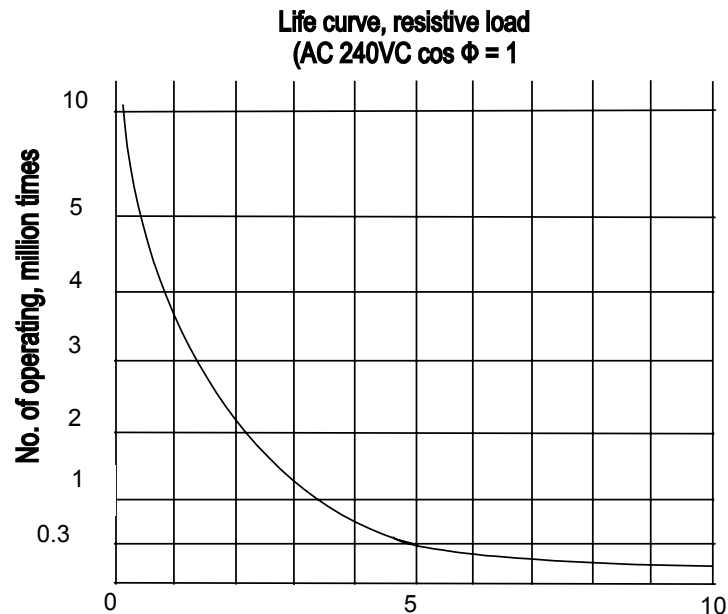
- Machine Tools
- Material Handling
- Food Processing Machinery
- Conveyors
- Packaging Machinery



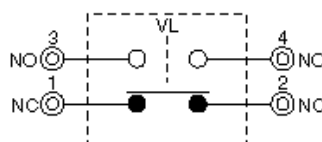
DESCRIPTION

The new economical SZL-VL Series miniature type limit switches are specially designed for applications of small mounting space. These miniature switches are ideal for OEM machinery which requires a rugged and reliable limit switch that is capable of being mounted in space restricted applications. A wide range of actuators and optional neon lamp indicators add additional flexibility. A special pre-molded flexible cable gland allows for fast and simple wiring termination

LIFE CURVE






CIRCUITRY



General Purpose Compact Limit Switches

VL Series




SELECTION GUIDE

			
	SZL-VL-A	SZL-VL-B	SZL-VL-C
Features			
Actuator	Side Rotary - Roller Lever Standard	Side Rotary - Roller Lever Adjustable	Side Rotary - Rod Adjustable
Operating Force (O.F.)	5,88 N max. [1.32 lbs max.]	3,35 N - 7,84 N max. [0.75 lbs - 1.76 lbs max.]	2 N - 7,84 N max. [.45 lbs - 1.76 lbs max.]
Release Force (R.F.)	0,49 N min. [0.11 lbs min.]	0,21 N - 0,49 N min. [0.046 lbs - 0.11 lbs min.]	0,12 N - 0,49 N min. [0.026 lbs - 0.11 lbs min.]
Pretravel (P.T.)	20 ° max.	20 ° max.	20 ° max.
Overtravel (O.T.)	75 ° min.	75 ° min.	75 ° min.
Differential Travel (D.T.)	10 ° max.	10 ° max.	10 ° max.
Product Type	Miniature Limit Switches		
Ampere Rating	5.0 A / 0.4 A		
Supply Voltage	250 Vac max. / 125 Vdc max.		
Termination Type	Cable Gland		
Operating Temperature Range	-20 °C to 60 °C [-4 °F to 140 °F]		
Vibration	55 Hz at double amplitude of 1.5 mm		
Housing Material	Zinc Die-Cast / Plastic		
Shock	10 g max.		
Circuitry	1NC 1NO SPDT; Double Break		
Approvals	UL, C-UL, CE		
Sealed	Industrial		
UL File #	E150950		
Availability	North-America; Asia-Pacific		
Sealing	IP64		
Mechanical Life	up to 10 million operations		
Series Name	VL Series		

General Purpose Compact Limit Switches

VL Series



SELECTION GUIDE

			
	SZL-VL-D	SZL-VL-E	SZL-VL-F
Features			
Actuator	Top Plunger	Cross Roller Plunger	Wobble - Plastic Rod Coil Spring
Operating Force (O.F.)	8,83 N max. [2 lbs max.]	8,83 N max. [2 lbs max.]	0,88 N max. [0.2 lbs max.]
Release Force (R.F.)	1,47 N min. [0.33 lbs min.]	1,47 N min. [0.33 lbs min.]	-
Pretravel (P.T.)	1,5 mm max. [0.060 in max.]	1,5 mm max. [0.060 in max.]	30 mm max. [1.18 in max.]
Overtravel (O.T.)	4 mm min. [0.158 in min.]	4 mm min. [0.158 in min.]	20 mm min. [0.788 in min.]
Differential Travel (D.T.)	0,7 mm max. [0.028 in. max.]	0,7 mm max. [0.028 in. max.]	-
Product Type	Minature Limit Switches		
Ampere Rating	5.0 A / 0.4 A		
Supply Voltage	250 Vac max. / 125 Vdc max.		
Termination Type	Cable Gland		
Operating Temperature Range	-20 °C to 60 °C [-4 °F to 140°F]		
Vibration	55 Hz at double amplitude of 1.5 mm		
Housing Material	Zinc Die-Cast / Plastic		
Shock	10 g max.		
Circuitry	1NC 1NO SPDT; Double Break		
Approvals	UL, C-UL, CE		
Sealed	Industrial		
UL File #	E150950		
Availability	North-America; Asia-Pacific		
Sealing	IP64		
Mechanical Life	up to 10 million operations		
Series Name	VL Series		

General Purpose Compact Limit Switches

VL Series

SELECTION GUIDE

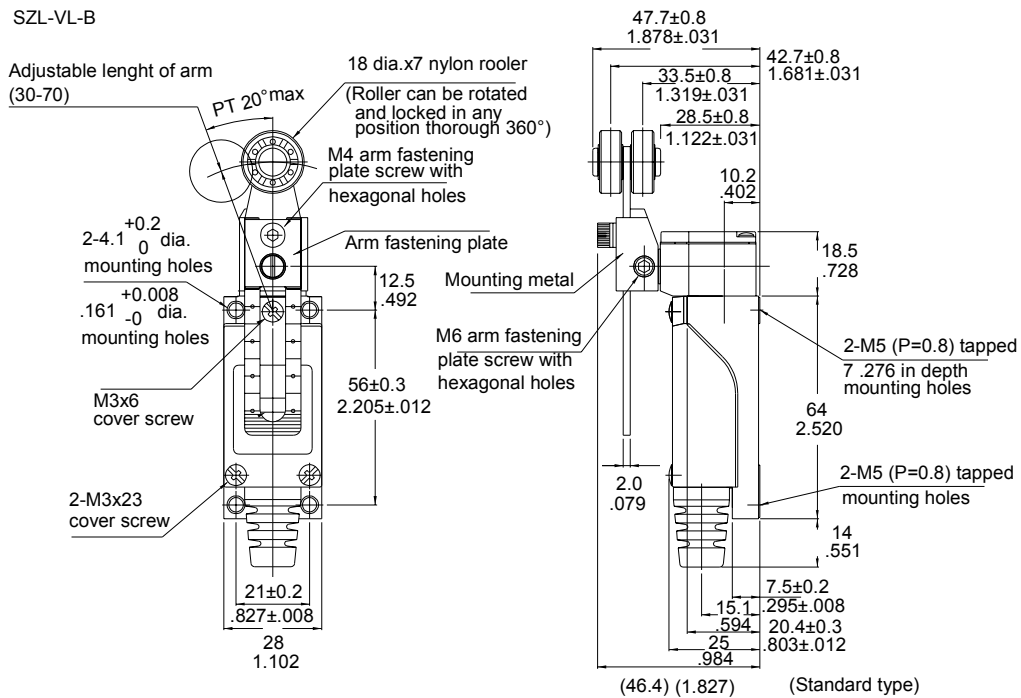
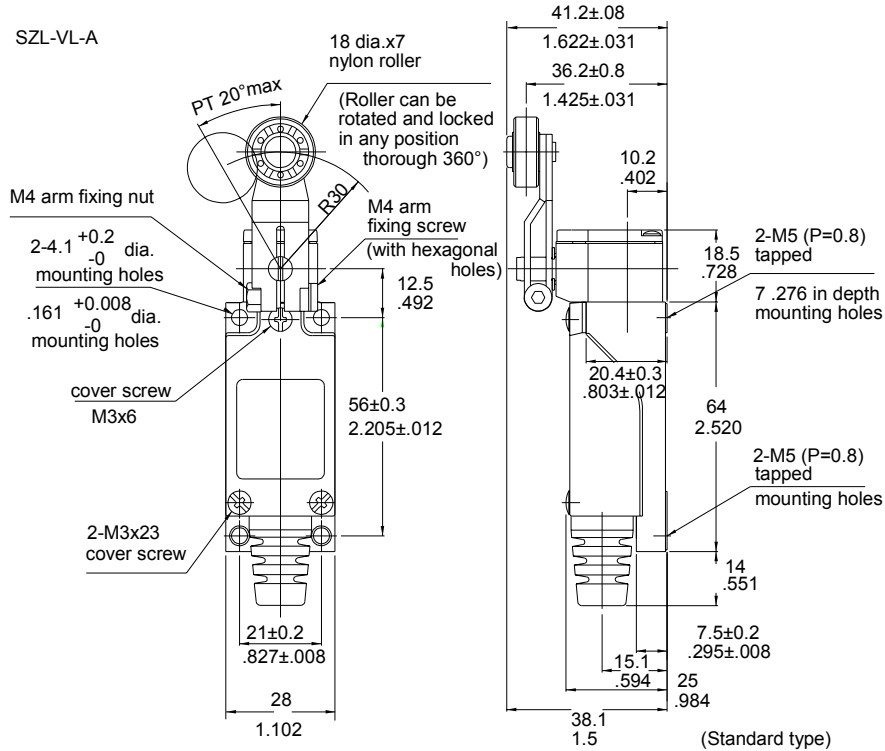
	 SZL-VL-G	 SZL-VL-H	
Features			
Actuator	Wobble - Coil Spring	Roller Plunger	
Operating Force (O.F.)	0,88 N max. [0.2 lbs max.]	8,83 N max. [2 lbs max.]	
Release Force (R.F.)	-	1,47 N min. [0.33 lbs min.]	
Pretravel (P.T.)	30 mm max. [1.18 in max.]	1,5 mm max. [0.060 in max.]	
Overtravel (O.T.)	20 mm min. [0.788 in min.]	4 mm min. [0.158 in min.]	
Differential Travel (D.T.)	-	0,7 mm max. [0.028 in. max.]	
Product Type	Minature Limit Switches		
Ampere Rating	5.0 A / 0.4 A		
Supply Voltage	250 Vac max. / 125 Vdc max.		
Termination Type	Cable Gland		
Operating Temperature Range	-20 °C to 60 °C [-4 °F to 140°F]		
Vibration	55 Hz at double amplitude of 1.5 mm		
Housing Material	Zinc Die-Cast / Plastic		
Shock	10 g max.		
Circuitry	1NC 1NO SPDT; Double Break		
Approvals	UL, C-UL, CE		
Sealed	Industrial		
UL File #	E150950		
Availability	North-America; Asia-Pacific		
Sealing	IP64		
Mechanical Life	up to 10 million operations		
Series Name	VL Series		

General Purpose Compact Limit Switches

VL Series

MOUNTING DIMENSIONS (For Reference Only)

mm
in

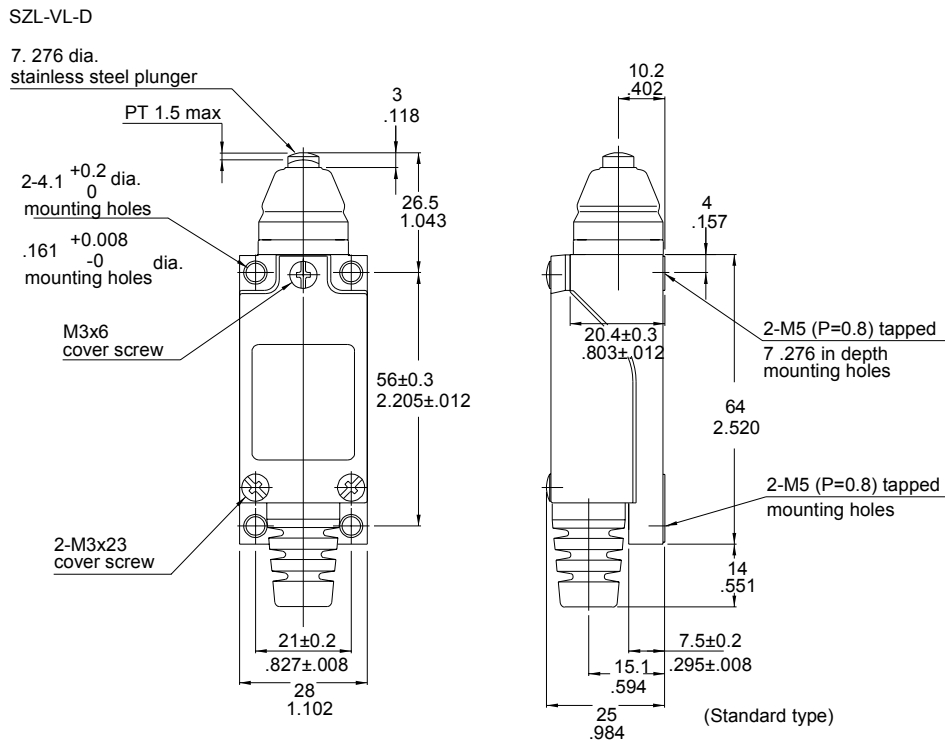
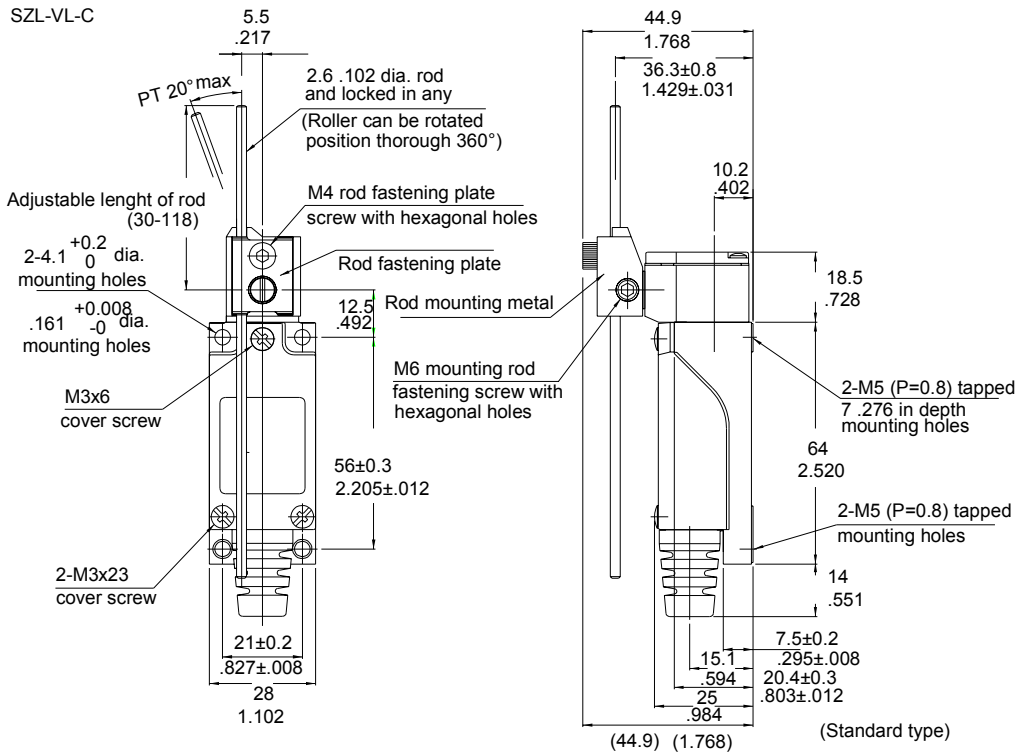


For application help: call 1-800-537-6945

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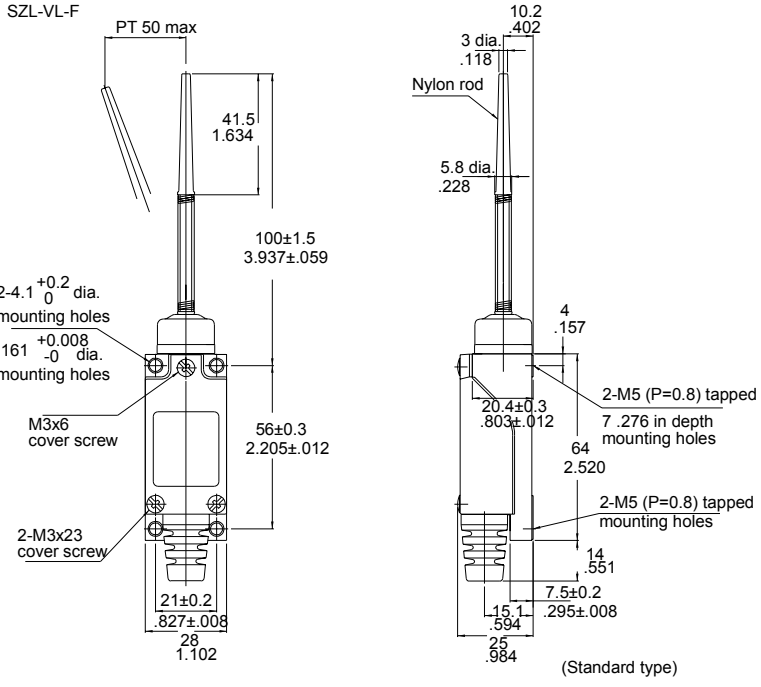
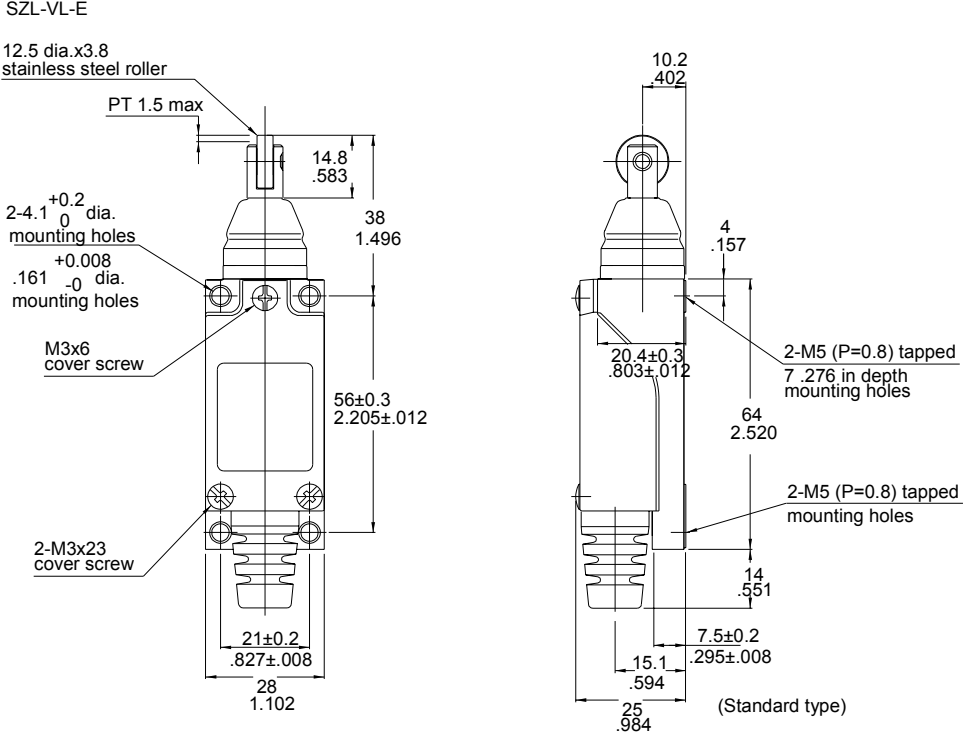
General Purpose Compact Limit Switches

VL Series



General Purpose Compact Limit Switches

VL Series



For application help: call 1-800-537-6945

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General Purpose Compact Limit Switches

VL Series

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For application assistance, current specifications, or name of the nearest Authorized Distributor, check the Honeywell web site or call:

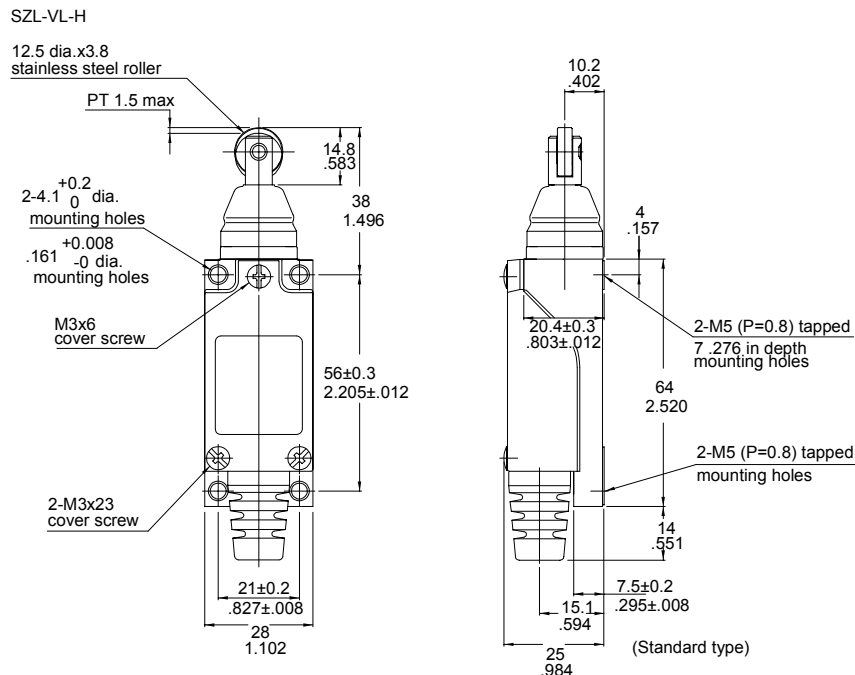
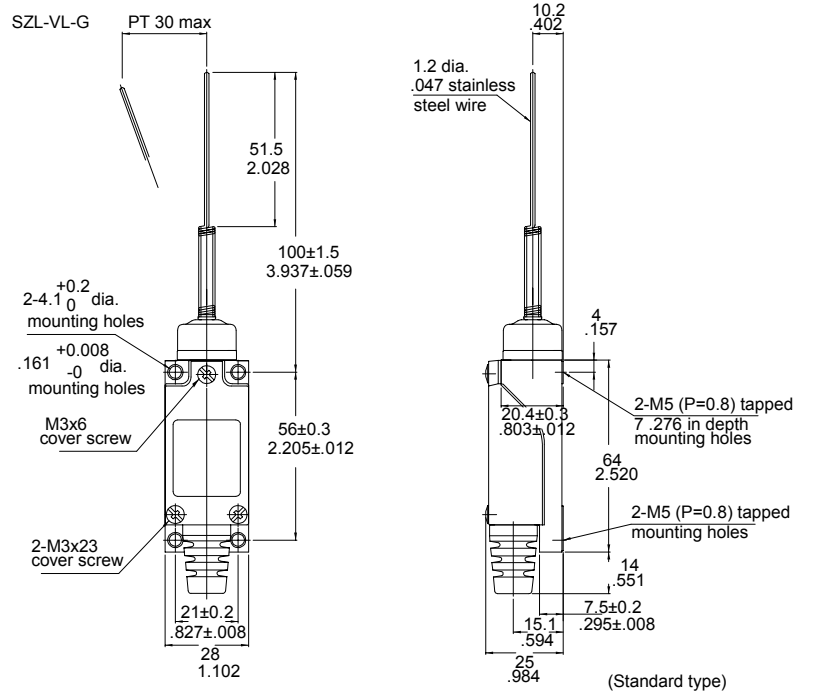
1-800-537-6945 USA
1-800-737-3360 Canada
1-815-235-6847 International

FAX

1-815-235-6545 USA

INTERNET

www.honeywell.com/sensing
info@micro.honeywell.com

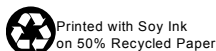


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Freeport, Illinois 61032



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91MCE Series

Mini Compact Limit Switch



DESCRIPTION

The 91MCE series limit switch is a compliment to Honeywell's existing product line of smaller, lower cost limit switches. Designed for modern industrial OEMs, the miniature package size fits in applications where space is limited. The small package size can be gang mounted for applications requiring more than two switch circuits. The 20mm mounting pattern meets most globally accepted mounting standards.

This product family offers the user many options including a variety of different actuator styles. Connection options include

pre-leaded cable in various lengths or M12 connectors, both with side or bottom exits. Design flexibility is further enhanced with the availability of both slow action and snap action circuitry. Direct acting contacts are designed to open the NC contact when actuated. The epoxy-sealed rugged die-cast housing provides enhanced environmental durability.

Priced competitively, the 91MCE is a drop-in replacement to many products, and provides enhanced quality that customers expect from Honeywell.

FEATURES

- Direct acting contacts are designed to open NC contacts when actuated ➡
- Sealed to IP67; NEMA 1, 4, 12, 13 suitable for outdoor applications
- CE, cULus, CCC approvals meet most global approvals
- Nine actuator styles offer design flexibility
- Slow-action and snap-action circuitry options
- Pre-leaded cable and M12 connector options
- Expected mechanical life: 5 million operations
- Side exit (standard) and bottom exit connection options

POTENTIAL APPLICATIONS

- Machine equipment
- Material handling
- Aerial lifts
- Forklifts
- Off road and outdoor equipment

91MCE Series

TECHNICAL SPECIFICATIONS

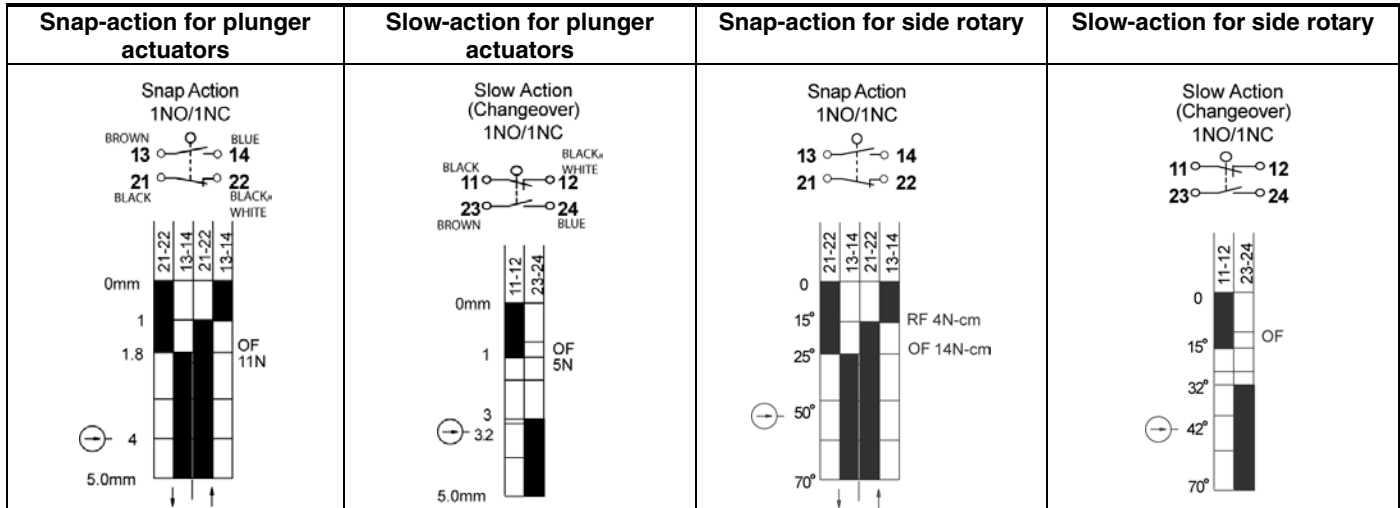
Parameter	Measure
Operating speed	0,05 mm to 1 m per second
Operating frequency – mechanical	120 ops per minute
Operating frequency – electrical	30 ops per minute
Insulation resistance	> 100 Mohm @ 500 Vdc
Rated voltage	300 Vac (EN60947-5-1)
Rated thermal current	10A pre-leaded versions; 3A connector versions
Electrical rating	ac 15 A 300; dc 13 Q300
Dielectric strength	1000 Vac for one minute between current carrying parts 2500 Vac for one minute between non-current carrying parts
Expected mechanical life	5 million operations
Expected electrical life	5 x 10 ⁵ operations
Operating temperature	-25 °C to 85 °C [-13 °F to 185 °F] without the formation of ice
Humidity	< 95 % RH
Cable	5 core, 0.75 mm ²
Degree of protection	IP67

ELECTRICAL RATINGS

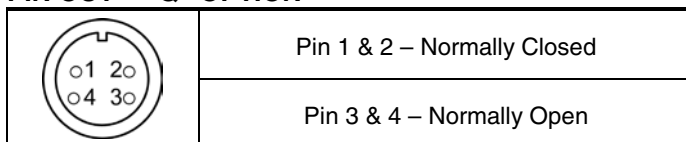
IEC 947-5-1 / EN 90947-5-1

Designation & Utilization Category	Rated operational current I _e (A) at rated operational voltage U _e						VA rating	
	120 V	240 V	380 V	480 V	500 V	600 V	Make	Break
AC15 A300	6	3	–	–	–	–	7200	720
	125 Vdc		250 Vdc					
DC13 Q300	0.55	0.27					69	69

BAR CHARTS



PIN OUT – “Q” OPTION

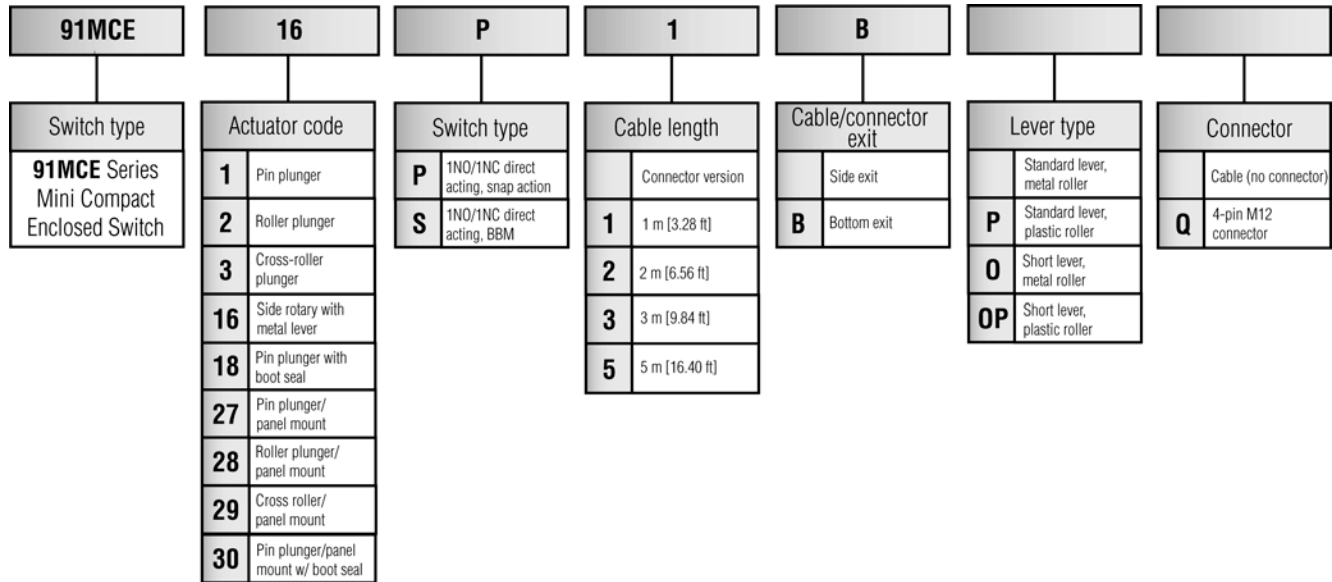


Mini Compact Limit Switch

DIMENSIONS


<p>91MCE1-P1/S1 – PIN PLUNGER</p>	<p>91MCE2-P1/S1 – ROLLER PLUNGER</p>	<p>91MCE3-P1/S1 – CROSS ROLLER PLUNGER</p>
<p>91MCE16-P1/S1 – SIDE ROTARY LEVER WITH METAL ROLLER</p>	<p>91MCE18-P1/S1 - PIN PLUNGER WITH BOOT SEAL</p>	<p>91MCE27-P1/S1 - PANEL MOUNT PIN PLUNGER</p>
<p>91MCE30-P1/S1 - PANEL MOUNT BOOTED PIN PLUNGER</p>	<p>91MCE28-P1/S1 – PANEL MOUNT ROLLER PLUNGER</p>	<p>91MCE29-P1/S1 – PANEL MOUNT CROSS ROLLER PLUNGER</p>

91MCE SWITCH PART NUMBER TREE



WARNING

IF USED IN APPLICATIONS CONCERNING HUMAN SAFETY

- Only use NC direct opening (“positive opening”/“positive break”) contacts, identified by the symbol .
- Do NOT use flexible/adjustable actuators. Only use actuators designed for safety applications.
- Do NOT defeat, tamper, remove, or bypass this switch.
- Hazardous voltage, disconnect power before servicing.
- Strictly adhere to all installation and maintenance instructions
- Consult with local safety agencies and their requirements when designing a machine-control link, interface, and all control elements that affect safety.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer’s sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828; +65 6445-3033 Fax
Europe	+44 (0) 1698 481481; +44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188; +1-305-883-8257 Fax
USA/Canada	+1-800-537-6945; +1-815-235-6847 +1-815-235-6545 Fax

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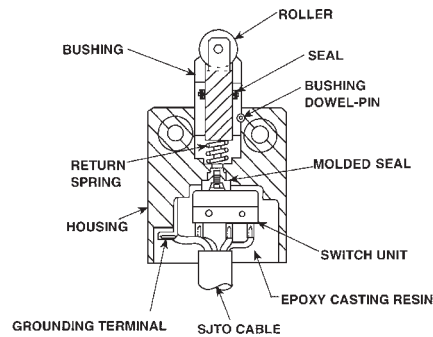
002311-2-EN IL50 GLO Printed in USA
June 2010
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Honeywell

Limit and Enclosed Switches

Miniature Pre-Wired Enclosed Switches

914CE Series



FEATURES

- Miniature size
- Wide selection of actuators
- Precision characteristics
- Zinc die cast housing
- Optional mounting bracket
- Fluorocarbon seal available
- Preleaded or connector versions
- Temperature range 35° to 160°F (2° to 71°C) for NEMA 1 and 3 only versions; all others 10° to 200°F (-12° to 93°C)
- UL Recognized, file #E41859
- CSA Certified, file #LR15775
- CE Certified
- Low temp. versions available (-40°C & °F)

ELECTRICAL RATING

Circuitry	Load	Amps		
		Make	Break	
<p>Single-pole Double-throw</p>	A	240 VAC, ind. 240 VAC, res. 28 VDC, res. 28 VDC, ind. UL/CSA: 5 amps, 1/10 Hp, 125 or 250 VAC	1.2 5 3 3	0.2 5 3 3
	B	1 amp res., 0.5 amp ind., 30 VDC UL Rating: 1 amp, 125 VAC		
	C	UL/CSA Rating 3 amp, 125 or 250 VAC		

NOTE: Bushing seal shown refers to "K" roller plunger and cross-roller plunger list-ings only.

Factory pre-wiring with industrial quality cable (type SJTO) allows for miniaturization of the connection and eliminates the need to wire at the switch. This allows the 914CE to be used in limited access areas.

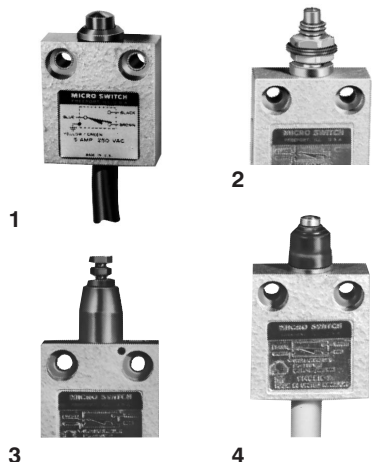
The cable electrical connection and basic switch terminals are encapsulated in an epoxy compound. An elastomer seal between the plunger and switch housing, plus mounting screw holes with continuous walls, keep liquids from entering the switch cavity. The seal boot offered on the 914CE18 and 914CE20 prevents contaminants from impeding plunger movement.

A full range of actuators is available, including plain plungers, roller plungers, side rotary, multi-directional wire, and manual. Any of the LS or HDLS limit switch levers may be used with the side rotary 914CE16. Pages A37 & A39.

914CE's may be specified with 3-foot (0,91 m), 6-foot (1,83 m), or 9-foot (2,74 m) cable.

A 90° steel bracket (Catalog Listing 933PA1) is available for mounting a switch in various planes relative to the mounting surface. See page A92.

PLUNGER ACTUATED SWITCHES



For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

CABLE TERMINATION



Side Exit

GANG MOUNT TO BUILD MULTIPLE-PLUNGER SWITCH

.63 in. (16mm) between plungers.



Bottom Exit

ORDER GUIDE

Description (Bottom exit cable unless otherwise noted)	Catalog Listing*	NEMA	Elec. Rating	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
Plunger ¹	914CE1-3	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Plunger ¹ Gold Contacts	914CE1-3G	1,3	B	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Plunger ¹ (Side exit cable)	914CE1-3A	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Bushing mount Plunger ²	914CE27-3	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Adjustable Plunger ³	914CE19-3	1,3,4 12,13	A	22,2 5	1,8 .071	3,0 .118	0,1 .004
Boot sealed Plunger ⁴	914CE18-3	1,3,4 12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
Side exit cable	914CE18-3A	1,3,4 12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
Fluorocarbon Seals	914CE18-3V						

N = Newtons
* These listings have 0,91m (3 ft.) cable. To order 1.83 (6 ft.) cable, change the -3 to -6. To order 2,74m (9 ft.) cable, change the -3 to -9.

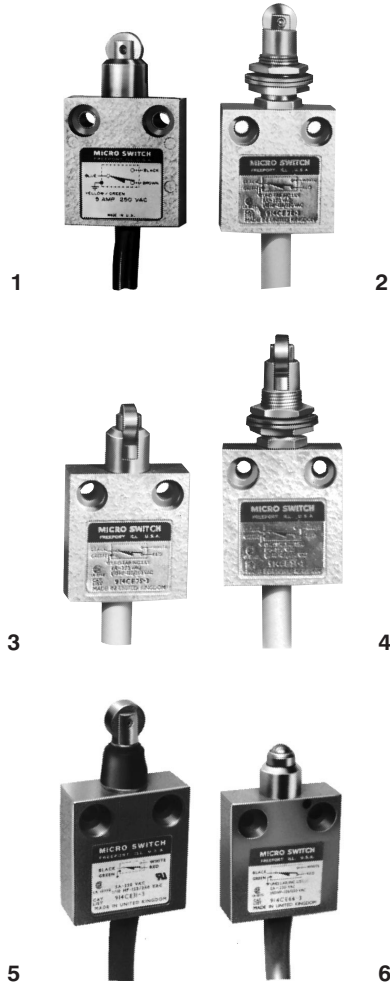
Characteristics: O.F. – Operating Force; P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

Limit/Enclosed

Miniature Pre-Wired Enclosed Switches

ROLLER PLUNGER ACTUATED SWITCHES

ORDER GUIDE



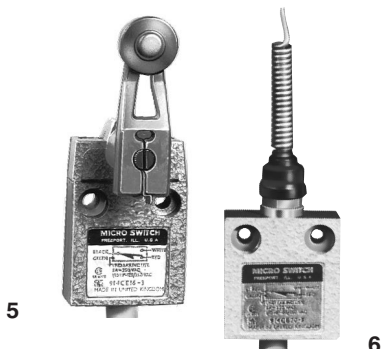
NOTE:
Switches held depressed for extended periods of time at temperature extremes may experience retarded plunger return upon deactuation. Where such a condition exists in the application, contact the 800 number.

Description** (Bottom exit cable unless otherwise noted.)	Catalog Listing	NEMA	Elec. Rating	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
Roller Plunger ¹	914CE2-3	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
	914CE2-3K	1,3,4,6 6P,12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
	914CE2-3C	1,3	A SPDADB	17,8 4	1,8 .071	3,0 .118	0,51 .020
Roller Plunger ¹ Gold Contacts	914CE2-3G	1,3	B	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Roller Plunger ¹ (Side exit cable)	914CE2-3A	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
	914CE2-3AK	1,3,4,6 6P,12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
Bushing Mount Roller Plunger ²	914CE28-3	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Cross Roller Plunger ³	914CE3-3	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
	914CE3-3K	1,3,4,6 6P,12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
Cross Roller Plunger ³ Gold Contacts	914CE3-3G	1,3	B	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Cross Roller Plunger ³ (Side exit cable).	914CE3-3A	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
	914CE3-3AK	1,3,4,6 6P,12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
Bushing Mount Cross-Roller Plunger ⁴	914CE29-3	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Boot Sealed Roller Plunger ⁵ Fluorocarbon Seals	914CE31-3	1,3,4,6 6P,12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
	914CE31-3V						
Boot Sealed Cross Roller Plunger	914CE55-3	1,3,4,6 6P,12,13	A	22,3 5	1,8 .071	3,0 .118	0,1 .004
Ball Bearing ⁶	914CE66-3	1,3	A	12,2 2.75	1,8 .071	3,0 .118	0,1 .004

SIDE ROTARY AND WOBBLE ACTUATED SWITCHES

ORDER GUIDE

Lever not included on side rotary versions. Any LS or HDLS lever may be used. See pages A37 to A39.



Description (Bottom exit)	Catalog Listing	NEMA	Elec. Rating	O.F. max.	P.T. max.	O.T. min.	D.T. max.
Side*** rotary ⁵	914CE16-3	1,3,4,6 6P,12,13	A	0,34 Nm 3 in. lbs.	30°	40°	3°
Side rotary ⁵ Side exit cable	914CE16-3A	1,3,4,6 6P,12,13	A	0,34 Nm 3 in. lbs.	30°	40°	3°
Multidirectional spring wire wobble actuator ⁶	914CE20-3	1,3,4,6 6P,12,13	A	0,56 N 2 oz.	—	—	—
	9PA86-CE	Replacement Actuator					

N = Newtons
* These listings have 0,91m (3 ft.) cable. To order 1,83m (6 ft.) cable, change the -3 to -6. For other cable lengths, contact the 800 number.

** Snap release not recommended on these devices.

*** Switch operates on clockwise and counterclockwise rotation of the lever shaft.

Characteristics: O.F. - Operate Force; P.T. - Pretravel; O.T. - Overtravel; D.T. - Differential Travel

Limit and Enclosed Switches

914CE Series

Miniature Pre-Wired Enclosed Switches

MANUALLY OPERATED SWITCHES



ORDER GUIDE

Description (Bottom exit cable)	Catalog Listing*	NEMA	Elec. Rating	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
.94 in. (23,9mm) dia. button	914CE22-3	1,3	A	8,9 2	1,8 .071	3,0 .118	0,1 .004

N = Newtons

*These listings have 0,91m (3 ft.) cable. To order 1,83m (6 ft.) cable, change the -3 to -6. For other cable lengths, contact the 800 number.

Characteristics: O.F. – Operate Force; P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel

MINIATURE ENCLOSED SWITCHES WITH CONNECTORS

ORDER GUIDE WITH AC STYLE CONNECTORS

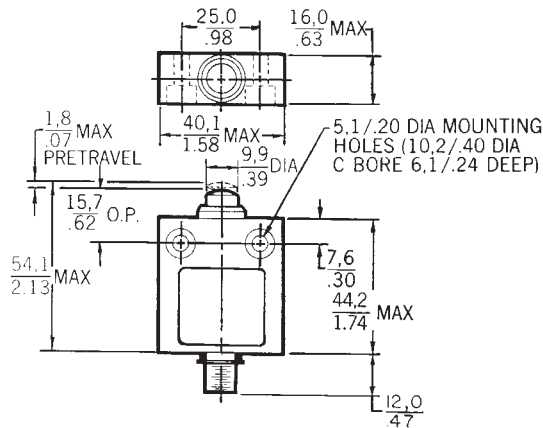
Description	Connector Exit	Catalog Listing	NEMA	Elec. Rating	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
Plunger	Bottom	914CE1-Q1	1, 3	C	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
Boot sealed plunger	Bottom	914CE18-Q1	1, 3, 4, 6	C	22,3 5	1,8 .071	3,0 .118	0,1 .004
	Side	914CE18-AQ1	12, 13					
Roller plunger	Bottom	914CE2-Q1	1, 3	C	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
	Bottom	914CE2-KQ1	1, 3, 4, 6, 12, 13					
Cross roller plunger	Bottom	914CE3-Q1	1, 3	C	12,2 2.75	1,8 .071	3,0 .118	0,1 .004
	Bottom	914CE3-KQ1	1, 3, 4, 6, 12, 13					
Side rotary (w/o lever)	Bottom	914CE16-Q1	1, 3, 4, 6	C	0,34 Nm 3 in. lb.	30°	40°	3°
	Side	914CE16-AQ1	12, 13					
Bushing mount Roller plunger	Bottom	914CE28-Q1	1, 3	C	12,2 2.75	1,8 .071	3,0 .118	0,1 .004



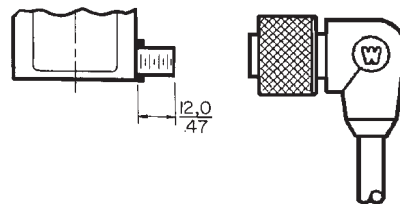
Limit/Enclosed

For DC style connectors, delete the "1" at the end of the catalog listing. Example: 914CE1-Q1 (AC); 914CE1-Q (DC).

MOUNTING DIMENSIONS PLAIN PLUNGER/RECEPTACLE



Bottom Exit Connector



Side Exit Connector

Miniature pre-wired enclosed switches

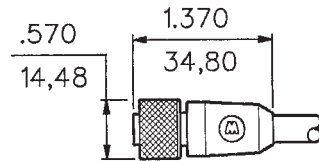
QUICK-CONNECT CABLES

914CE switches mate with the quick-connect cables listed below. The cable has PVC sheathing and #22 AWG leadwires.

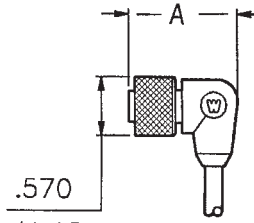
AC STYLE CABLES

Connector Style	Cable Length	Catalog Listing
Straight	6'	704000D02F060
	20'	704000D02F200
Right angle (90°)	6'	704001D02F060
	20'	704001D02F200

MOUNTING DIMENSIONS



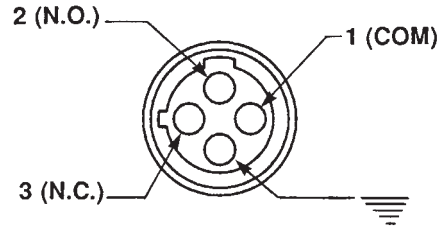
Straight Style Connector



Right Angle (90°) Style Connector

Dimension "A"
 AC Style - 1.375 (34,9)
 DC Style - 1.050 (26,7)

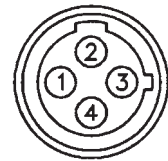
AC Style Pin Configuration (male receptacle)



Pin Layout

AC Style Pin Configuration (cable plug)

(Face view of female connector)

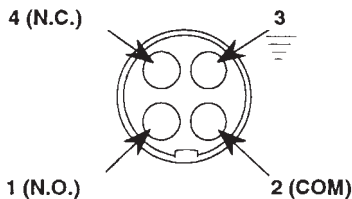


Pin #1 = Red w/Black Tr.-Common
 Pin #2 = Red w/White Tr.-Normally Open
 Pin #3 = Red-Normally Closed
 Pin #4 = Green-Ground

DC STYLE CABLES

Connector Style	Cable Length	Catalog Listing
Straight	2 M	804000A09M020
	5 M	804000A09M050
Right angle (90°)	2 M	804001A09M020
	5 M	804001A09M050

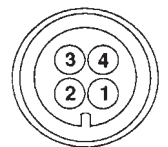
DC Style Pin Configuration (male receptacle)



Pin Layout

DC Style Pin Configuration (cable plug)

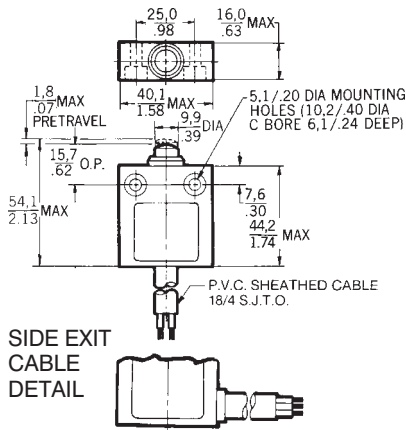
(Face view of female connector)



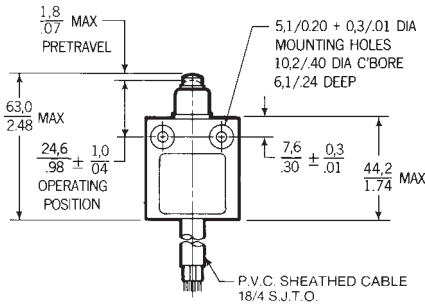
Pin #1 = Brown leadwire/Normally opened
 Pin #2 = White leadwire/Common
 Pin #3 = Blue leadwire/Ground
 Pin #4 = Black leadwire/Normally closed

Mounting Dimensions

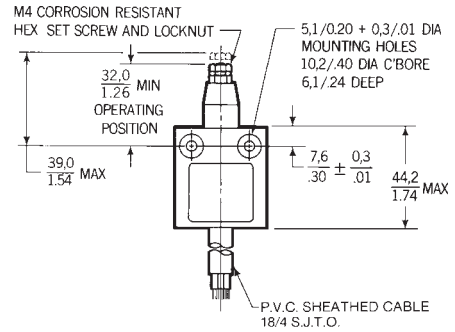
PLUNGER/CABLE



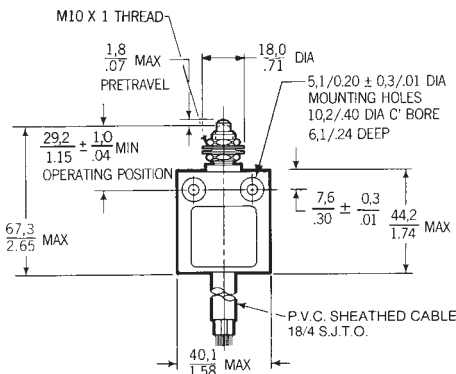
PLUNGER (With seal boot)



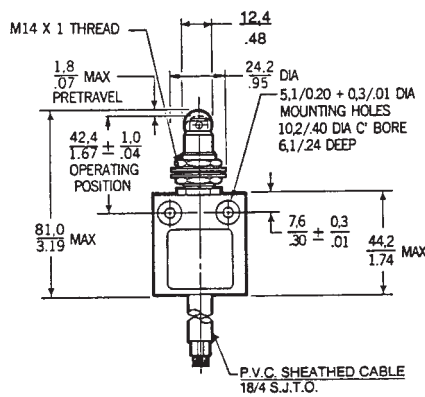
ADJUSTABLE PLUNGER



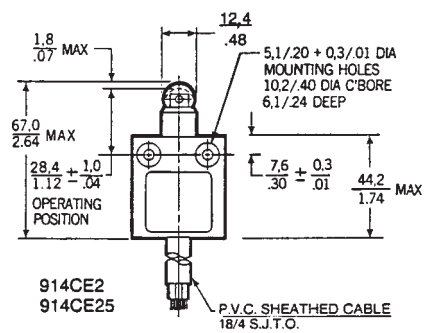
PLUNGER (Bushing mount)



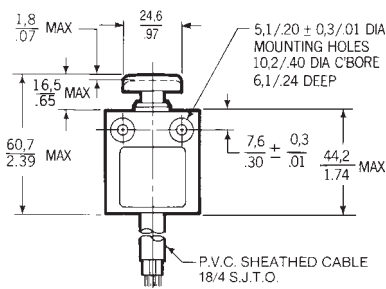
ROLLER PLUNGER (Bushing mount)



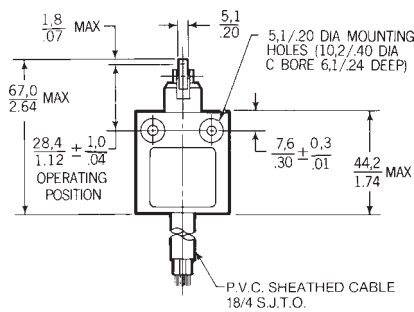
ROLLER PLUNGER



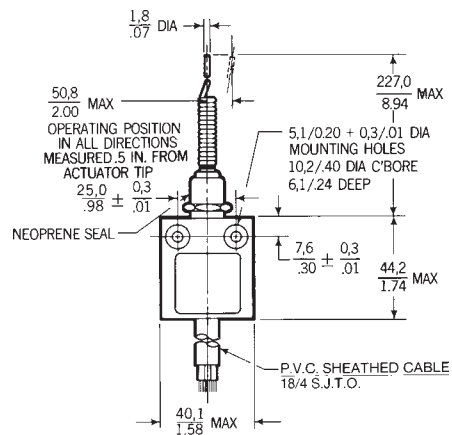
MANUAL OPERATOR



CROSS ROLLER PLUNGER



MULTIDIRECTIONAL WIRE



Limit/Enclosed

Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com

Plastic Enclosed Switches



BF Series Plastic Enclosed Basic Switches are available with a wide variety of operators, and are designed for easy mounting and wiring.

BF switches mount utilizing two (2) #6 screws installed through the two diametrically opposite mounting holes in the switch housing (2.312 in x 1.375 in spacing). The BF switches are designed to allow mounting with the cover either towards or away from the mounting surface. It may be more convenient to select the appropriate operator orientation to allow mounting with the cover away from the mounting surface, permitting wiring after mounting.

Switches with lever type actuators (actuator code L in the second position after the dash) are adjustable in two directions. The entire actuator can be rotated around its mounting bushing, and the angle of the lever can also be changed.

FEATURES

- Wide variety of actuators — roller levers, wobble levers, and pin plungers
- Four conduit openings:
 - 1/2-14 NPT
 - 1/2-14 NPSM
 - PF1/2
 - PG13.5
- Large internal cavity for easy wiring
- Pressure plate style wire clamps
- Rugged plastic enclosure eliminates need for grounding
- Several basic switches available ranging from 0.1 Amp electronic duty gold contact to 11 Amp 1/3 HP
- Sealed to NEMA 1, 3, 4 and 13 requirements
- Wide temperature range, –25 to +160°F (–31 to +71°C)
- UL recognized

TYPICAL APPLICATIONS

- Overhead cranes and hoists
- Surface transportation equipment
- Special machinery
- Agricultural equipment
- Earth moving equipment

Limit/Enclosed

Plastic Enclosed Switches

ORDER GUIDE

BF _____

ORIENTATION _____
L L.H. Actuator, std. mtg.

CONDUIT OPENING _____
1 1/2 - 14 NPT
2 1/2 - 14 NPSM
3 PF1/2
4 PG13.5

BASIC SWITCH _____
A 5 Amp - V7
B 11 Amp - V7
S 0.1 Amp Gold Clad - V7

ACTUATOR _____
L1 Roller Lever
L2 Rod Lever
L3 One Way Roller Lever
L4 Manual Lever
P1 Straight Plunger, Std.
W1 Coil Spring Wobble
W2 Plastic Wobble, Std.
W3 Plastic Wobble, Tall
W4 Spring Wire, Std.
W5 Spring Wire, Tall

SEALING PACKETS (for use with the 1/2-14 npt conduit opening)

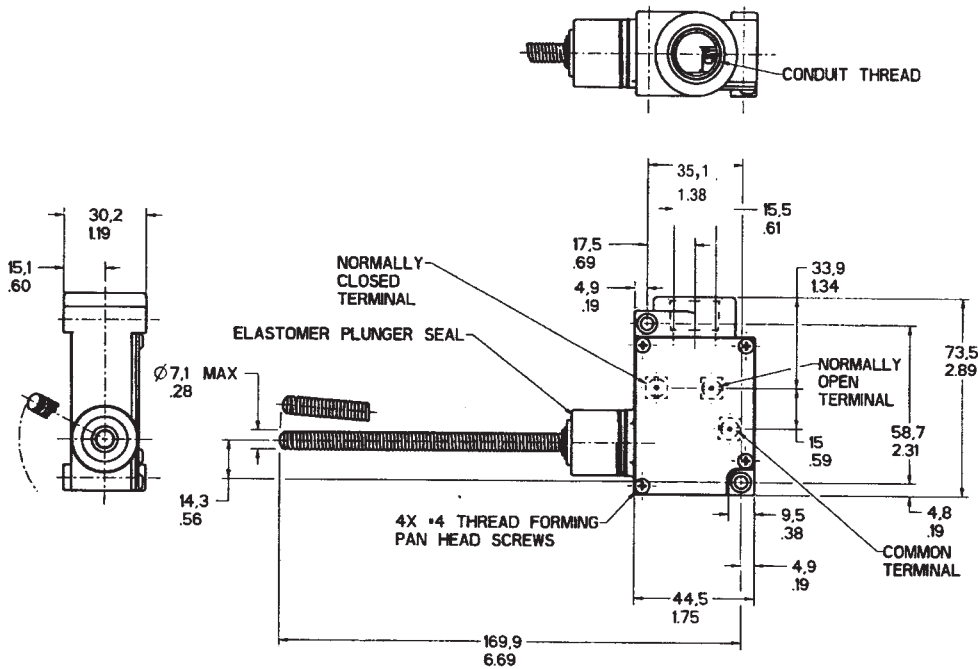
Packet (for use with 1/2-14 NPT)	Cable O.D. In. (mm)
2PA6	.400 - .435 (10,2 - 11,05)
2PA16	.435 - .470 (11,05 - 11,90)
2PA1	.530 - .570 (13,5 - 14,5)

A liquid tight conduit fitting for the 1/2-14 NPT conduit opening is also available.

Packet	Cable O.D. In. (mm)
2PA17	.170 - .470 (4,3 - 11,9)

MOUNTING DIMENSIONS (For reference only)

COIL SPRING WOBBLE LEVER

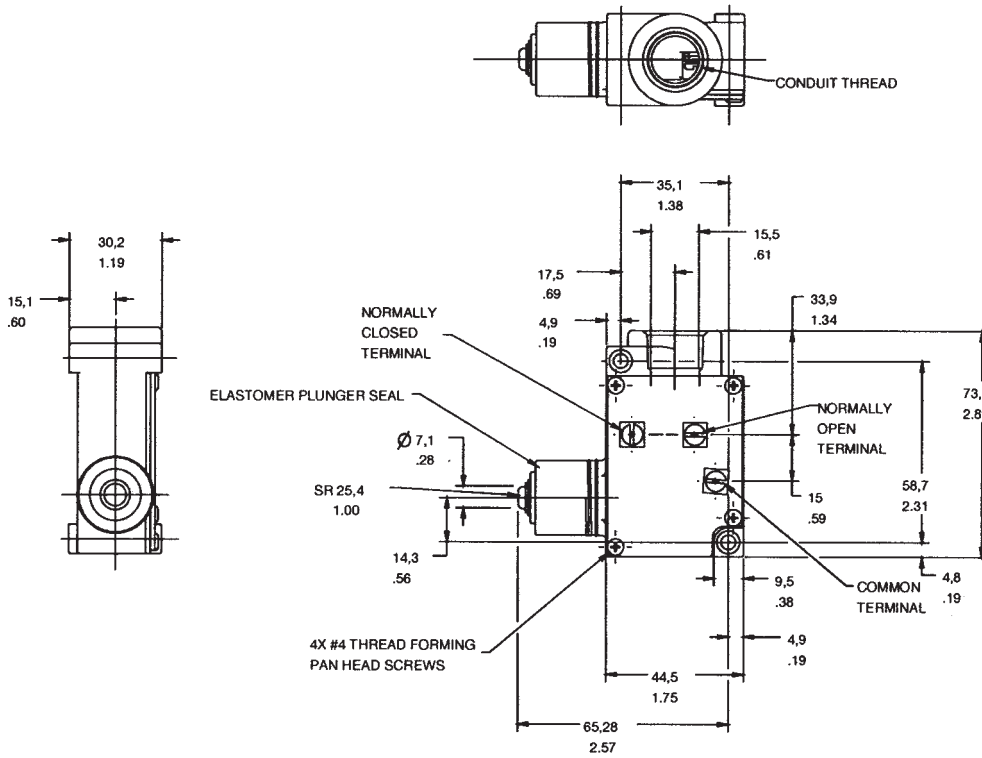


Limit and Enclosed Switches

BF Series

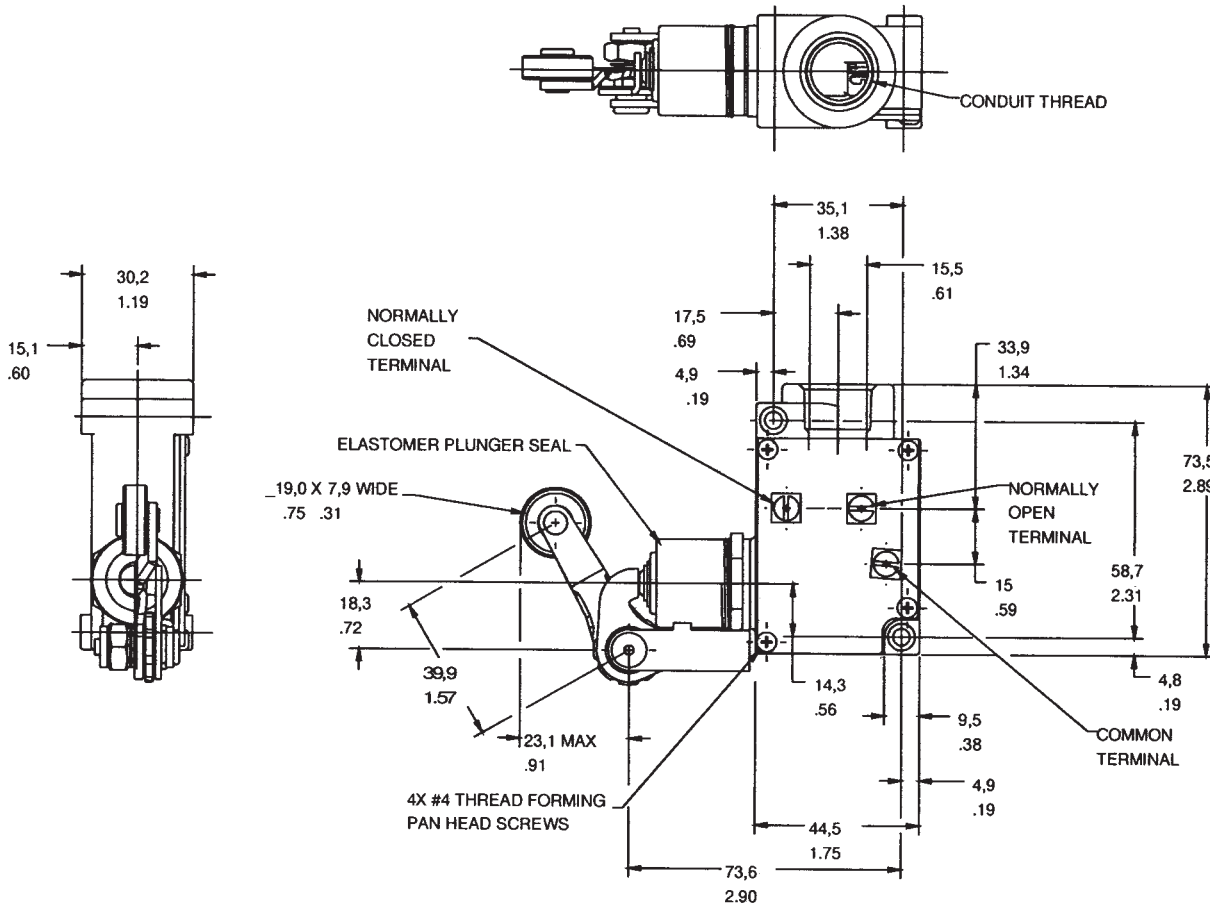
Plastic Enclosed Switches

PIN PLUNGER



Limit/Enclosed

ROLLER LEVER



Limit and Enclosed Switches

Compact Enclosed Switches

E6/V6 Series



FEATURES

- Side or flange mount
- Momentary or maintained contact
- Grounding screw
- High capacity (22 amp) available
- Temperature range -25°F to +160°F (-32° to +71°C)
- Cast zinc housing NEMA 1
- UL Recognized, file #E12252
- CSA Certified, file #LR41372
- E6 NEMA 1
- V6 NEMA 1, 3
- Epoxy filled NEMA 1, 3, 4, 12, 13
- Preleaded or connector termination options

STRAIGHT PLUNGER ACTUATED SWITCHES



Side mount with seal boot



Side mount without seal boot

ROLLER PLUNGER ACTUATED SWITCHES



Side mount with seal boot

E6 (side mount) and V6 (flange mount) switches are offered with or without actuator seal boots. Both have a combination insulator/seal cemented inside the bottom enclosure. Lead washers are used to seal the

mounting holes on side mount switches. All side mount switches are installed with #6 screws, except the BZE6-2RN7 (#8 screws). Removal of the bottom enclosure exposes the terminals for easy wiring.

ELECTRICAL RATING

Circuitry	Electrical Rating	
<p>Single-pole Double-throw</p>	A	UL/CSA Rating: 15 amps, 125, 250 or 480 VAC: 2 amps, 600 VAC: 1/8 Hp, 125 VAC: 1/4 Hp, 250 VAC: 1/2 amp, 125 VDC: 1/4 amp, 250 VDC.
<p>Double-pole Double-throw</p>	B	UL/CSA Rating: 10 amps, 125 or 250 VAC: 0.3 amp, 125 VDC: 0.15 amp, 250 VDC.

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.P. mm in.	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot SPDT.	A	Side	BZE6-2RN	43,66 ± 0,76 1.719 ± .030	2,50- 6,67 9-24	1,98 .078	5,56 .219	0,05 .002
		Flange	BZV6-2RN	69,09 ± 1,52 2.720 ± .060				
Same as BZE6-2RN except #8 Mounting screws.	A	Side	BZE6-2RN7	43,66 ± 0,76 1.719 ± .030	2,50- 6,67 9-24	1,98 .078	5,56 .219	0,05 .002
With seal boot. DPDT.	B	Side	DTE6-2RN	46 ± 0,76 1.812 ± .030	7,23- 16,4 26-59	2,80 .110	3,17 .125	1,53 .060
		Flange	DTV6-2RN	71,4 ± 0,76 2.812 ± .030				
Without seal boot. SPDT.	A	Side	BZE6-2RQ	38,1 ± 0,76 1.500 ± .030	2,50- 3,62 9-13	0,38 .015	5,56 .219	0,05 .002
		Flange	BZV6-2RQ	63,5 ± 1,14 2.500 ± .045				

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.P. mm in.	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot. Roller parallel to long axis of switch. SPDT	A	Side	BZE6-2RN80	56,7 ± 1,14 2.232 ± .045	2,50- 6,68 9-24	1,98 .078	5,55 .219	0,05 .002
		Flange	BZV6-2RN80	82,1 ± 1,14 3.232 ± .045				
With seal boot. Roller parallel to long axis of switch. DPDT.	B	Side	DTE6-2RN80	59,6 ± 1,0 2,345 ± .040	5,56- 13,3 20-48	2,80 .110	3,17 .125	1,53 .060
Without seal boot. Roller parallel to long axis of switch. SPDT.	A	Side	BZE6-2RQ8	49,6 ± 1,14 1.953 ± .045	2,50- 3,62 9-13	0,38 .015	3,55 .140	0,05 .002
		Flange	BZV6-2RQ8	75 ± 1,52 2.953 ± .060				

N = Newtons

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

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

Compact Enclosed Switches

CROSS ROLLER PLUNGER ACTUATED SWITCHES



Flange mount
without seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.P. mm in.	O.F. N oz.	P.T. mm in.	O.T. mm in.	D.T. max. mm in.
Without seal boot. Roller perpendicular to long axis of switch. SPDT.	A	Side	BZE6-2RQ81	49,6 ± 1,14 1.953 ± .045	2,50-3,62 9-13	0,38 .015	3,55 .140	0,05 .002
		Flange	BZV6-2RQ81	75 ± 1,52 2.953 ± .060				
As above with seal boot.	A	Side	BZE6-2RN81	56,7 ± 1,14 2.232 ± .045	2,5-6,67 9-24	1,98 .078	5,56 .219	0,05 .002
		Flange	BZV6-2RN81	82,1 ± 1,14 3.232 ± 0.45				

ROLLER LEVER ACTUATED SWITCHES



Flange mount
with seal boot



Side mount
without seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot. Field adjustable 360° horizontally and 225° vertically.	SPDT	A Side	BZE6-2RN2	2,78-5,57 10-20	4,78 .188	5,56 .219	0,15 .006
		A Flange	BZV6-2RN2				
	DPDT	B Side	DTE6-2RN2	2,78-8,35 10-30	6,76 .266	5,56 .219	4,19 .165
		B Flange	DTV6-2RN2				
Without seal boot. Adjustable as above, except horizontal adjustment in 45° increments.	SPDT	A Side	BZE6-2RQ2	2,78-5,01 10-18	4,78 .188	5,56 .219	0,15 .006
		A Flange	BZV6-2RQ2				
	DPDT	B Side	DTE6-2RQ2	2,78-5,57 10-20	6,76 .266	5,56 .219	4,19 .165
		B Side	DTE6-2RQ2				

ONE-WAY ROLLER LEVER ACTUATED SWITCHES



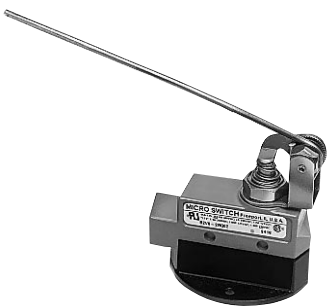
Side mount
with seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot. Field adjustable 360° horizontally and 180° vertically. SPDT.	A	Side	BZE6-2RN28	2,22-5,57 8-20	5,95 .234	5,56 .219	0,15 .006
		Flange	BZV6-2RN28				

LOW FORCE ROD LEVER

Rod can be formed in-line with the switch once, or cut, for application.



Flange mount
without seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
Without seal boot. Field adjustable 360° horizontally in 45° increments and 250° vertically. SPDT.	A	Side	BZE6-2RQ62	0,55-1,39 2-5	18,24 .718	21,2 .838	5,82 .229
		Flange	BZV6-2RQ62				
As above, but with seal boot.	A	Side	BZE6-2RN62	0,83-1,95 3-7			
		Flange	BZV6-2RN62				

N = Newtons

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

Limit/Enclosed

Compact Enclosed Switches

MANUALLY ACTUATED SWITCHES

With 1.5 inch (38,1 mm) button.



Side mount with seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot. Field adjustable 360° horizontally and 180° vertically. SPDT.	A	Side	BZE6-2RN4	2,78-5,57 10-20	4,78 .188	5,56 .219	0,15 .006
		Flange	BZV6-2RN4				
As above, but without seal boot.	A	Side	BZE6-2RQ4	2,78-5,00 10-18			
		Flange	BZV6-2RQ4				

COIL SPRING



Side mount with seal boot

WOBBLE LEVER ACTUATED SWITCHES

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.F. max. N oz.	P.T. max.
With seal boot. Operates from any direction, except pull. SPDT.	A	Side	BZE6-2RN18	1,95 7	15°
		Flange	BZV6-2RN18		

MAINTAINED CONTACT (RESET) SWITCHES

The switches shown below provide maintained contact after the operating force on either top or bottom plunger is released. Note: The top plungers on these switches provide more accurate and uniform operation than the "reset" plungers and should be used when closely held operating characteristics are required.

ELECTRICAL RATING

Circuitry	Electrical Rating
<p>Single-pole Double-throw</p>	<p>C UL/CSA Rating: L67 15 amps, 125, 250 or 480 VAC; ¼ Hp, 125 VAC; ½ Hp, 250 VAC; ½ amp, 125 VDC; ¼ amp, 250 VDC.</p>

STRAIGHT PLUNGER ACTUATED (RESET) SWITCHES



Side mount with seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.P. mm in.	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	Reset O.F. min. N* oz.
Without seal boot. SPDT.	C	Side	BZE6-RQX2	38,1±0,76 1.500±.030	1,66-2,65 6-9.5	0,31 .012	4,75 .187	2,22 8
		Flange	BZV6-RQX2					
With seal boot. SPDT.	C	Side	BZE6-RNX1	43,66±0,76 1.718±.030	1,66-5,57 6-20	1,98 .078	4,75 .187	1,66 6
		Flange	BZV6-RNX1					

ROLLER PLUNGER ACTUATED (RESET) SWITCHES



Side mount without seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing	O.P. mm in.	O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	Reset O.F. min. N* oz.
Without seal boot. Roller parallel to long axis to switch. SPDT.	C	Side	BZE6-RQ8X2	51,2±1,15 2.015±.045	1,67-2,64 6-9.5	0,31 .012	3,56 .140	2,22 8

N = Newtons

Characteristics: O.F. — Operating Force; P.T. — Pretravel; O.T. — Overtravel; O.P. — Operating Position

Compact Enclosed Switches

ROLLER LEVER ACTUATED (RESET) SWITCHES

ORDER GUIDE



Side mount without seal boot

Description	Elec. Rating	Mtg.	Catalog Listing	O.F. max. N oz.	P.T. max. mm in.	O.T. min. mm in.	Reset O.F. min. N oz.
Without seal boot. Field adjustable 360° horizontally in 45° increments and 180° vertically. SPDT.	C	Side	BZE6-RQ2X2	2,78-5,01 10-18	4,78 .188	5,56 .219	2,22 8
		Flange	BZV6-RQ2X2				
With seal boot. Adjustable as above. SPDT.	C	Side	BZE6-RN2X1	4,45 16	4,78 .188	5,56 .219	3,33- 8,35 12-30
		Flange	BZV6-RN2X1				

REPLACEMENT PARTS

Bottom enclosure includes bottom half of enclosure, insulator seal and two screws. Seal boot includes the elastomer plunger seal, and retaining hardware. Basic packet includes mounting hardware and seal boot, where applicable.

CONDUIT SEALING PACKETS

Packet	Cable O.D. Inches
2PA6	.400" - .435"
2PA16	.435" - .470"
2PA1	.530" - .570"

Limit/Enclosed

Catalog Listing	Bottom Enclosure	Seal Boot	Basic Packet	Switching Unit	Actuator
BZE6-2RN BZV6-2RN	3PA13-E6 3PA14-V6	10PA2	1PA2*	BZ-2RQ77**	—
BZE6-2RN7	3PA13-E6	10PA2	1PA46*	BZ-2RN730**	—
BZE6-2RQ BZV6-2RQ	3PA13-E6 3PA14-V6	—	1PA1	BZ-2RQ66**	—
BZE6-2RQ8 BZV6-2RQ8	3PA13-E6 3PA14-V6	—	—	BZ-2RQ784**	—
BZE6-2RQ81 BZV6-2RQ81	3PA13-E6 3PA14-V6	—	1PA19	BZ-2RQ785**	—
BZE6-2RN80	3PA13-E6	10PA2	1PA54-BZ*	BZ-2RN784	—
BZE6-2RN2 BZV6-2RN2	3PA13-E6 3PA14-V6	10PA2	1PA13*	BZ-2RN702**	6PA2*
BZE6-2RQ2 BZV6-2RQ2	3PA13-E6 3PA14-V6	—	1PA3	BZ-2RQ68**	6PA1
BZE6-2RN28 BZV6-2RN28	3PA13-E6 3PA14-V6	10PA2	1PA13*	BZ-2RN702**	6PA16*
BZE6-2RQ62 BZV6-2RQ62	3PA13-E6 3PA14-V6	—	1PA3	BZ-2RQ68**	6PA62
BZE6-2RN62 BZV6-2RN62	3PA13-E6 3PA14-V6	10PA2	1PA13*	BZ-2RN702**	6PA140-E6*
BZE6-2RQ4 BZV6-2RQ4	3PA13-E6 3PA14-V6	—	1PA3	BZ-2RQ68**	6PA7
BZE6-RQX2 BZV6-RQX2	8PA54-E6 8PA53-V6	—	1PA1	BZ-RQX66**	—
BZE6-RNX1 BZV6-RNX1	8PA56-E6 8PA55-V6	10PA2	1PA2*	BZ-RQX167**	—
BZE6-RQ8X2	8PA54-E6	—	1PA19	BZ-RQX784**	—
BZE6-RQ2X2 BZV6-RQ2X2	8PA54-E6 8PA53-V6	—	1PA3	BZ-RQX68**	6PA1
BZE6-RN2X1 BZV6-RN2X1	8PA56-E6 8PA55-V6	10PA2	1PA13*	BZ-RNX702**	6PA2*
BZE6-2RN4 BZV6-2RN4	3PA13-E6 3PA14-V6	10PA2	1PA13*	BZ-2RN702**	6PA9*
BZE6-2RN18 BZV6-2RN18	3PA13-E6 3PA14-V6	10PA2	—	BZ-2R-A2	6PA195*
DTE6-2RN† DTV6-2RN†	3PA13-E6 3PA14-V6	10PA2	1PA2*	DT-2R-A7	8PA14
DTE6-2RN2† DTV6-2RN2†	3PA13-E6 3PA14-V6	10PA2	—	DT-2R-A7	6PA2*

*Includes seal boot.

**Includes basic packet.

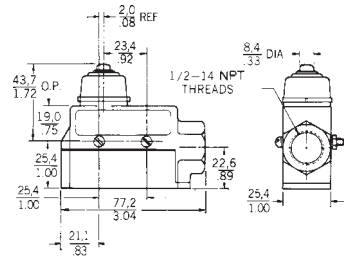
†To replace internal plunger, order 8PA14.

Limit and Enclosed Switches

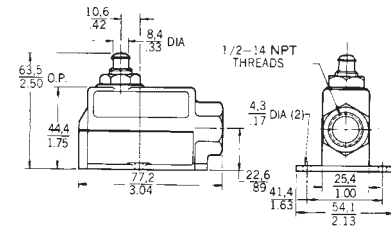
Mounting Dimensions (For reference only)

E6/V6 Series

STRAIGHT PLUNGER

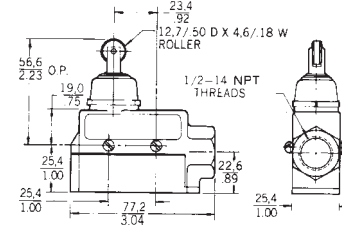


Side mount with seal boot



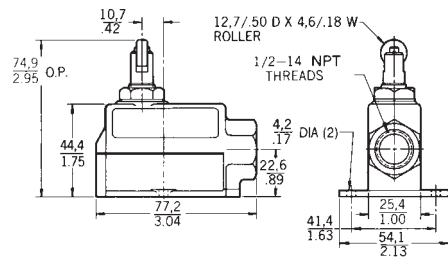
Flange mount without seal boot

ROLLER PLUNGER



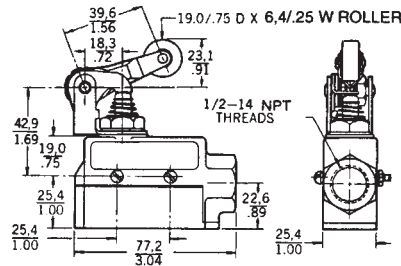
Side mount with seal boot

CROSS ROLLER PLUNGER

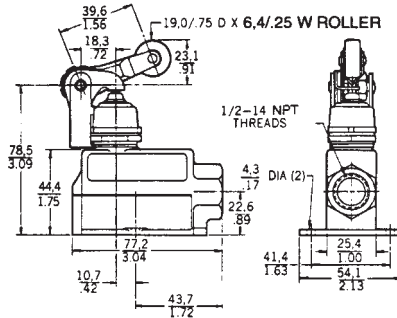


Flange mount without seal boot

ROLLER LEVER

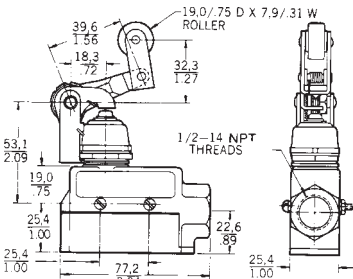


Side mount without seal boot



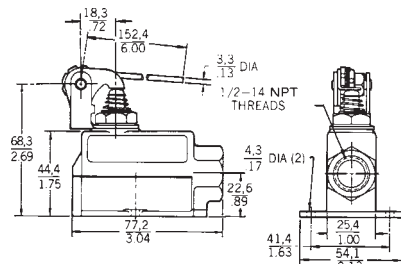
Flange mount with seal boot

ONE-WAY ROLLER LEVER



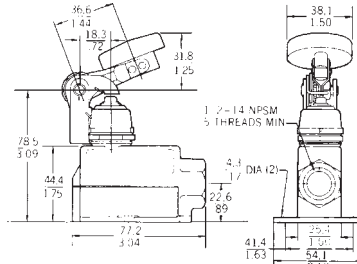
Side mount with seal boot

ROD LEVER



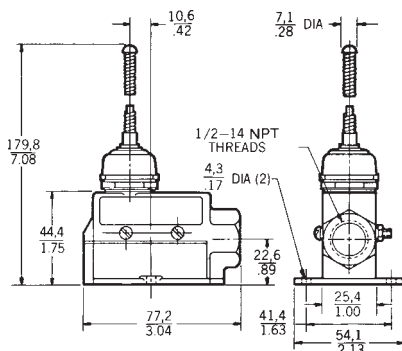
Flange mount without seal boot

MANUAL



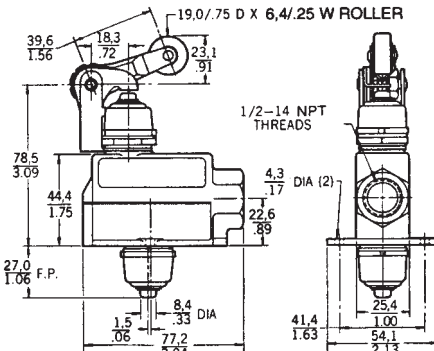
Side mount with seal boot

COIL SPRING

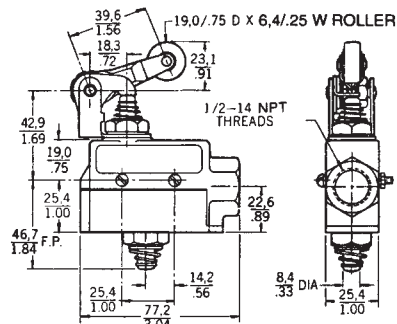


Flange mount with seal boot

ROLLER LEVER (Reset)



Flange mount with seal boot

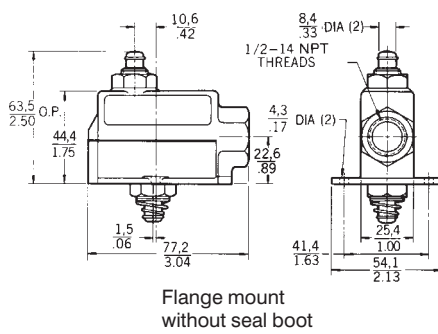
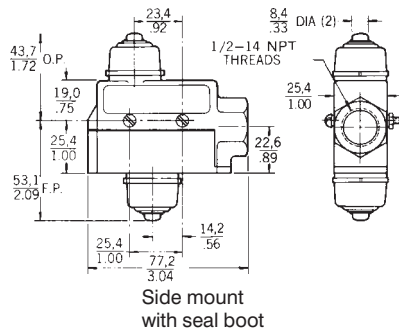


Side mount without seal boot

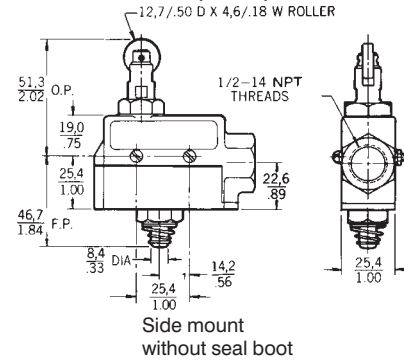
Epoxy Filled

MOUNTING DIMENSIONS (continued)

PLUNGER (Reset)



ROLLER PLUNGER (Reset)



Epoxy Filled Compact Enclosed Switches

The Epoxy Filled Compact Enclosed Switch is a very rugged, but economical solution for precision switching needs for a variety of applications in heavy equipment. **This may be the cost effective solution you've been looking for.**

TYPICAL APPLICATIONS

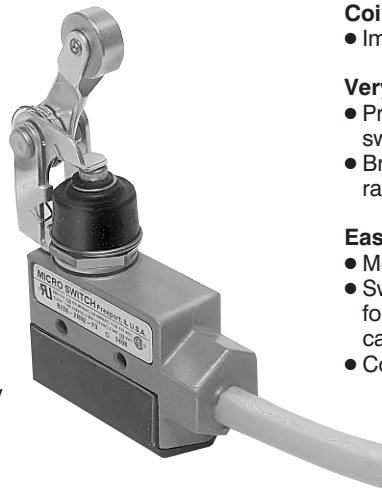
- Trash compactors – mobile or stationary
- Off-road construction equipment
- Machine tools where precision switching is needed
- Heavy machinery
- Bottling machinery

Designed for demanding environments

- Rugged zinc diecast housing with phosphate sealed epoxy finish

Resists harsh conditions

- Switch wiring cavity is epoxy filled
- Wire entry area completely factory sealed
- NEMA 1, 3, 4, 12, 13



Fits wide variety of applications

- Seven different actuator styles
- Coil spring boot band
- Improved sealing

Very reliable operation

- Precision snap-action basic switch within housing
- Broad electrical and temperature ranges

Easy and economical to install

- Mounts with just two screws
- Switch is preleaded with three (3) foot, four (4) conductor ST00W-A cable .41-.46 in. (10.4-11.7 mm)
- Connector versions available

ORDERING GUIDE FOR EPOXY FILLED E6/V6 TYPES

Description	Catalog Listing
Straight plunger.	BZE6-2RN-F3
Straight plunger 4 pin connector.	BZE6-2RN-FR
Roller lever. Field adjustable 360° horizontally and 225° vertically	BZE6-2RN2-F3
Coil spring wobble lever. Operates from any direction except pull.	BZE6-2RN18-C3*
Low force rod lever. Field adjustable 360° horizontally in 45° increments and 180° vertically.	BZE6-2RN62-F3

* Note: This switch has a pin plunger and the wiring cavity cannot be completely filled with epoxy. They are sealed at the conduit opening only.

Limit/Enclosed

Enclosed Switches



FEATURES

- Pilot light (optional)
- Cast aluminum housing
- Side or flange mount

- Single and double conduit openings
- UL Recognized, file #E12252
- Grounding screw
- Sealed to NEMA 1, 3, 4, and 13

ACCESSORIES

Pilot Light 110-220 VAC (complete with seal) 15LT1
 Wiring Seal (for No. 14 type "S" rubber jacketed cord) 2PA1

ELECTRICAL RATING

Circuitry	Electrical Rating
<p>Single-pole Double-throw</p>	<p>A</p> <p>UL Rating 15 amp, 125, 250 or 480 VAC; 2 amp, 600 VAC; 1/8 Hp, 125 VAC; 1/4 Hp, 250 VAC; 1/2 amp, 125 VDC; 1/4 amp 250 VDC.</p>

BZG/BZH switches have a neoprene seal gasket between the housing halves, elastomer boot actuators, sealed conduit connectors, and die cast aluminum housing. Mounting holes are located outside the switch cavity and accept No. 10 screws. A neon pilot light can be added to switches having two conduit openings to indicate contact status.

STRAIGHT PLUNGER ACTUATED SWITCHES



Flange mount
with seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing		O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
			1 Conduit Opening	2 Conduit Openings				
With seal boot. SPDT.	A	Side	BZG1-2RN	BZG2-2RN	2,50-6,68 9-24	1,98 .078	5,56 .219	0,05 .002
		Flange	BZH1-2RN	BZH2-2RN				
Seal boot with roller plunger	A	Side	BZG1-2RN80	—				

ROLLER LEVER ACTUATED SWITCHES



Side mount
with seal boot

ORDER GUIDE

Description	Elec. Rating	Mtg.	Catalog Listing		O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
			1 Conduit Opening	2 Conduit Openings				
With seal boot. Field adjustable 360° horizontally and 225° vertically. SPDT.	A	Side	BZG1-2RN2	BZG2-2RN2	2,78-5,57 10-20	4,78 .188	5,56 .219	0,15 .006
		Flange	BZH1-2RN2	BZH2-2RN2				

LOW FORCE ROD ACTUATED SWITCHES



Side mount
with seal boot

ORDER GUIDE

Rod can be cut or bent to suit application needs

Description	Elec. Rating	Mtg.	Catalog Listing		O.F. N oz.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
			1 Conduit Opening	2 Conduit Openings				
With seal boot. Field adjustable 360° horizontally and 250° vertically. SPDT.	A	Side	BZG1-2RN62	BZG2-2RN62	0,83-1,95 3-7	18,24 .718	21,29 .838	5,82 .229
		Flange	BZH1-2RN62	BZH2-2RN62				

N = Newtons

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

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

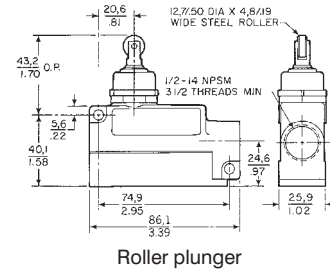
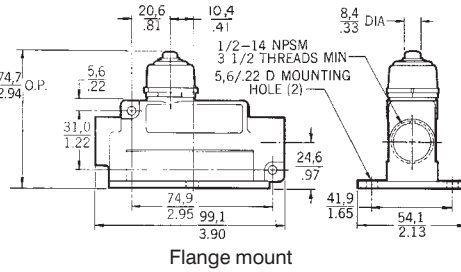
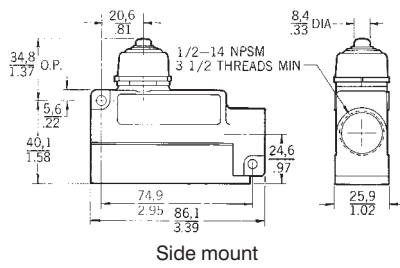
Enclosed Switches

REPLACEMENT PARTS

	Catalog Listing
Switching Units For Straight Plunger Switch For Roller or Rod Lever Switch	BZ-2RN770 BZ-2RN702
Actuators Roller Lever Rod Lever Seal Boot , including retaining hardware	6PA2 6PA140-E6 10PA2

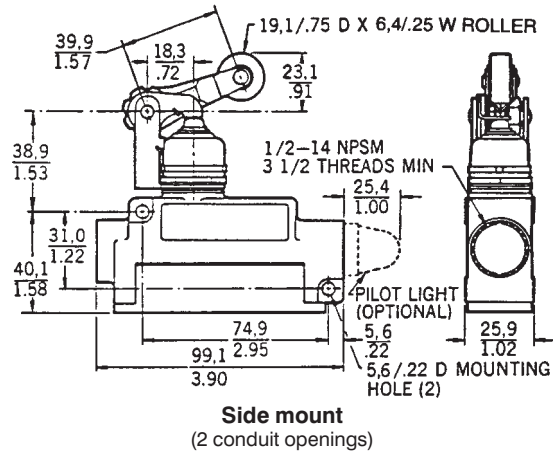
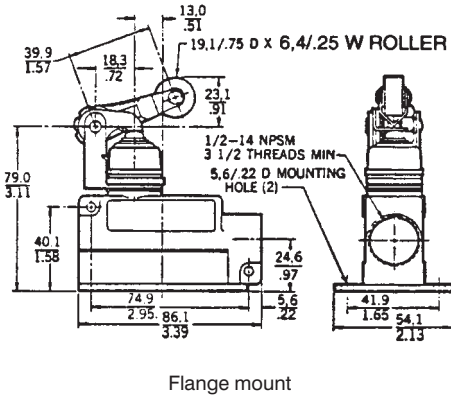
MOUNTING DIMENSIONS (For reference only)

PLUNGER

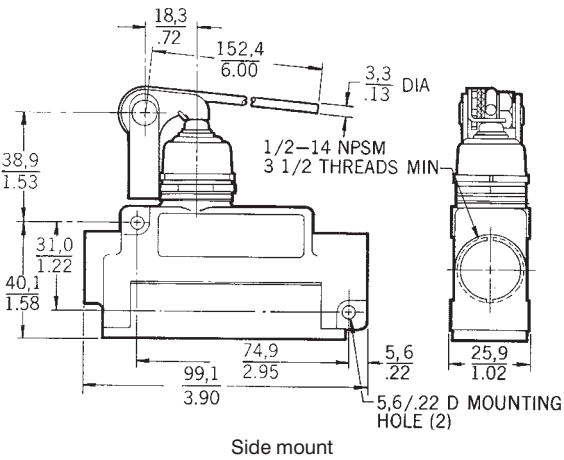
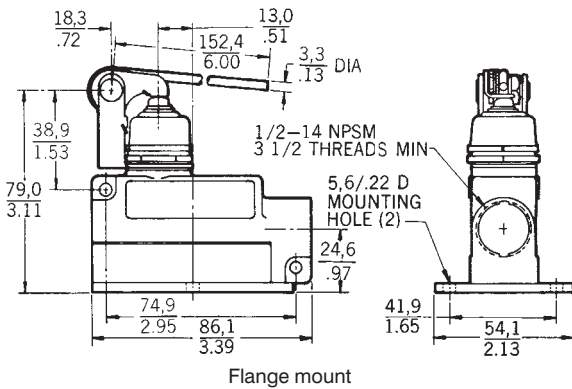


Limit/Enclosed

ROLLER LEVER



ROD



Key: $\frac{0.0}{0.00} = \frac{\text{mm}}{\text{inches}}$

Limit and Enclosed Switches

High Capacity Enclosed Switches

BAF1 Series



The elastomer boot on sealed actuator versions protects the actuating mechanism and the internal basic switch from contaminants. There is a seal gasket between the cover plate and the enclosures on all versions.

The cover plate is removed for ease of wiring and switch replacement without demounting the switch.

The actuator position is designated "right" or "left," when looking at the nameplate.

FEATURES

- Up to 20 ampere capacity
- Cast aluminum housing with 3-hole mounting
- Right or left-hand (sealed or unsealed) actuators

- Cover seal, captive cover screws
 - Momentary or maintained contact
 - UL Recognized, file #E12252
 - CSA Certified, file #LR41372
 - Grounding screw
 - NEMA 1, 3*, 4*, and 13*
- (* except BAF1-2RQ9 listings)

ELECTRICAL RATING

Circuitry	Electrical Rating
<p>Double-pole Double-throw</p>	<p>B</p> <p>UL/CSA Rating: 10 amps, 125 or 250 VAC; 0.3 amp, 125 VDC; 0.15 amp, 250 VDC.</p>
<p>High Capacity SPDT</p>	<p>D</p> <p>UL/CSA Rating: 20 amps, 125, 250 or 480 VAC; 1 Hp, 125 VAC; 2 Hp, 250 VAC; ½ amp, 125 VDC; ¼ amp, 250 VDC; Lamp Load — 10 amps, 125 VAC.</p>

STRAIGHT PLUNGER ACTUATED SWITCHES



With seal boot, right-hand actuator

ORDER GUIDE

Description	Elec. Rating	Actuator Position†	Catalog Listing	O.P. mm in.	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot.	SPDT	Right	BAF1-2RN-RH	53,19±0,76	11,2	2,39	5,56	0,26
		Left	BAF1-2RN-LH	2.094±.030	2.5	.094	.219	.010
DPDT	B	Right	DTF2-2RN-RH	52,07±1,0	11,2	3,59	3,96	1,53
		Left	DTF2-2RN-LH	2.050±.040	2.5	.141	.156	.060

ROLLER PLUNGER ACTUATED SWITCHES



Without seal boot, right-hand actuator

ORDER GUIDE

Description	Elec. Rating	Actuator Position†	Catalog Listing	O.P. mm in.	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
Without seal boot.	SPDT	Right	BAF1-2RQ9-RH	64,69	11,1	2,39	3,96	0,25
		Left	BAF1-2RQ9-LH	2.547	2.5	.094	.156	.010
Field adjustable 360° horizontally.	Has O-ring actuator seal SPDT	Right	BAF1-2RQN8-RH	64,69	35,6	3,18	4,75	0,19
		Left	BAF1-2RQN8-LH	2.547	8	.125	.187	.0075

FLEXIBLE ROD ACTUATED SWITCHES



With seal boot, right-hand actuator

ORDER GUIDE

Description	Elec. Rating	Actuator Position†	Catalog Listing	P.T. max.
With seal boot. Operates from any direction, except direct pull. SPDT.	D	Right	BAF1-2RN18-RH	15°
		Left	BAF1-2RN18-LH	

N = Newtons
† When looking at nameplate.

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

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

High Capacity Enclosed Switches

ROLLER LEVER ACTUATED SWITCHES



With seal boot, right-hand actuator

ORDER GUIDE

Description	Elec. Rating	Actuator Position†	Catalog Listing	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot. Field adjustable 360° horizontally and 225° vertically.	SPDT	Right	BAF1-2RN2-RH	8,90	5,56	6,35	0,51
		Left	BAF1-2RN2-LH	2	.219	.250	.020
	DPDT	Right	DTF2-2RN2-RH	11,1	7,93	5,56	3,05
		Left	DTF2-2RN2-LH	2,5	.312	.219	.120

ONE-WAY ROLLER LEVER ACTUATED SWITCHES



With seal boot right-hand actuator

ORDER GUIDE

Description	Elec. Rating	Actuator Position†	Catalog Listing	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
With seal boot. Field adjustable 360° horizontally and 180° vertically. SPDT.	D	Right	BAF1-2RN28-RH	8,90	5,56	6,35	0,51
		Left	BAF1-2RN28-LH	2	.219	.250	.020

MANUALLY ACTUATED SWITCHES



With seal boot, right-hand actuator

ORDER GUIDE

Has 1.5 inch (38,1 mm) diameter button.

Description	Elec. Rating	Actuator Position†	Catalog Listing	O.F. max. N lbs.
With seal boot. Field adjustable 360° horizontally and 180° vertically. SPDT.	D	Right	BAF1-2RN4-RH	8,90
		Left	BAF1-2RN4-LH	2

MAINTAINED CONTACT (RESET) PLUNGER ACTUATED SWITCHES



With seal boots, right-hand actuator

ORDER GUIDE

Contact transfer is maintained after either plunger is operated. (Top plunger provides more accurate and uniform characteristics.)

Description	Elec. Rating	Actuator Position†	Catalog Listing	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.
With seal boot on both top and bottom (reset) plungers. SPDT.	D	Right	BAF1-3RNX1	7,79	2,39	4,45
				1,75	.094	.219

N = Newtons
† When looking at nameplate.

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

Limit/Enclosed

High Capacity Enclosed Switches

REPLACEMENT PARTS

Basic Packets include mounting hardware, an insulator, and a cover seal ring. The plunger seal boot and retaining hardware may be ordered separately as **10PA2**.

CONDUIT SEALING PACKETS

Catalog Listing Packet	Cable O.D. Inches
2PA6	.400"-.435"
2PA16	.435"-.470"
2PA1	.530"-.570"

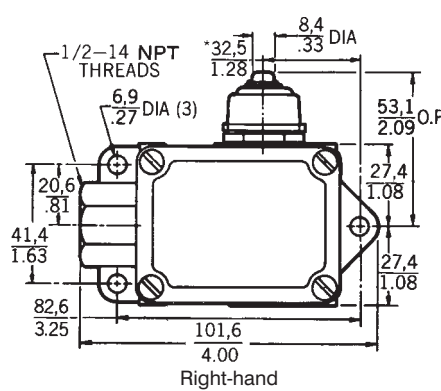
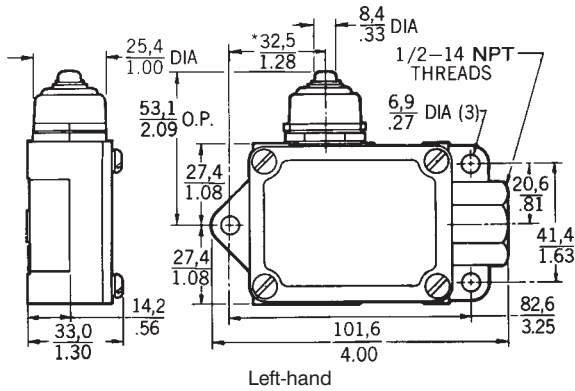
(See page A41 for description.)

Switch Type	Catalog Listing Replacement Part Numbers		
	Basic Packet	Switching Unit*	Actuator
BAF1-2RN	1PA10	BA-2R708-P7	8PA1**
BAF1-2RQ9	1PA10	BA-2R708-P7	8PA10
BAF1-2RQN8	1PA10	BA-2R708-P7	8PA52
BAF1-2RN18	1PA10	BA-2R708-P7	6PA20**
BAF1-2RN2	1PA10	BA-2R708-P7	6PA2**
BAF1-2RN28	1PA10	BA-2R708-P7	6PA16**
BAF1-2RN4	1PA10	BA-2R708-P7	6PA9**
BAF1-3RNX1	1PA23	BA-3RX717	8PA1**
DTF2-2RN	—	DT-2R-A7	8PA32**
DTF2-2RN2	—	DT-2R-A7	6PA2**

* Includes basic packet.
** Includes seal boot.

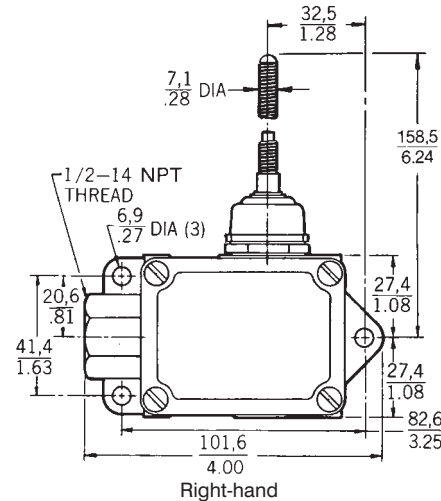
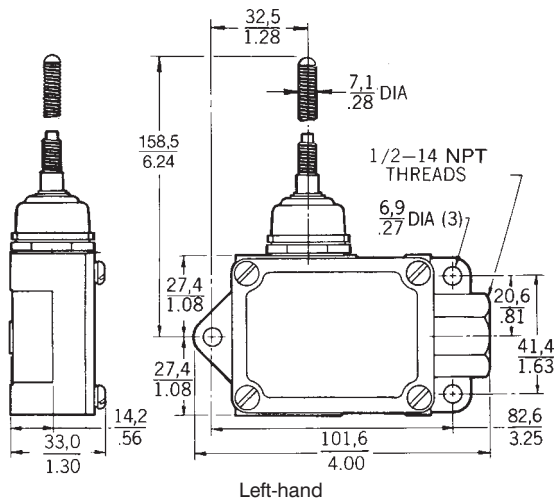
MOUNTING DIMENSIONS (For reference only)

PLUNGER (with seal boot)



*28.2 on DTF2 Types
1.11

COIL SPRING (with seal boot)



Key: 0,0 = mm
0.00 = inches

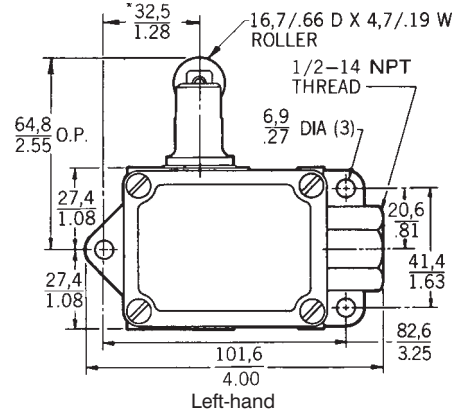
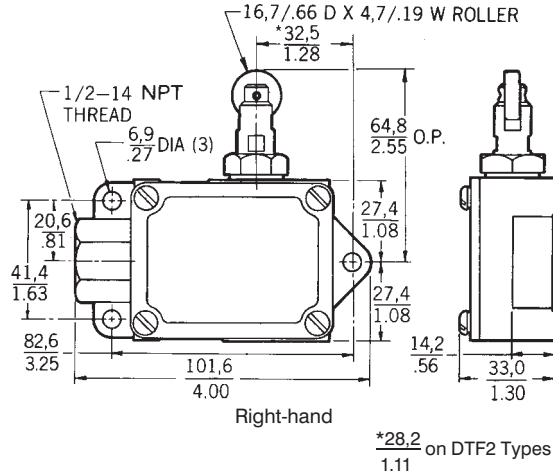
Limit and Enclosed Switches

BAF1 Series

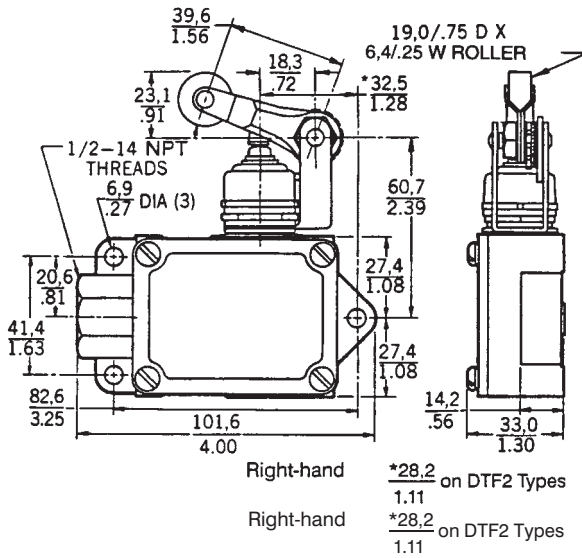
High-Capacity Enclosed Switches

MOUNTING DIMENSIONS (For reference only)

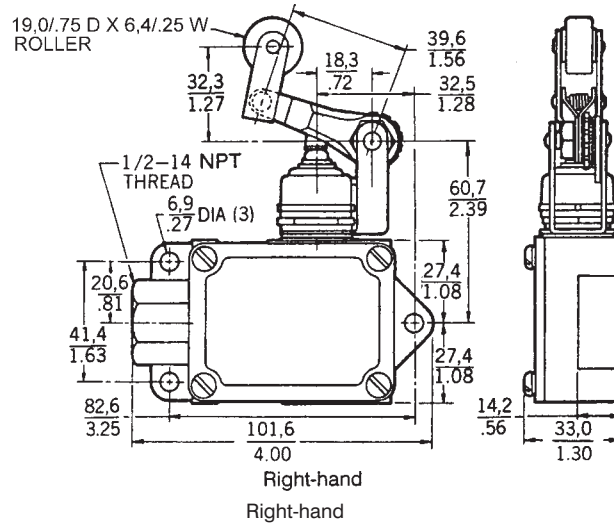
ROLLER PLUNGER (without seal boot)



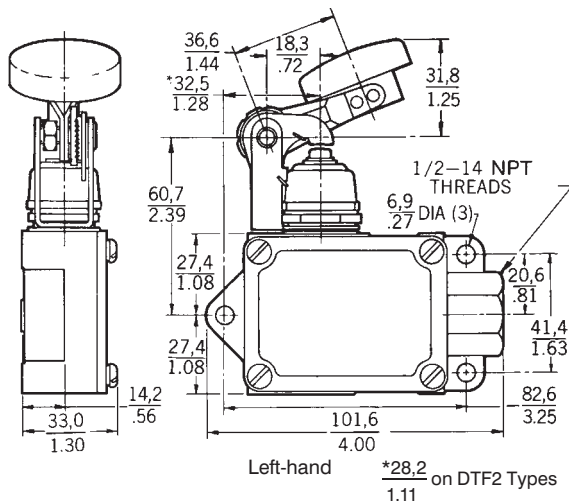
ROLLER LEVER (with seal boot)



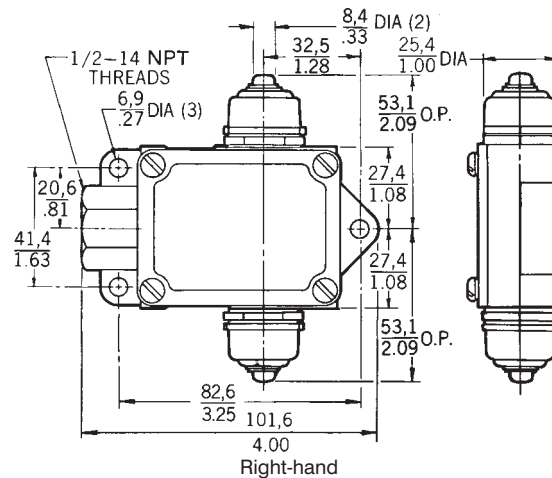
ONE-WAY ROLLER LEVER (with seal boot)



MANUAL (with seal boot)



PLUNGER (Reset) (with seal boot)



Limit/Enclosed

Enclosed Switches



OP enclosed switches are precision snap-action switches sealed in rugged cast aluminum housings. Cover and shaft seals keep out moisture and other contaminants on rotary operated switches. The plungers in the Q-plunger version are not sealed.





Refer to page A123 for explosion-proof Type EX switches, which are dimensionally interchangeable with OP switches.

FEATURES

- Cast aluminum housing
- Mounts from 4 sides
- Cover seal, captive cover screws
- Momentary contact

- UL Recognized, file #E12252
 - CSA Certified, file #LR57325
 - Grounding screw
 - NEMA 1, 3*, 4* and 13*
- (* Except Q-plunger and high temperature types)

ELECTRICAL RATING

Circuitry	Electrical Rating
 Single-pole Double-throw	A UL/CSA Rating: 15 amps, 125, 250 or 480 VAC; 1/8 Hp, 125 VAC; 1/4 Hp, 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.
 Double-pole Double-throw	B UL/CSA Rating: 10 amps, 125, 250 VAC; 0.3 amp, 125 VDC; 0.15 amp, 250 VDC.
 Single-pole Double-throw	D UL/CSA Rating: 20 amps, 125, 250 or 480 VAC; 1 Hp, 125 VAC; 2 Hp, 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC. Lamp Load — 10 amps, 125 VAC.
 Single-pole Double-throw	E 5 amps, 125, 250 or 480 VAC; 1/2 amp - 125VDC; 1/4 amp - 250 VDC

ROLLER LEVER ACTUATED SWITCHES



N = Newtons
 * Actuation is designated as CW (clockwise) or CCW rotation, when looking at the switch nameplate.
 † Choice of levers available for use with OP-AR20:
6PA5-EX (non-sparking roller), **6PA6-OP** (steel roller), **6PA127-EX** (nylon roller), **6PA130-EX** (CW), **6PA142-EX** (CCW), and **6PA136-EX** (Aluminum rod).

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

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

ORDER GUIDE

Description		Elec. Rating	Catalog Listing	O.F.	P.T. max. mm in.	O.T. max.	D.T. max. mm in.
Roller Lever is field adjustable through 360°	CW actuation* SPDT	A	OP-AR	2,22-5,56 N .5-1.25 lbs.	5,56 .219 (8°)	90°	0,18 .007 (.25°)
	CW actuation* SPDT will withstand 400°F for 100 hours	E	OP-AR400	2,22-5,56 N .5-1.25 lbs.	5,56 .219 (8°)	90°	0,18 .007 (.25°)
	CW actuation* High capacity. SPDT	D	OPA-AR	3,34-8,90 N .75-2 lbs.	5,56 .219 (8°)	25°	0,3 .012 (.4°)
	CW actuation* DPDT	B	OPD-AR	2,22-6,67 N .5-1.5 lbs.	4,78 .250 (10°)	25°	2,77 .109 (4°)
	CCW actuation* SPDT	A	OP-AR30	1,11 N max. 2.5 lbs. max.	1,65 .065 (3.5°)	25°	0,18 .007 (.25°)
	CCW actuation* Basic switch plunger held depressed (normal position) DPDT	B	OPD-AR30	12,2 N max. 2.75 lbs. max.	5,56 .219 (8°)	25°	2,77 .109 (4°)
	CW or CCW actuation* No lever return spring. No mounting bracket furnished. SPDT.	A	OP-AR16	0,56 N max. 2 oz. max.	—	—	—
No lever furnished.† CW actuation.* SPDT		A	OP-AR20	0,08-0,23 N .75-2 in. lb.	8°	90°	.25°

Enclosed Switches

CROSS ROLLER LEVER ACTUATED SWITCH



ORDER GUIDE

Description	Elec. Rating	Catalog Listing	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
CW actuation* Field adjustable through 360°. SPDT	A	OP-CR	2,22-5,56 .5-1.25	5,56 .219 (8°)	90° max.	0,18 .007 (.25°)

MANUALLY ACTUATED SWITCH



ORDER GUIDE

Description	Elec. Rating	Catalog Listing	O.F. max.
Large 3x3.5 inch paddle for fast, easy operation SPDT	A	OP-AR50	11.1 Newtons 2.5 lbs. (approx.)

Limit/Enclosed

OVERTRAVEL PLUNGER ACTUATED SWITCHES



ORDER GUIDE

Description		Elec. Rating	Catalog Listing	O.P. mm in.	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
In-line actuation	SPDT	A	OP-Q	47,2±1,52 1.859±.060	13,3 3	1,98 .078	4,78 .188	0,10 .004
	High Capacity SPDT	D	OPA-Q	46±1,52 1.812±.060	8,90 2	1,27 .050	3,18 .125	0,23 .009
	DPDT	B	OPD-Q	46±1,52 1.812±.060	13,3 3	2,77 .109	3,58 .141	1,52 .060

BOOT SEALED PLUNGER ACTUATED SWITCH

ORDER GUIDE

Description	Elec. Rating	Catalog Listing	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
In-line actuation with boot seal	A	OP-N	15,5 3.5	1,98 .078	4,78 .188	0,10 .004

* Clockwise actuation, when looking at the switch nameplate.
N = Newtons

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

Enclosed Switches

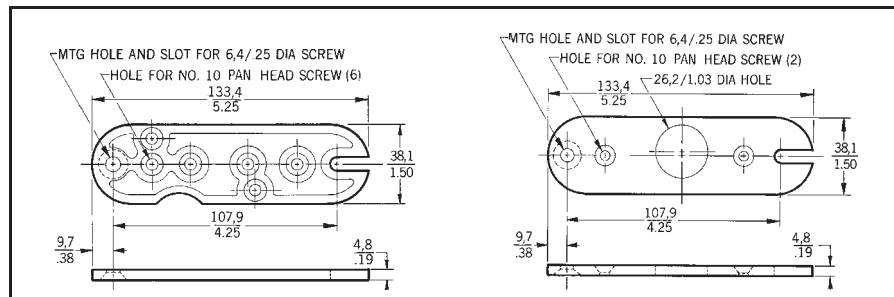
REPLACEMENT PARTS

In addition to the items shown below, these replaceable internal levers are available:
33PA2-OP for OP-AR, OP-AR20 and OP-CR; and
33PA3-OP for OP-AR50.

Switch Listing	Catalog Listing Replacement Part Numbers		
	Switching Unit	Actuator	Springs
OP-AR	BZ-2R-P4	6PA6-OP	33PA7-EX
OPA-AR	BA-2R-P4	6PA6-OP	33PA6-EX
OPD-AR	DT-2R4-A7	6PA6-OP	33PA6-EX
OP-AR30	BZ-2R-P4	6PA6-OP	33PA5-EX
OPD-AR30	DT-2R711-A7	6PA6-OP	33PA5-EX
OP-AR16	BZ-2RW88-P5	6PA6-OP	—
OP-AR20	BZ-2R-P4	†	33PA7-EX
OP-Q	BZ-2R-P4	8PA7-OP	—
OPA-Q	BA-2R-P4	—	—
OPD-Q	DT-2R-A7	—	—
OP-CR	BZ-2R-P4	6PA131-EX	33PA7-EX
OP-AR50	BZ-2R-P4	6PA134-OP	33PA7-EX

† Levers for OP-AR20 are on pages A108 and A109.

MOUNTING BRACKETS



15PA85-EX is used for top, bottom, back or end mounting. It is furnished with each switch, except OP-AR16 and OP-AR62.

15PA86-EX is ordered separately for top mounting of plunger switches.

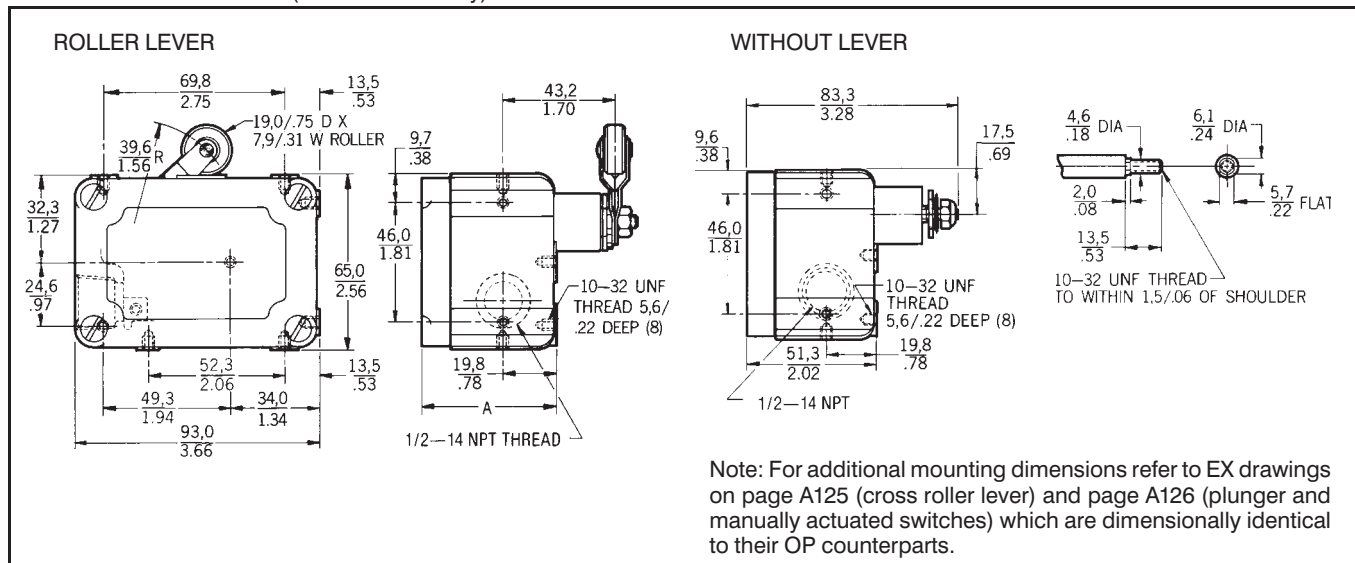
(Switches may also be direct mounted using 10-32 NF screws.)

CONDUIT SEALING PACKETS

Catalog Listing Packet	Cable O.D. Inches
2PA6	.400" - .435"
2PA16	.435" - .470"
2PA1	.530" - .570"

(See page A99 for description.)

MOUNTING DIMENSIONS (For reference only)



Limit and Enclosed Switches

Compact Pre-Wired Enclosed Switches

LN Series



LN switches are designed to withstand rapid hammer-blow actuation. Impact on the actuating plunger cannot reach the precision switch unit inside. Individual seals around each leadwire and cover plate protect switch cavity from condensate, oil and dust.



Actuator Position: The RH or LH suffix on the end of the catalog listing means the actuator is to the right or left side of the switch as viewed from the nameplate.

FEATURES

- Zinc die cast housing
- Will withstand impact actuation
- Positioning dowel holes
- SPDT or 2-CKT DB circuitry
- CSA Certified, file #LR41372
- UL Recognized, file #E12252
- No. 14 type HWM wire leads, conduit hub seal
- Conduit size 1/2 -14NPSM
- NEMA, 1, 3, 4, and 13

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

ELECTRICAL RATING

Circuitry	Electrical Rating
 <p>Single-pole Double-throw</p>	<p>A UL/CSA Rating: 15 amps, 125, 250 or 480 VAC; 1/8 Hp, 125 VAC; 1/4 Hp, 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.</p>
 <p>Two-circuit Double-break</p>	<p>E UL Rating: 10 amps, 125 or 250 VAC; 1/2 Hp, 125 VAC.</p>

Limit/Enclosed

STRAIGHT PLUNGER ACTUATED SWITCHES

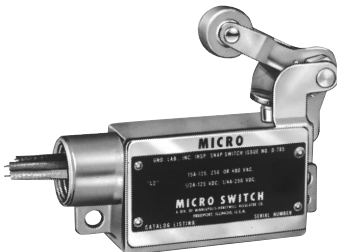


Left-hand actuator

ORDER GUIDE

Elec. Rating	Catalog Listing		Lead Length*	O.P. mm in.	O.F. max. N lbs.	P.T. mm in.	O.T. min. mm in.	D.T. max. mm in.
	Right-Hand	Left-Hand						
A	BZLN-RH	BZLN-LH	1-ft.	41,7 ± 0,10	22,2	0,20-0,51	5,16	0,10
	BZLN-RH5	BZLN-LH5	5-ft.	1.640 ± .004	5	.008-.020	.203	.004
E	1LN1-1-RH		1-ft.	41,0 ± 0,13	26,7	1,57	4,34	0,76
	1LN1-5-RH	1LN1-5-LH	5-ft.	1.615 ± .005	6	.062 max.	.171	.030

ROLLER ARM ACTUATED SWITCHES



Right-hand actuator

ORDER GUIDE

Roller arm is field adjustable 260° vertically.

Elec. Rating	Catalog Listing**		Lead Length*	O.F. max. N lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
	Right-Hand	Left-Hand					
A	BZLN-2-RH	BZLN-2-LH	1-ft.	13,3	1,98	11,91	0,36
	BZLN-2-RH5	BZLN-2-LH5	5-ft.	3	.078	.469	.014
E	2LN1-3-RH	2LN1-3-LH	3-ft.	13,3	3,18	8,74	1,98
	2LN1-5-RH	2LN1-5-LH	5-ft.	3	.125	.344	.078

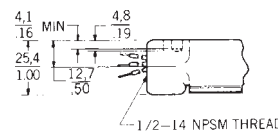
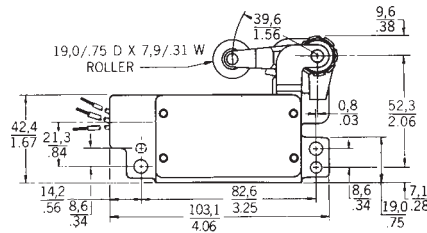
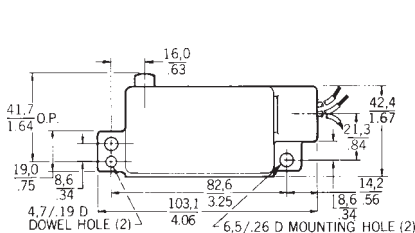
N = Newtons

* In addition to 1-ft. (0,305 m) and 5-ft. (1,524 m), other lead lengths are available.

** Replacement actuators: 6PA4-RH for right-hand, 6PA4-LH for left-hand versions.

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

MOUNTING DIMENSIONS (For reference only)



Key: 0,0 = mm
0.00 = inches

Limit and Enclosed Switches

Explosion-Proof Switches

MICRO SWITCH explosion-proof switches contain and cool the escaping hot gases that otherwise could cause an explosion outside the switch. Most of them are UL-CSA listed. Appropriate file reference numbers and copies of the card file are available from your local Branch Office or MICRO SWITCH, Freeport, Illinois.

Switches described on the following pages, except as noted below, are UL listed as follows:

NEMA TYPE 7, CLASS I FLAMMABLE GASES OR VAPORS

Type 7 enclosures are for use indoors in locations classified as Class I, Groups B, C, or D by the National Electrical Code.

Group B — (only switches so noted in the order guides include this listing). Atmospheres containing hydrogen or manufactured gas.

Group C — atmospheres containing diethyl ether, ethylene, or cyclopropane.

Group D — Atmospheres containing gasoline, hexane, butane, naphtha, propane, acetone, toluene, or isoprene.

DIVISION 1

Locations in which hazardous agents are present under normal operating conditions.

DIVISION 2

Locations in which hazardous agents may be present only in case of accidental rupture or breakdown.

All MICRO SWITCH listings covered in Division 1 are also covered in the same groups in Division 2.

NEMA TYPE 9, CLASS II COMBUSTIBLE DUSTS

Type 9 enclosures are for use in indoor locations classified as Class II, Groups E, F or G, as defined in the National Electrical Code.

Group E — Atmospheres containing metal dust.

Group F — Atmospheres containing carbon black, coal dust or coke dust.

Group G — Atmospheres containing flour, starch, or grain dust.

MICRO SWITCH™ GSX Series

Explosion-Proof Safety Switch



DESCRIPTION

Honeywell Sensing and Control MICRO SWITCH™ GSX Series Explosion-Proof Safety Switches combines the world-class MICRO SWITCH™ global safety switch (GSS) with our superior explosion-proof housing from our LSX and BX product lines, offering our customers the best of our engineering expertise.

FEATURES

- Snap-action contacts with positive break
- Positive action push plunger breaks current upon opening of door or aperture
- Explosion-proof housing for hazardous locations
- NEMA 1, 3, 4, 12, 13 and IP67 sealing
- cULus, ATEX, IECEx
- Simple installation
- Positive break feature
- Extensive switching options and actuator styles

BENEFITS

- Designed to ensure that even welded contacts will open and the machine will stop in an emergency
- Breaks current upon opening of door or aperture
- Reduces risk that hazardous gases or dusts could cause an explosion
- Meets IECEx standards
- Designed to provide a safe failure mode, ensuring the machine will not start
- Superior sealing for different applications

The positive break feature is designed to provide a safe failure mode, ensuring the machine will not start, and therefore supporting a safer working environment.

The GSX Series safety switch platform allows for over 10,000 actuator and switching option combinations, enabling our customers to source most of their safety and explosion-proof switch requirements from a single, global supplier.

POTENTIAL APPLICATIONS

Gates, doors, access panels or cages on machinery in:

- Hydrocarbon refining
- Chemical processing
- Agricultural equipment
- Food processing
- Grain elevators

MICRO SWITCH™ GSX Series

SPECIFICATIONS

Designation and Utilization Category		Rated Operational Current I _e (A) at Rated Operational Voltage U _e (V)						
		24 V	120 V	240 V	380 V	480 V	500 V	600 V
AC15	A300	—	6 A	3 A	—	—	—	—
AC15	A500	—	6 A	3 A	1,9 A	1,5 A	1,4 A	—
AC15	A600	—	6 A	3 A	1,9 A	1,5 A	1,4 A	1,2 A
DC13	Q300	2,8 A	0,55 A	0,27 A	—	—	—	—

Rated thermal current (I_{th})	10 A	Sealing	IP67; NEMA 1, 3, 4, 12, 13
Rated impulse withstand (U_{imp})	2500 V	Pollution degree	3
Rated insulation voltage (U_i)	300 V, 500 V, 600 V	Operating temperature range	-40 °C to 70 °C [-40 °F to 158 °F]
Short-circuit protective device (type/maximum rating)	Class J fuse (10 A/600 V)	Expected mechanical life	1,000,000 operations
Conditional short-circuit current	1000 A	—	—

Complies with:

Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.

Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.

IEC/EN60947-1, IEC/EN60947-5-1.

Explosion-Proof Safety Switch

NOMENCLATURE TREE MICRO SWITCH™ GSX Series Nomenclature

GSX	A	16	A	1	B																																																																																							
Switch type ^(Note 1)	Housing (conduit)	Basic switch	Head	Actuator	Actuator options	Modifications/ Specials																																																																																						
Explosion-proof positive break series	<table border="1"> <tr><td>A</td><td>0.5 in NPT</td></tr> <tr><td>B</td><td>PG 13.5</td></tr> <tr><td>C</td><td>20 mm</td></tr> <tr><td>D</td><td>PF 1/2</td></tr> </table>	A	0.5 in NPT	B	PG 13.5	C	20 mm	D	PF 1/2	<table border="1"> <tr><td>01</td><td>Snap action, 1NC/1NO</td></tr> <tr><td>03</td><td>Slow acting, 1NC/1NO Break before make</td></tr> <tr><td>04</td><td>Slow acting, 1NC/1NO Make before break</td></tr> <tr><td>06</td><td>Slow acting, 2NC</td></tr> <tr><td>07</td><td>Snap action, 1NC/1NO, gold</td></tr> <tr><td>20</td><td>Snap action, 2NC/2NO</td></tr> <tr><td>22</td><td>Snap action, 2NC/2NO, gold</td></tr> <tr><td>33</td><td>Slow acting, 1NC/1NO Break before make, gold</td></tr> <tr><td>34</td><td>Slow acting, 1NC/1NO Make before break, gold</td></tr> <tr><td>36</td><td>Slow acting, 2NC, gold</td></tr> <tr><td>40</td><td>Slow acting, 4NC</td></tr> <tr><td>41</td><td>Slow acting, 4NC, gold</td></tr> <tr><td>42</td><td>Slow acting, 2NC/1NO Break before make</td></tr> <tr><td>43</td><td>Slow acting, 2NC/1NO Break before make, gold</td></tr> <tr><td>44</td><td>Slow acting, 2NC/2NO Break before make</td></tr> <tr><td>45</td><td>Slow acting, 2NC/2NO Break before make, gold</td></tr> <tr><td>46</td><td>Slow acting, 3NC/1NO Break before make</td></tr> <tr><td>47</td><td>Slow acting, 3NC/1NO Break before make, gold</td></tr> </table>	01	Snap action, 1NC/1NO	03	Slow acting, 1NC/1NO Break before make	04	Slow acting, 1NC/1NO Make before break	06	Slow acting, 2NC	07	Snap action, 1NC/1NO, gold	20	Snap action, 2NC/2NO	22	Snap action, 2NC/2NO, gold	33	Slow acting, 1NC/1NO Break before make, gold	34	Slow acting, 1NC/1NO Make before break, gold	36	Slow acting, 2NC, gold	40	Slow acting, 4NC	41	Slow acting, 4NC, gold	42	Slow acting, 2NC/1NO Break before make	43	Slow acting, 2NC/1NO Break before make, gold	44	Slow acting, 2NC/2NO Break before make	45	Slow acting, 2NC/2NO Break before make, gold	46	Slow acting, 3NC/1NO Break before make	47	Slow acting, 3NC/1NO Break before make, gold	<table border="1"> <tr><td>A</td><td>Side rotary momentary</td></tr> <tr><td>B</td><td>Top pin plunger</td></tr> <tr><td>C</td><td>Top roller plunger</td></tr> <tr><td>D</td><td>Top roller lever</td></tr> </table>	A	Side rotary momentary	B	Top pin plunger	C	Top roller plunger	D	Top roller lever	<table border="1"> <tr><td>1</td><td>Std. fixed length roller</td></tr> <tr><td>3</td><td>Yoke roller</td></tr> <tr><td>5</td><td>Offset roller</td></tr> </table>	1	Std. fixed length roller	3	Yoke roller	5	Offset roller	<table border="1"> <tr><td>A</td><td>19 x 6,35 [0.75 x 0.25] nylon roller</td></tr> <tr><td>C</td><td>25,4 x 12,7 [1 x 0.5] nylon roller</td></tr> <tr><td>D</td><td>38,1 x 6,35 [1.5 x 0.25] nylon roller</td></tr> <tr><td>E</td><td>19 x 6,35 [0.75 x 0.25] bronze roller</td></tr> <tr><td>W</td><td>38,1 x 12,7 [0.75 x 0.5] rubber roller</td></tr> <tr><td>Y</td><td>50,9 x 12,7 [2.0 x 0.5] rubber roller</td></tr> </table>	A	19 x 6,35 [0.75 x 0.25] nylon roller	C	25,4 x 12,7 [1 x 0.5] nylon roller	D	38,1 x 6,35 [1.5 x 0.25] nylon roller	E	19 x 6,35 [0.75 x 0.25] bronze roller	W	38,1 x 12,7 [0.75 x 0.5] rubber roller	Y	50,9 x 12,7 [2.0 x 0.5] rubber roller	<table border="1"> <tr><td>1</td><td>Clockwise rotation</td></tr> <tr><td>2</td><td>Cnterclock rotation</td></tr> <tr><td>3</td><td>Head assb. w/ actuator to right side</td></tr> <tr><td>4</td><td>Head assb. w/ actuator to left side</td></tr> <tr><td>5</td><td>Head assb. w/ actuator to mtg. surf.</td></tr> <tr><td>6</td><td>Roller perpendicular to mounting surface</td></tr> <tr><td>C</td><td>Prelead cable</td></tr> <tr><td>Q</td><td>Connector</td></tr> </table>	1	Clockwise rotation	2	Cnterclock rotation	3	Head assb. w/ actuator to right side	4	Head assb. w/ actuator to left side	5	Head assb. w/ actuator to mtg. surf.	6	Roller perpendicular to mounting surface	C	Prelead cable	Q	Connector
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NOTES

(1) Not all possible combinations are available; these are only guidelines.

MICRO SWITCH™ GSX Series

Figure 1. Side rotary head with standard roller

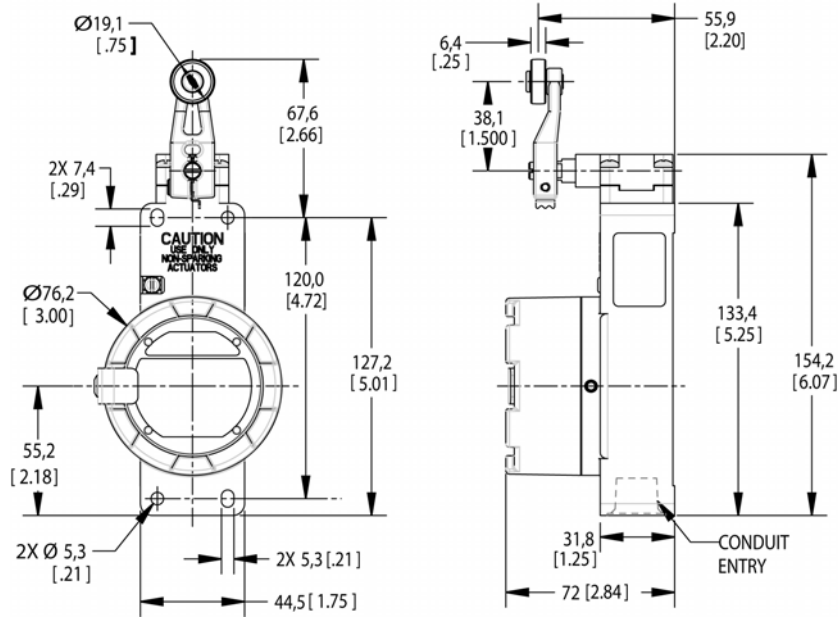


Figure 2. Pin plunger

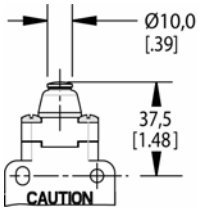


Figure 3. Top roller plunger

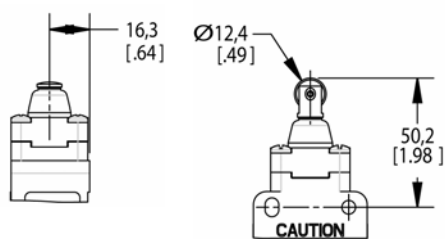
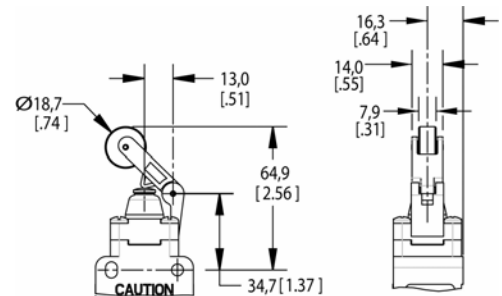


Figure 4. Top roller lever



ORDER GUIDE

Listing	Description
GSXA42A1E	0.5 in NPT housing 2NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXA42B	0.5 in NPT housing 2NC/1NO pin plunger
GSXA42C	0.5 in NPT housing 2NC/1NO top roller plunger
GSXA42D	0.5 in NPT housing 2NC/1NO top roller lever
GSXA46A1E	0.5 in NPT housing 3NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXA46B	0.5 in NPT housing 3NC/1NO pin plunger
GSXA46C	0.5 in NPT housing 3NC/1NO top roller plunger
GSXA46D	0.5 in NPT housing 3NC/1NO top roller lever
GSXC42A1E	20 mm housing 2NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXC42B	20 mm housing 2NC/1NO pin plunger
GSXC42C	20 mm housing 2NC/1NO top roller plunger
GSXC42D	20 mm housing 2NC/1NO top roller lever
GSXC46A1E	20 mm housing 3NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXC46B	20 mm housing 3NC/1NO pin plunger
GSXC46C	20 mm housing 3NC/1NO top roller plunger
GSXC46D	20 mm housing 3NC/1NO top roller lever

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other**

warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

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	+44 (0) 1698 481676 Fax
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	+1-305-883-8257 Fax
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	+1-815-235-6545 Fax

Sensing and Control

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Honeywell

MICRO SWITCH™ BX/BX2 Series

Hazardous Area Switches



DESCRIPTION

The MICRO SWITCH™ BX/BX2 Series is ideal for outdoor use or in adverse environments where a combination of explosion proof plus sealing requirements are needed. To comply with explosion-proof requirements the BX/BX2 has flame paths within the housing, which cool exploding gases below the ignition temperature before they reach explosive gases surrounding the housing. Flame paths on the BX/BX2 are (1) an extended plunger between the switch cavity and head and (2) the cover-housing threads on the front of the switch.

While the MICRO SWITCH™ BX Series features an aluminum housing, the MICRO SWITCH™ BX2 Series has a 316L stainless steel housing that provides enhanced corrosion resistance in applications exposed to aggressive, caustic agents, as well as those often present in chemical processing plants, off-shore/near-shore sites, and other hazardous areas.

These products are weather sealed for outdoor use and designed for explosive gas/dust environments. The BX/BX2 Series is directly interchangeable with the LSX. Adapter plate not required. All heads are field adjustable at 90° increments.

Honeywell explosion-proof switches are designed specifically for use in hazardous location applications. The BX/BX2 enclosure is sealed for protection against corrosion, water, dust and oil as defined in IEC60529. The temperature

rating for these products depends upon the seal material used. Products using a fluorosilicone seal have a rating of -40 °C to 70 °C [-40 °F to 158 °F]. Products using a fluorocarbon seal have a rating of -12 °C [10 °F] to 70 °C [158 °F]. These enclosures meet Ex d IIC T6, Ta -40 °C to 70 °C and Ta -12 °C to 70 °C, respectively. As well as Ex d tD A21 IP67 T85 °C. SIRA 00ATEX1037X and IECEx SIR 07.0102X.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-0:2006, EN 60079-1:2007, EN 61241-0:2004, EN 61241-0:2006, IEC 60079-0:2004 4th Ed., IEC 60079-0:2007 6th Ed., IEC 61241-0:2004 1st Ed., and IEC 61241-1:2004 1st Ed. The maximum construction gap (ic) is less than that required by Table 2 of EN/IEC60079-1:2007, clause 5.2.2 as detailed below.

Flame path	Max. gap	Comment
Push rod & bearing	0,076 mm	Cylindrical spigot joint

All BX2 conduit types and BX products with conduit types 1/2-14NPT, 3/4-14NPT also meet the North American Hazardous Locations Designation: NEMA 7 - Class I, Groups B, C and D; NEMA 9 - Class II, Groups E, F and G and comply with UL Standard: UL 894.

FEATURES






- BX (M20, PG13.5, or PF1/2 conduit): ATEX and IEC Ex
- BX (1/2-14 NPT, 3/4-14 NPT): UL, CSA, ATEX, IEC Ex
- BX2: UL, cUL, ATEX IEC Ex
- BX/BX2: IP67; NEMA 1, 3, 4, 6, 13
- BX (1/2-14 NPT, 3/4-14 NPT) and BX2: NEMA 7, 9 (Div. 1, Class I, Groups B, C, & D Div 1, Class II, Groups E, F, & G)
- BX/BX2: II 2 G; Ex d IIC T6 • II 2 D; Ex d tD A21 T85°C
- Choice of housing: aluminum or 316L stainless steel
- Diverse conduit selection for wide range of applications
- Variety of heads and non-sparking actuators
- 10 A continuous carry electrical rating
- Choice of silver or gold contacts
- External and internal grounding screw
- Fluorocarbon and low-temperature sealing

POTENTIAL APPLICATIONS

- Control valves and actuators
- Offshore drilling
- Grain elevators
- Petrochemical plants
- Chemical plants
- Waste treatment
- Paint booths
- Mining conveyors
- Pulp and paper coating
- Hazardous waste handling





MICRO SWITCH™ BX/BX2 Series

SELECTION GUIDE

Features					
	BX4A3K	BX24A3K	BX4A3K-1A	BX24A3K-1A	BX24P4L
Description	Side rotary, momentary, no lever, 1NO/1NC		Side rotary, momentary, with lever, 1NO/1NC		Side rotary, momentary, low pre-travel, 2NO/2NC
Actuator	Lever not included - reference lever required accessory		1.5 in fixed length lever with front mounted nylon roller (.75 in dia. x .25 in wide)		Lever not included - reference lever required accessory
Conduit Thread	20 mm conduit		20 mm conduit		20 mm conduit
Circuitry	1NC 1NO single-pole double-throw, snap-action, double-break		1NC 1NO single-pole double-throw, snap-action, double-break		2NO 2 NC double-pole double-throw, snap-action, double-break
Approvals	ATEX, IEC Ex	UL, cUL, ATEX IEC Ex	ATEX, IEC Ex	UL, cUL, ATEX IEC Ex	UL, cUL, ATEX, IEC Ex
Actuator	Side rotary		Side rotary		Side rotary
Pretravel	15°		15°		9°
Overtravel	60°		60°		68°
Differential Travel	5°		5°		4°
Operating Torque	0,45 N m max. [4 in-lb max.]				
UL File #	-		-		-
CSA File #	-		-		-
Sealing	IP67; NEMA 1, 3, 4, 6, 13	IP67; NEMA 1, 3, 4, 6, 7, 9, 13	IP67; NEMA 1, 3, 4, 6, 13	IP67; NEMA 1, 3, 4, 6, 7, 9, 13	IP67; NEMA 1, 3, 4, 6, 7, 9, 13
Product Type	Weather-sealed, explosion-proof limit switches/IEC Ex approvals				
Ampere Rating	10 A (Thermal)				
Supply Voltage	600 Vac and 250 Vdc max.				
Operating Temperature Range	-40 °C to 70 °C [-40 °F to 158 °F]				
Housing Material	Aluminum (BX Series); 316L Stainless Steel (BX2 Series)				
Housing Type	BX non plug-in				
Sealed	Explosion-proof				
Availability	Global				
Agency Approvals and Standards	<ul style="list-style-type: none"> • BX (M20, PG13.5, or PF1/2 conduit): ATEX and IEC Ex • BX (1/2-14 NPT, 3/4-14 NPT): UL, CSA, ATEX, IEC Ex • BX2: UL, cUL, ATEX IEC Ex • BX/BX2: IP67; NEMA 1, 3, 4, 6, 13 • BX (1/2-14 NPT, 3/4-14 NPT) and BX2: NEMA 7, 9 (Div. 1, Class I, Groups B, C, & D Div 1, Class II, Groups E, F, & G • BX/BX2: II 2 G; Ex d IIC T6 • II 2 D; Ex d tD A21 T85°C) 				







Hazardous Area Switches

SELECTION GUIDE

Features				
	BX4D3K	BX4C3K	BX24C4L	BXA4L
Description	Top roller plunger, 1NO/1NC	Top plunger plain, 1NC/1NC	Top plunger plain, 2NO/2NC	Side rotary, momentary, no lever, 2NO/2NC
Actuator	N/A	N/A		Lever not included - reference lever required accessory
Conduit Thread	20mm conduit	20 mm conduit		3/4 in - 14NPT conduit
Circuitry	1NC 1NO single-pole double-throw, snap-action, double-break	1NC 1NO single-pole double-throw, snap-action, double-break	2NO 2 NC double-pole double-throw, snap-action, double-break	2NC 2NO single-pole double-throw, snap-Action, double-break
Approvals	ATEX, IEC Ex	ATEX, IEC Ex	UL, cUL, ATEX IEC Ex	UL, CSA, ATEX, IEC Ex
Actuator	Top roller plunger	Top plunger		Side rotary
Pretravel	1,78 mm [0.070 in]	1,78 mm [0.070 in]		15°
Overtravel	4,83 mm [0.190 in]	4,83 mm [0.190 in]		60°
Differential Travel	0,38 mm [0.015 in]	0,38 mm [0.015 in]	0,51 mm [0.020 in]	7°
Operating Position	68.6 mm ± 1 mm [2.700 in ± 0.040 in]	58.5 mm ± 0.76 mm [2.305 in ± 0.030 in]		–
Operating Torque	–	–		0,45 N m max. [4 in-lb max.]
Operating Force	0,45 N max. [4 lb max.]	0,45 N max. [4 lb max.]		–
UL File#	–	–		E61730
CSA File #	–	–		LR57327
Sealing	IP67; NEMA 1, 3, 4, 6, 13	IP67; NEMA 1, 3, 4, 6, 13	IP67; NEMA 1, 3, 4, 6, 7, 9, 13	IP67; NEMA 1, 3, 4, 6, 7, 9, 13
Product Type	Weather-sealed, explosion-proof limit switches/IEC Ex approvals			
Ampere Rating	10 A (Thermal)			
Supply Voltage	600 Vac and 250 Vdc max.			
Operating Temperature Range	-40 °C to 70 °C [-40 °F to 158 °F]			
Housing Material	Aluminum (BX Series); 316L Stainless Steel (BX2 Series)			
Housing Type	BX non-plug-in			
Sealed	Explosion-proof			
Availability	Global			
Agency Approvals and Standards	<ul style="list-style-type: none"> • BX (M20, PG13.5, or PF1/2 conduit): ATEX and IEC Ex • BX (1/2-14 NPT, 3/4-14 NPT): UL, CSA, ATEX, IEC Ex • BX2: UL, cUL, ATEX IEC Ex • BX/BX2: IP67; NEMA 1, 3, 4, 6, 13 • BX (1/2-14 NPT, 3/4-14 NPT) and BX2: NEMA 7, 9 (Div. 1, Class I, Groups B, C, & D Div 1, Class II, Groups E, F, & G) • BX/BX2: II 2 G; Ex d IIC T6 • II 2 D; Ex d tD A21 T85°C 			

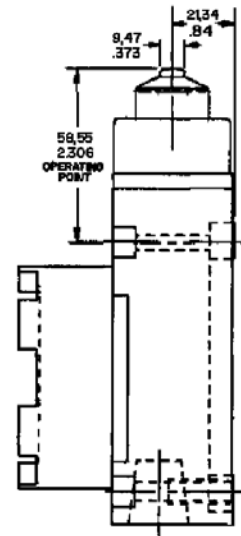
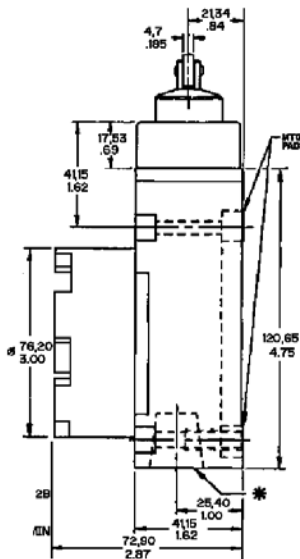
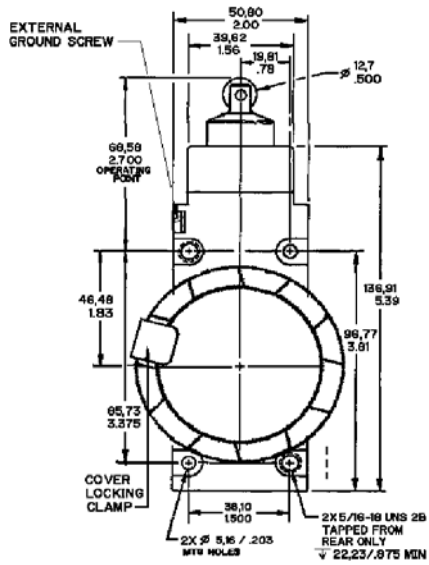
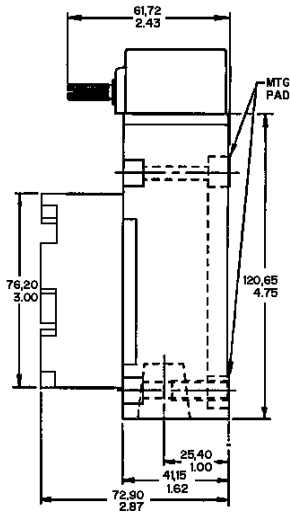
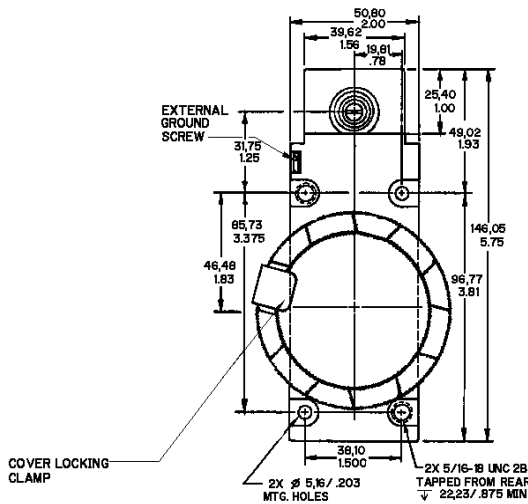
MICRO SWITCH™ BX/BX2 Series

SELECTION GUIDE

						
Features	BXP4L	BX2P4L	BXA3K	BX2A3K	BXC4L	BX2C4L
Description	Side rotary, momentary, low pre-travel, 2NO/2NC		Side rotary, momentary, no lever, 1NO/1NC		Top plunger plain, 2NO/2NC	
Actuator	Lever not included - reference lever required accessory		Lever not included - reference lever required accessory		N/A	
Conduit Thread	3/4 in - 14NPT conduit		1/2 in - 14NPT conduit		3/4 in - 14NPT conduit	
Circuitry	2NO 2 NC double-pole double-throw, snap-action, double-break		1NC 1NO single-pole double-throw, snap-action, double-break		2NO 2 NC double-pole double-throw, snap-action, double-break	
Approvals	UL, CSA, ATEX, IEC Ex	UL, cUL, ATEX IEC Ex	UL, CSA, ATEX, IEC Ex	UL, cUL, ATEX IEC Ex	UL, CSA, ATEX, IEC Ex	UL, cUL, ATEX IEC Ex
Actuator	Side rotary		Side rotary		Top plunger	
Pretravel	9°		15°		1,78 mm [0.070 in]	
Overtravel	68°		60°		4,83 mm [0.190 in]	
Differential Travel (D.T.)	4°		5°		0,51 mm [0.020 in]	
Operating Position	-		-		58.5 mm ± 0.76 mm [2.305 in ± 0.030 in]	
Operating Force	-		-		0,45 N max. [4 lb max.]	
Operating Torque	0,45 N m max. [4 in-lb max.]					
UL File #	-		E61730	-	-	
CSA File #	-		LR57327	-	-	
Sealing	IP67; NEMA 1, 3, 4, 6, 7, 9, 13		IP67; NEMA 1, 3, 4, 6, 7, 9, 13		IP67; NEMA 1, 3, 4, 6, 7, 9, 13	
Product Type	Weather-sealed, explosion-proof limit switches/IEC Ex approvals					
Ampere Rating	10 A (Thermal)					
Supply Voltage	600 Vac and 250 Vdc max.					
Operating Temperature Range	-40 °C to 70 °C [-40 °F to 158 °F]					
Housing Material	Aluminum (BX Series); 316L Stainless Steel (BX2 Series)					
Housing Type	BX non plug-in					
Sealed	Explosion-proof					
Operating Force (O.F.)	0,45 N max. [4 in lb max.]					
Availability	Global					
Agency Approvals and Standards	<ul style="list-style-type: none"> • BX (M20, PG13.5, or PF1/2 conduit): ATEX and IEC Ex • BX (1/2-14 NPT, 3/4-14 NPT): UL, CSA, ATEX, IEC Ex • BX2: UL, cUL, ATEX IEC Ex • BX/BX2: IP67; NEMA 1, 3, 4, 6, 13 • BX (1/2-14 NPT, 3/4-14 NPT) and BX2: NEMA 7, 9 (Div. 1, Class I, Groups B, C, & D Div 1, Class II, Groups E, F, & G) • BX/BX2: II 2 G; Ex d IIC T6 • II 2 D; Ex d tD A21 T85°C 					

Hazardous Area Switches

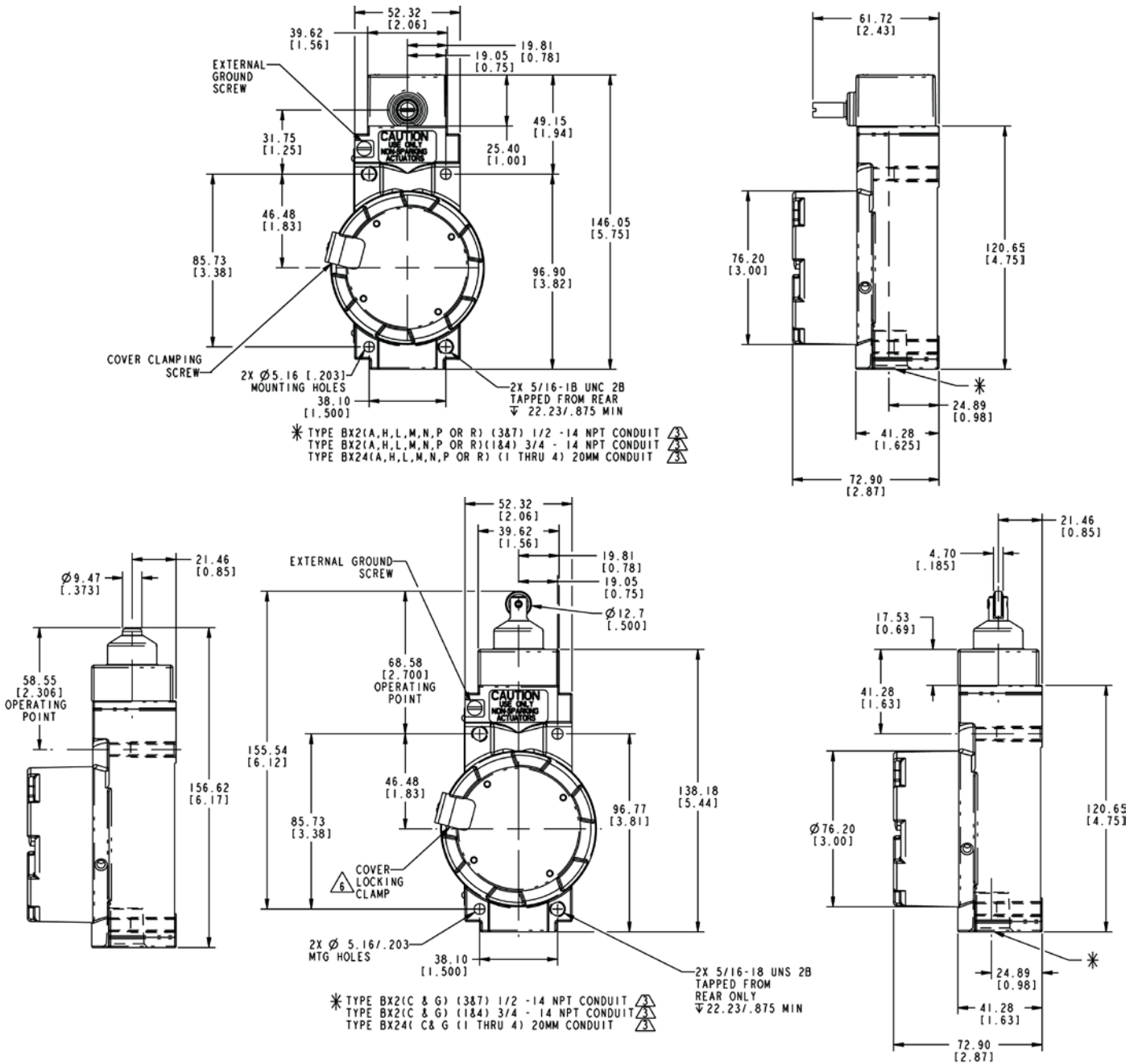
BX MOUNTING DIMENSIONS (For reference only) mm/in



Conduit sizes 1/2-14NPT, 3/4-14NPT, M20, PG13.5, PF1/2 are available for each switch type and carry ATEX and IEC Ex approvals. 1/2-14 NPT, 3/4-14 NPT, and M20 carry UL and CSA approvals
Verify that the mating threaded fitting is identical with the conduit thread shown on the product nameplate






MICRO SWITCH™ BX/BX2 Series






BX2 MOUNTING DIMENSIONS (For reference only) mm/in






Conduit sizes 1/2-14NPT, 3/4-14NPT, M20, PG13.5, PF1/2 are available for each switch type and carry ATEX and IEC Ex approvals. 1/2-14 NPT, 3/4-14 NPT, and M20 carry UL and CSA approvals
 Verify that the mating threaded fitting is identical with the conduit thread shown on the product nameplate

Hazardous Area Switches

BX Levers – Required Accessories					
	LSZ51A	LSZ51C	LSZ52C	LSZ52J	LSZ52K
Lever style	Roller – standard	Roller – standard	Roller – adjustable	Roller – adjustable	Roller – adjustable
Comment	Roller - standard; material: nylon; roller mounted on front of lever	Roller - standard; material: nylon; roller mounted on back of lever	Roller - adjustable; material: nylon; roller mounted on front of lever	Roller - adjustable; material: nylon; roller mounted on front of lever	Roller - adjustable; material: nylon; roller mounted on front of lever
Radius	38,1 mm [1.5 in]	38,1 mm [1.5 in]	38,1 mm to 88,9 mm [1.5 in to 3.5 in]	38,1 mm to 88,9 mm [1.5 in to 3.5 in]	38,1 mm to 88,9 mm [1.5 in to 3.5 in]
Diameter	19,05 mm [0.75 in]	19,05 mm [0.75 in]	19,05 mm [0.75 in]	25,4 mm [1.0 in]	38,1 mm [1.5 in]
Width	6,35 mm [0.25 in]	6,35 mm [0.25 in]	6,35 mm [0.25 in]	12,7 mm [0.5 in]	6,35 mm [0.25 in]
Product type	Lever				
Availability	Global				

BX Levers – Required Accessories					
	LSZ53E	LSZ53S	LSZ54M	LSZ55A	LSZ55C
Lever style	Roller – yoke	Roller – yoke	Rod – standard	Roller with offset	Roller with offset
Comment	Roller - yoke; material: nylon; roller mounted on back-front of lever	Roller - yoke; material: nylon; roller mounted on back-back of lever	Rod - standard; material: aluminum; material: aluminum	Roller - with offset; material: nylon; roller mounted on back of lever	Roller - with offset; material: nylon; roller mounted on front of lever
Radius	38,1 mm [1.5 in]	38,1 mm [1.5 in]	139,7 mm [5.5 in]	38,1 mm [1.5 in]	38,1 mm [1.5 in]
Diameter	19,05 mm [0.75 in]	19,05 mm [0.75 in]	-	19,05 mm [0.75 in]	19,05 mm [0.75 in]
Width	6,35 mm [0.25 in]	6,35 mm [0.25 in]	-	6,35 mm [0.25 in]	6,35 mm [0.25 in]
Product type	Lever				
Availability	Global				

BX2 Levers – Required Accessories			
	LS2Z51A	L2SZ51R	LS2Z52A
Lever style	Non-sparking roller – standard	Non-sparking roller – standard	Non-sparking roller – adjustable
Comment	Roller - standard; material: nylon; roller mounted on front of lever	Roller - standard; material: nylon; roller mounted on back of lever	Roller - adjustable; material: nylon; roller mounted on front of lever
Radius	38,1 mm [1.5 in]	38,1 mm [1.5 in]	38,1 mm to 88,9 mm [1.5 in to 3.5 in]
Diameter	19,05 mm [0.75 in]	40,38 mm [1.59 in]	19,05 mm [0.75 in]
Width	12,7 mm [0.5 in]	6,35 mm [0.25 in]	6,35 mm [0.25 in]
Product type	Lever		
Availability	Global		

WARNING

IF USED IN APPLICATIONS CONCERNING HUMAN SAFETY

- Use only NC direct opening (“positive opening”/“positive break”) contacts, identified by the symbol.
- Do NOT use flexible/adjustable actuators. Only use actuators designed for safety applications.
- Do NOT defeat, tamper, remove, or bypass this switch.
- Hazardous voltage, disconnect power before servicing
- Strictly adhere to all installation and maintenance instructions
- Consult with local safety agencies and their requirements when designing a machine-control link, interface and all control elements that affect safety.

Failure to comply with these instructions could result in death or serious injury.

WARNING

OPENING PRODUCTS HAZARD

DO NOT OPEN these products when energized or in a flammable gas atmosphere.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sensing and Control
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WARNING

IMPROPER CONDUIT THREAD USE

DO NOT USE any other conduit thread than the one identified on the product. Verify that the mating threaded fitting is identical with the conduit thread shown on the product nameplate.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

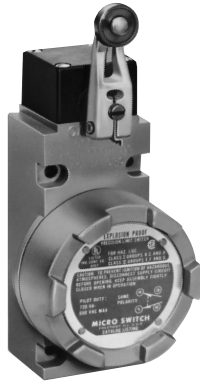
Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

Honeywell

Limit and Enclosed Switches

Weather-Sealed Explosion-Proof Switches

LSX Series



LSX switches are for use either indoors or outdoors in hazardous atmospheres as they are a completely sealed explosion-proof device. Mounting hole location and tracking is same as the long established MICRO SWITCH ML-E1 explosion-proof switch.

An optional mounting plate provides the same tracking and mounting as the standard HDLS. The majority of HDLS operating heads and circuitry options are available on the LSX.

Standard HDLS levers are used, but because of explosion-proof requirements, only nylon rollers or other non-sparking material can be selected. Plunger and cat whisker types listed in the LSX order guide are of non-sparking material.

SEALS

Application proven HDLS head seals are retained to seal the top of the LSX. The circular cover on the front is easily unscrewed to expose the switching elements for wiring or replacement. A screwdriver or bar used on the wrenching lugs extending from the front of the cover allows easy removal or tightening. An O-ring seal is located between the housing and cover.

The LSX withstands pressure of an internal explosion and cools the exploding gases below the kindling temperature of the explosive atmosphere. Flame paths are provided by the cover-housing threads and an extended plunger between the switch cavity and head.

FEATURES

- Sealing - applicable portions of NEMA 1, 3, 4, 6, 7, 9, and 13.
- Tracking interchangeability with MICRO SWITCH ML-E1 and HDLS.
- Variety of heads and non-sparking actuators.
- Field adjustability matches switch to application.
- Momentary, maintained, random sequence, or center neutral action.
- 10 amps continuous carry electrical rating.
- Choice of silver or gold contacts.
- ½ or ¾ inch conduit opening.
- UL Listed, file #E61730
- CSA Certified, file #LR57327
- Internal grounding screw.

NEMA standards: 1, 3, 4, 6, 7, 9 and 13. UL listed and CSA certified: Class I, Div. 1, Groups B, C and D. Class II, Div. 1, Groups E, F and G.

Limit/Enclosed

Limit and Enclosed Switches

Weather-Sealed Explosion-Proof Switches

LSX Series

HOW TO ORDER

The order guide shows the option codes which are added to the LSX prefix to specify the operating head, body and circuitry, assembly modifications (if desired) and actuator type.

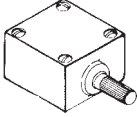
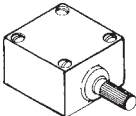
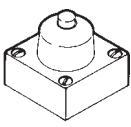
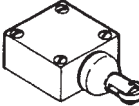
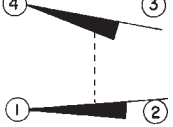
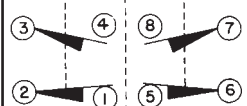
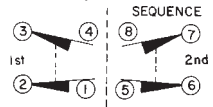
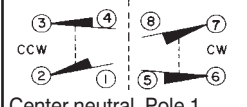
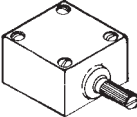
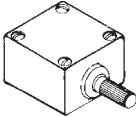
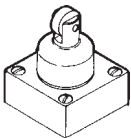
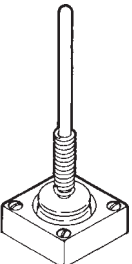
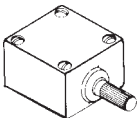
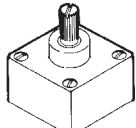
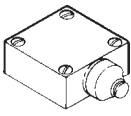
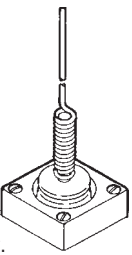
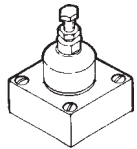
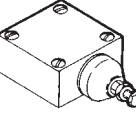
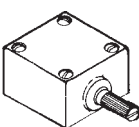
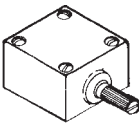
The example given below is LSXA3K-1A. This is an explosion-proof LSX switch with the standard side rotary momentary-action head (A), single-pole circuitry and 1/2 in. conduit opening (3K). Since no modification codes are listed, it is adjusted for both clockwise (CW) and counterclockwise (CCW)

operation, with the actuator shaft facing the front (label side) of the switch. The actuator (-1A) is in a 1.5 in. lever with a .75 in. nylon roller on the open side. There are list price adders for double-pole circuitry and the actuators. (Levers may also be ordered separately by specifying the LSX listings shown in the actuator code description.)

ORDER GUIDE

LSX standard weather-sealed explosion-proof switch.

Typical Catalog Listing: **LSX**

Head Code				Body and Contacts Circuitry Code	
A*  Side rotary. Momentary.	H  Side rotary. Low differential travel and low torque. Momentary.	C  Top plunger. Momentary.	F*  Side roller plunger. Momentary.	3K Silver 3E Gold plated MOMENTARY  Single-pole, 1 N.O., 1 N.C., 1/2 in. conduit.† 4K 3/4 in. conduit† 4L Silver 4S Gold plated MOMENTARY  Double-pole, 2 N.O., 2 N.C., 3/4 in. conduit.† 7L Silver 1/2 in. conduit† 7S Gold plated 3N SPNC Direct Acting 4M Silver 4T Gold plated SEQUENCE  Sequential. Pole 1 operates before Pole 2 (CW, CCW or both). 3/4 in. conduit.† 7T Gold plated 1/2 in. conduit. 4N Silver 4U Gold plated CENTER NEUTRAL  Center neutral. Pole 1 operates CCW, Pole 2 operates CW. 3/4 in. conduit.† 7U Gold contacts 1/2 in. conduit	
P  Side rotary. Low differential travel. Momentary.	N*  Side rotary. Maintained contact.	D  Top roller plunger. Momentary.	J  Wobble stick. Momentary.		
R*  Side rotary. Low torque. Momentary.	B*  Top rotary. Momentary.	E*  Side plunger. Momentary.	K  Cat whisker. Momentary.		
V  Adjustable top plunger. Momentary.	W*  Adjustable side plunger. Momentary.		L  Side rotary. Sequence operation.		
			M  Side rotary. Center neutral.		

* Available with a Single Pole N.C. Direct Acting contact. Electrical Rating D. To order, use 3N for body and circuitry code.

Limit and Enclosed Switches

LSX Series

Weather-Sealed Explosion-Proof Switches

ELECTRICAL RATINGS

Same as HDLS, see page A34.

OPERATING CHARACTERISTICS

See next page.

TEMPERATURE RATINGS

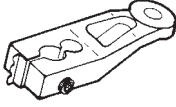
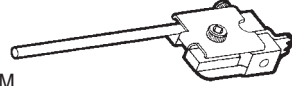
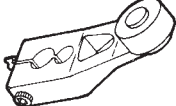
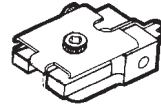
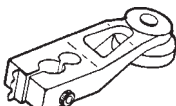
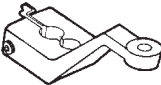
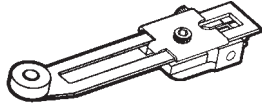
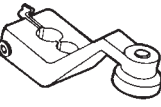
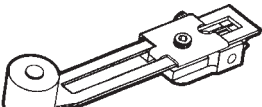
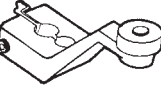
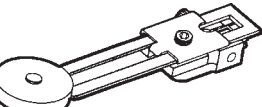
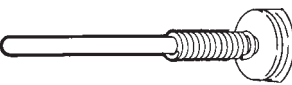
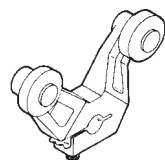
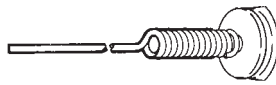
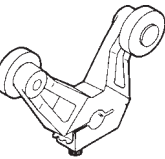
Same as HDLS, see page A56.

ENVIRONMENTAL SEAL PERFORMANCE

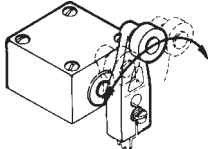
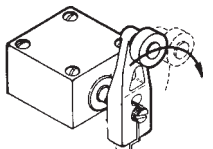
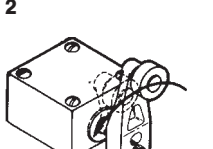
Same as HDLS, see page A56.

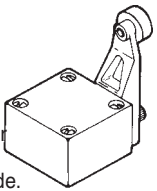
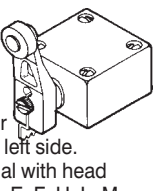
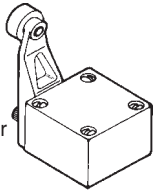
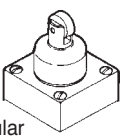
LOW TEMPERATURE and HIGH TEMPERATURE SEALED

See next page.

Actuator Code	
<p>1</p> <p>LSZ51 lever (no roller).</p> 	<p>4M</p> <p>LSZ54M aluminum rod actuator.</p> 
<p>1A</p> <p>LSZ51A lever with .75 in. nylon roller on front side.</p> 	<p>4</p> <p>LSZ54 hub for rod actuator.</p> 
<p>1C</p> <p>LSZ51C lever with nylon roller on back side.</p> 	<p>5</p> <p>LSZ55 offset lever (no roller).</p> 
<p>2C</p> <p>LSZ52C adjustable lever (1.5-3.5 in.) with .75 in. nylon roller.</p> 	<p>5A</p> <p>LSZ55A offset lever with .75 in. nylon roller on back side.</p> 
<p>2J</p> <p>LSZ52J adjustable lever (1.5-3.5 in.) with 1 in. nylon roller.</p> 	<p>5C</p> <p>LSZ55C offset lever with .75 in. nylon roller on front side.</p> 
<p>2K</p> <p>LSZ52K adjustable lever (1.5-3.5 in.) with 1.5 in. nylon roller.</p> 	<p>7A</p> <p>Wobble stick actuator. (Use with head type J only.)</p> 
<p>3S</p> <p>LSZ53S yoke lever with .75 in. nylon rollers (same side).</p> 	<p>8A</p> <p>Cat whisker actuator. (Use with head type K only.)</p> 
<p>3E</p> <p>LSZ53E yoke lever with .75 in. nylon roller (one ea. side).</p> 	<p>1.5 in. long levers, except where noted.</p>

Limit/Enclosed

Actuator Direction Modification Code (No additional cost.)
<p>No Code.</p>  <p>CW and CCW. (Head types A, B, H, L, P, R.)</p>
<p>1</p>  <p>CW operation. (Optional with head types A, B, H, L, P, R.)</p>
<p>2</p>  <p>CCW operation. (Optional with head types A, B, H, L, P, R.)</p>

Head/Actuator Orientation Modification Code (No additional cost.)
<p>No Code.</p> <p>Side rotary heads assembled with actuator shaft facing front. Roller on top roller plungers assembled parallel to mounting surface.</p>
<p>3</p> <p>Head assembled with actuator shaft to right side. (Optional with head types A, E, F, H, L, M, N, P, R.)</p> 
<p>4</p> <p>Head assembled with actuator shaft to left side. (Optional with head types A, E, F, H, L, M, N, P, R.)</p> 
<p>5</p> <p>Head assembled with actuator shaft to back of switch. (Optional with head types A, E, F, H, L, M, N, P, R.)</p> 
<p>6</p> <p>Roller on top roller plungers assembled perpendicular to mounting surface. (Optional with head type D.)</p> 
<p>8</p> <p>Roller on side plunger is assembled in vertical position.</p>

Weather-Sealed Explosion-Proof Switches

OPERATING CHARACTERISTICS

Rotary actuated switches

	Side Rotary								Top Rotary Momentary					
	Momentary				Maintained	Sequence	Center Neutral	LSXB						
	LSXA Standard	LSXP Low Diff. Travel	LSXR Low Torque	LSXH Low Diff. Low Torque	LSXN	LSXL (Double Pole Only)	LSXM (Double Pole Only)							
Pretravel max.	15°		9°		15°		9°		65°	1st step 15° 2nd step 10° additional	18°	25°		
Overtravel min.	60°		66°		60°		66°		20°	48°	57°	100°		
Differential Travel max.	SPDT 5°	DPDT 7°	SPDT 3°	DPDT 4°	SPDT 5°	DPDT 7°	SPDT 3°	DPDT 4°	SPDT 30°	DPDT 35°	5°	10°	SPDT 10° DPDT 12°	
Operating Torque max.	0,45 Nm 4 in. lbs.		0,45 Nm 4 in. lbs.		0,19 1.7 in. lbs.		0,19 Nm 1.7 in. lbs.		0,45 Nm 4 in. lbs.		0,45 Nm 4 in. lbs.		0,28 Nm 2.5 in. lbs.	
Operating Temp. Range	10 to 250°F -12 to 121°C				30 to 250°F -1 to 121°C				10 to 250°F -12 to 121°C		30 to 250°F -1 to 121°C			

Nm = Newton meters

Plunger actuated switches

	Momentary							
	LSXC Top Plunger	LSXD Top Roller Plunger	LSXE Side Plunger	LSXF Side Roller Plunger				
Pretravel max.	1,78mm .070 in.		1,78mm .070 in.		2,54mm .100 in.		2,54mm .100 in.	
Differential Travel max.	SPDT 0,38mm .015 in.	DPDT 0,51mm .020 in.	SPDT 0,38mm .015 in.	DPDT 0,51mm .020 in.	1,14mm .045 in.		1,14mm .045 in.	
Overtravel min.	4,83mm .190 in.		4,83mm .190 in.		4,83mm .190 in.		4,83mm .190 in.	
Operating Force max.	17,8 N 4 lbs.		17,8 N 4 lbs.		26,7 N 6 lbs.		26,7 N 6 lbs.	
Operating Point	58,5 ± 0,76mm 2.305 ± .030 in.		68,6 ± 1mm 2.700 ± .040 in.		33,0 ± 0,76mm 1.300 ± .030 in.		44,1 ± 1mm 1.735 ± .040 in.	
Operating Temperature Range	-12 to 93°C 10 to 200°F							

Wobble Actuated Switches

	Momentary		
	LSXJ Delrin Rod	LSXK Cat Whisker (Wire)	
Pretravel max.	Radius approx. 25,4mm 1.0 in.		50,8mm 2.0 in.
Operating Force max.	2,78 N 10 oz.		1,39 N 5.0 oz.
Operating Temperature Range	-12 to 93°C 10 to 200°F		

N = Newtons

COMPLETELY FLUOROCARBON-SEALED AND LOW TEMPERATURE SWITCHES

Completely fluorocarbon-sealed and low temperature construction LSX switches are available. See page A42 for a full description of both of these options.

How to order

For **fluorocarbon-sealed** switches, insert the additional letters Y and C in the appropriate places in the standard catalog listing; for **low temperature** versions insert the additional letters Y and B. Examples follow:

- LSXA3K—standard side rotary switch
- LSXYAC3K—completely fluorocarbon-sealed version of the LSXA3K
- LSXA3K—standard side rotary switch
- LSXYAB3K—low temperature version of the LSXA3K

Limit and Enclosed Switches

LSX Series

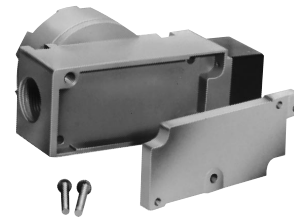
Weather-Sealed Explosion-Proof Switches

REPLACEMENT PARTS

Operating Heads

Switch Type	Catalog Listing Operating Head Only
LSXA	LSZ1A
LSXB	LSZ1B
LSXC	LSXZ1C
LSXD	LSXZ1D
LSXE	LSXZ1E
LSXF	LSXZ1F
LSXH	LSZ1H
LSXJ	LSZ1JGA
LSXK	LSXZ1KHA
LSXL	LSZ1L
LSXM	LSZ1M
LSXN	LSZ1N
LSXP	LSZ1P
LSXR	LSZ1R

ADAPTER PLATE



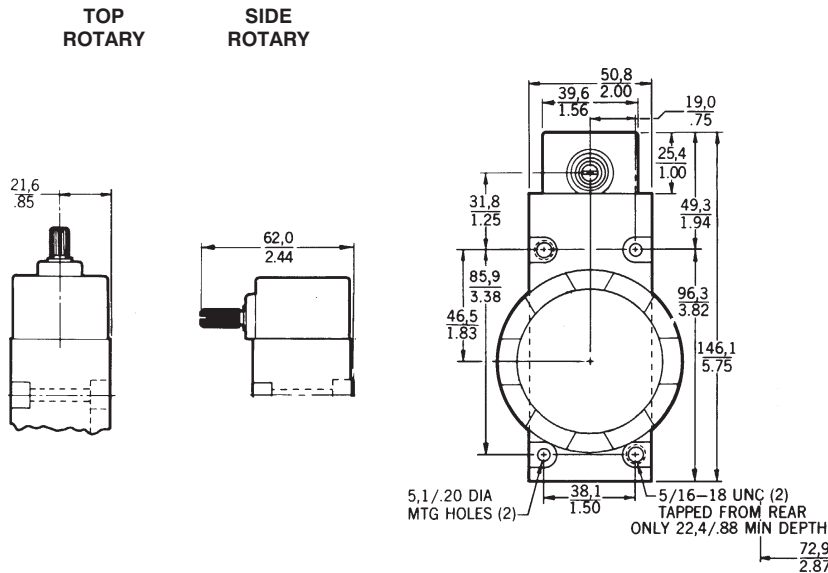
Catalog Listing **LSXZ4022** adapter plate enables the explosion-proof LSX to be mounted on existing HDLS mounting holes. The LSX has a recessed back into which the adapter plate fits and mounts, using two screws (furnished).

Limit/Enclosed

Contact Blocks

Circuitry	Contact Block
Single Pole	LSXZ3K
Double Pole	LSXZ3L
Sequence or Center Neutral	LSXZ3M

MOUNTING DIMENSIONS (For reference only)



Conduit Openings
 (LSXA3, LSXB3, LSXH3, LSXN3,
 LSXP3 and LSXR3 have 1/2-14 NPT.
 LSXA4, LSXB4, LSXH4, LSXLR,
 LSXM4, LSXN4, LSXP4, and LSXR4 have 3/4-14 NPT.

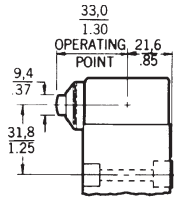
Limit and Enclosed Switches

LSX Series

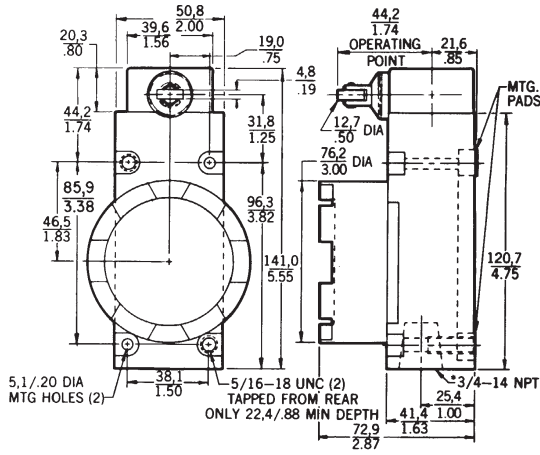
Weather-Sealed Explosion-Proof Switches

MOUNTING DIMENSIONS (For reference only)

TOP PLUNGER

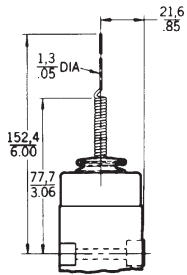


TOP ROLLER PLUNGER

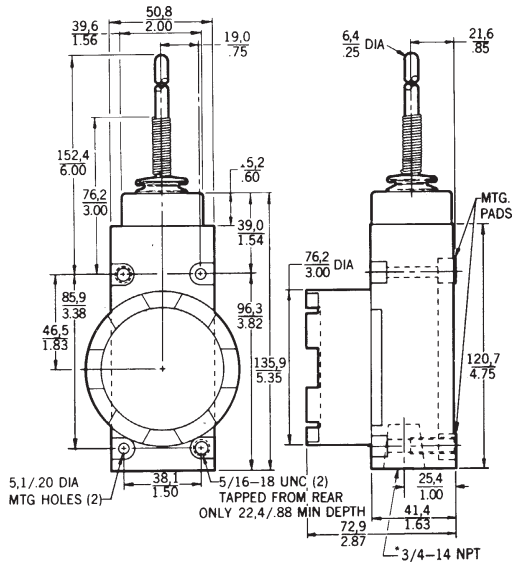


Conduit Openings
(LSXJ3, and LSXK3 have 1/2-14 NPT.)
(LSXJ4 and LSXK4 have 3/4-14 NPT.)

CAT WHISKER

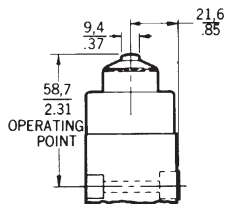


WOBBLE STICK

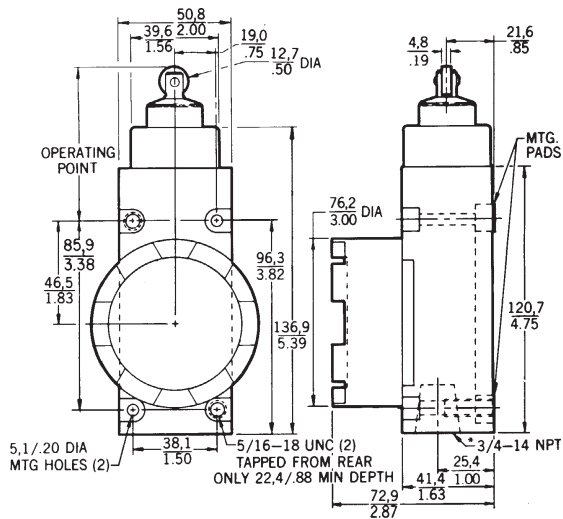


Conduit Openings
(LSXE3 and LSXF3 have 1/2-14 NPT.
LSXE4 and LSXF4 have 3/4-14 NPT.)

TOP PLUNGER



TOP ROLLER PLUNGER



Conduit Openings
(LSXC3 and LSXD3 have 1/2-14 NPT.
LSXC4 and LSXD4 have 3/4-14 NPT.)

Key: 0,0 = mm
0.00 = inches

Momentary Explosion-Proof Cable Pull Limit Switches: For Signaling Applications



FEATURES

- Optional direct acting contacts enhance reliability
- Cable length may be up to 200 ft. in a straight line
- Sealing meets applicable portions of NEMA 1, 3, 4, 7, 9 and 13
- 10 amps continuous carry electrical rating
- 1/2 or 3/4 inch conduit opening
- UL Listed
- CSA Certified
- Internal grounding screw

NEMA standards: 1, 3, 4, 7, 9 and 13. UL listed and CSA certified: Class I, Div. 1, Groups B, C and D. Class II, Div. 1, Groups E, F and G.

Typical Applications

- Petroleum Plants
- Chemical Plants
- Mining Conveyors

MOMENTARY (CONTACT SWITCH) OPERATING HEAD

Momentary CLSX Cable Pull Limit Switches are designed for signaling applications; they are not to be used as emergency stop devices. (For emergency stop applications, see the Maintained Explosion-Proof Cable Pull Limit Switch in the Safety Products Catalog.)

When using direct acting contacts, Momentary Cable Pull Limit Switches provide a means to manually force disconnection of a normally closed control circuit by pulling on an attached cable. Momentary switches cause contact transfer if the cable is manually pulled and held. When the cable is released, switch contacts return to their original state. Momentary switches have either direct-acting contacts or snap-action contacts.

SEALS

CLSX Switches are for use either indoors or outdoors in hazardous atmospheres as they are a completely sealed explosion-proof device.

Application proven HDLS head seals are retained to seal the top of the CLSX. The circular cover on the front is easily unscrewed to expose the switching elements for wiring or replacement. A screwdriver or bar used on the wrenching lugs extending from the front of the cover allows easy removal or tightening. An O-ring seal is located between the housing and cover.

The CLSX withstands pressure of an internal explosion and cools the exploding gases below the kindling temperature of the explosive atmosphere. Flame paths are provided by the cover-housing threads and an extended plunger between the switch cavity and head.

Limit/Enclosed

Limit and Enclosed Switches

CLSX Series

Momentary Explosion-Proof Cable Pull Limit Switches: For Signaling Applications

TECHNICAL DATA CLSX SERIES SPECIFICATIONS

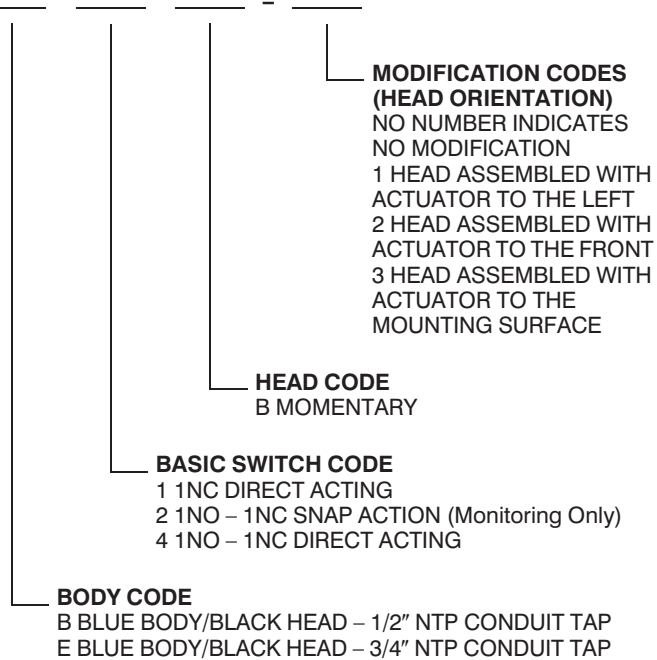
Electrical	
Rate thermal current	$I_{th} = 10 \text{ A}$
Rate insulation voltage	$U_i = 660 \text{ VAC}/660 \text{ VDC}$
Impulse voltage	$U_{imp} = 2.5 \text{ kV}$
Contact resistance	<25 milliohms
Operating rating	AC15 $U = 600 \text{ V}: I = 1.2 \text{ A}$ $U = 240 \text{ V}: I = 3 \text{ A}$ $U = 120 \text{ V}: I = 6 \text{ A}$ DC13 $U = 250 \text{ V}: I = 0.27 \text{ A}$ $U = 24 \text{ V}: I = 2.8 \text{ A}$
UL/CSA	A600/Q300
Mechanical	
Protection class	NEMA 1, 3, 4, 7, 9 and 13
Mechanical life	10^5 operations maximum
Temperature Range	-1° to 70°C (30° to 158°F)
Terminal identification	Numbering to EN50013
Head/housing material	Zinc die cast

EXAMPLE CATALOG LISTING

Catalog Listing	Description
B4B-1	Blue Body/Black Head – 1/2" NTP Conduit Tap, 1NO – 1NC Direct Acting, Momentary, Head Assembled with Actuator to the Left

CLSX ORDER GUIDE

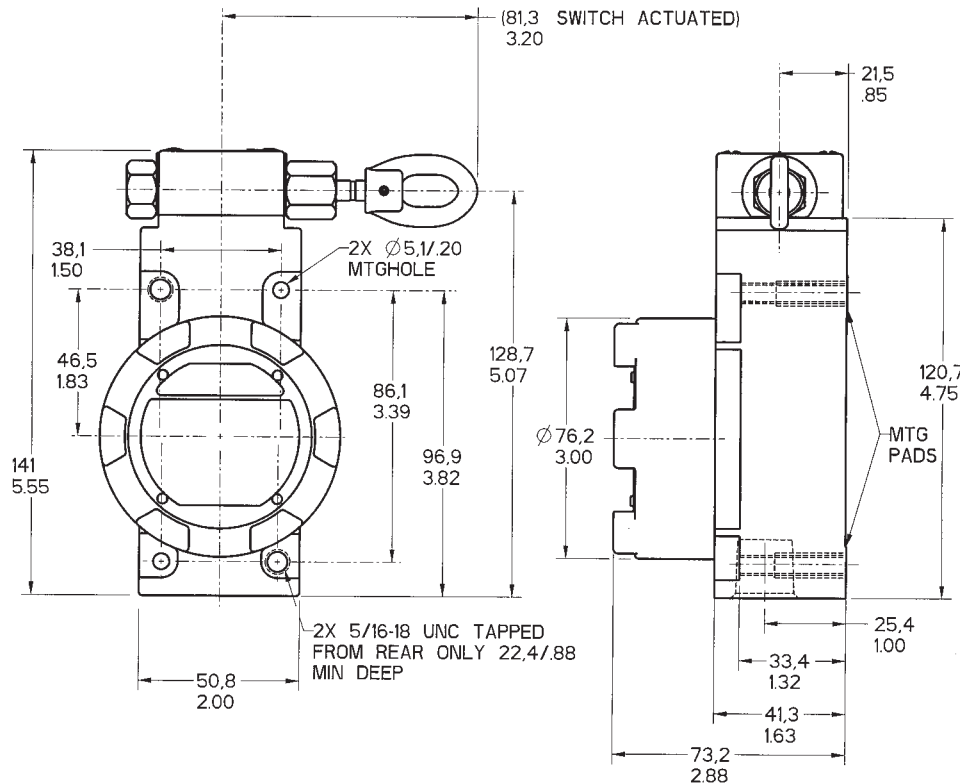
CLSX



CLSX SERIES – BASE PRICE

EXPLOSION – PROOF SINGLE HEAD CABLE PULL LIMIT SWITCH

MOUNTING DIMENSIONS (For reference only)

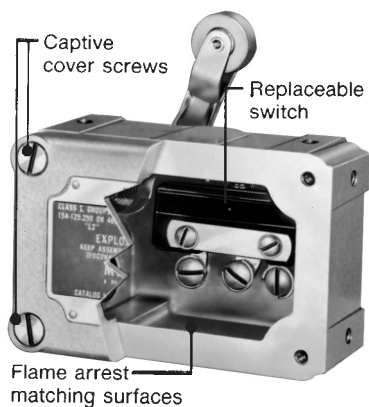


Limit and Enclosed Switches

Explosion-Proof Switches

EX Series

Single-Conduit Connect Switch*



* See page A124 for double conduit connect switches.

EX switches feature the smallest UL-listed housings available for use in hazardous locations. Flame paths within the housing cool exploding gases below the kindling temperature before they reach the explosive gases surrounding the housing.

The enclosed switching unit, which is held in place by screws, is accessible when the cover plate is removed. A tapped conduit

opening is located in one end of one group of EX listings (pages A122-A123); while a second group (page A124) has a conduit opening in each end of the switch.

These switches are not sealed against liquids and are not intended to be subjected to liquid splash or for outdoor applications. If a sealed explosion-proof switch is required, refer to the type CX and LSX.

FEATURES

- NEMA 1, 7 and 9
- Compact, rugged housing
- Up to 20 amp capacity
- Ample wiring space
- Mounts from 4 sides
- Roller arms adjustable through 360°
- Non-sparking actuators
- Captive cover screws
- UL Listed, file #E14274
- CSA Certified, file #LR57324
- Grounding screw

NEMA

NEMA standards: 1, 7 and 9.
UL listed and CSA certified: Class I, Div. 1, Groups B, C and D (Group B - only as noted in order guides); and Class II, Div. 1, Groups E, F and G.

Also refer to NEMA application note in the Reference Standards section at the rear of this catalog.

TEMPERATURE RANGE

EX switches are for use in a temperature range of -40 to 160°F (-40 to 71°C). For applications outside these limits, please call the 800 number.

ACTUATORS

Roller arm versions are designed for cam or slide operation. Listings include clockwise and counterclockwise actuation. Levers are adjustable through 360°. The roller is non-sparking material.

The cross-roller arm switch is for use where the operating mechanism approaches from a direction perpendicular to the longitudinal axis of the switch.

The overtravel plunger has a case hardened, radius tipped, push-rod plunger guided by a sturdy bushing.

The manually operated switch has a large paddle-shaped actuator.

REPLACEMENT PARTS

Available replacement parts are listed on page A125. An installation sheet packed with each switch describes these parts in detail and explains how they are installed.

ELECTRICAL RATINGS

Circuitry	Electrical Ratings
<p>Single-Pole Double-Throw</p>	<p>A</p> <p>UL/CSA Rating: 15 amps, 125, 250 or 480 VAC; 1/8 Hp, 125 VAC; 1/4 Hp, 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.</p>
<p>Single-Pole Double-Throw</p>	<p>B</p> <p>UL/CSA Rating: 20 amps, 125, 250 or 480 VAC; 10 amps, 125 VAC "L"; 1 Hp, 125 VAC; 2 Hp, 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.</p>
<p>Double-Pole Double-Throw</p>	<p>C</p> <p>UL/CSA Rating: 10 amps, 125 or 250 VAC; 0.3 amp, 125 VDC; 0.15 amp, 250 VDC.</p>
<p>Single-Pole Double-Throw</p>	<p>D</p> <p>UL/CSA Rating: 10 amps, 125, 250 or 480 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.</p>
<p>Single-Pole Double-Throw</p>	<p>E</p> <p>UL Rating: 1 amp, 125 VAC.</p>

Limit/Enclosed


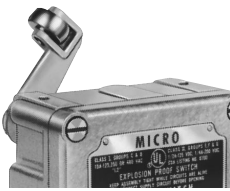



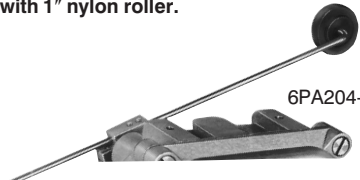
Explosion-Proof Switches

ROLLER LEVER ACTUATED SWITCHES



AUXILIARY ACTUATORS

Order rotary actuators for the EX-AR20 from the selection shown below.

 <p>Roller Lever</p> <p>6PA5-EX (Bronze roller)</p> <p>6PA127-EX (Nylon roller)</p>	
 <p>Cross Roller Lever</p> <p>6PA131-EX (Bronze roller)</p>	
 <p>One-Way Roller Lever</p> <p>For CW actuation: 6PA130-EX (Bronze roller) For CCW actuation: 6PA142-EX (Bronze roller)</p>	
 <p>Adjustable Length Roller Lever</p> <p>6PA138-EX (Nylon roller)</p>	
 <p>Rod Lever</p> <p>6PA136-EX (Aluminum rod)</p>	<p>Adjustable length 12.5" max. rod lever with 1" nylon roller.</p>  <p>6PA204-EX</p>

ORDER GUIDE

Description	Elec. Rating Pg. A121	Catalog Listing	O.F.	P.T. max. mm in.	O.T. max.	D.T. max. mm in.	
CW actuation*. 15 amp. SPDT.	A	EX-AR	2,22-5,56 N .5-1.25 lb.	5,56 .219 (8°)	90°	0,18 .007 (0,25°)	
CW actuation*. 20 amp. SPDT.	B	EXA-AR	3,34-8,90 N .75-2 lb.	5,56 .219	25°	0,3 .012 (4°)	
CCW actuation*. 15 amp. SPDT.	A	EX-AR30	11,1 N 2.5 lb. max.	2,65 .065	25°	0,18 .007 (0,25°)	
CW or CCW actuation*. 15 amp. Low O.F. (no return spring). Without mtg. bracket. SPDT.	A	EX-AR16	0,56 N 2 oz. max.	—	—	—	
Also UL listed and CSA certified for Class I Group B (hydrogen) atmospheres.	CW actuation*. 15 amp. SPDT.	A	EX-AR800	2,22-5,56 N .5-1.25 lb.	5,56 .219	90°	0,18 .007 (0,25°)
	CCW actuation*. 15 amp. SPDT.	A	EX-AR830	11,1 N 2.5 lb. max.	1,65 .065	25°	0,18 .007 (0,25°)
	CW actuation*. 10 amp. DPDT.	C	EXD-AR-3†	2,22-6,67 N .5-1.5 lb.	6,35 .250	25°	2,77 .109 (4°)
	CCW actuation*. 10 amp. DPDT.	C	EXD-AR30-3†	12,2 N 2.75 lb.	5,56 .219	25°	2,77 .109
	CW actuation*. 1 amp.** SPDT.	E	EXH-AR3	2,22-6,67 N .5-1.5 lb.	5,56 .219	25°	0,64 .025
	CCW actuation*. 1 amp.** SPDT.	E	EXH-AR33	11,1 N 2.5 lb. max.	1,65 .065 (3,5°)	25°	0,64 .025
No lever furnished. (Order levers shown at left of this page as separate items.) CW actuation*. SPDT.	A	EX-AR20	0,22 Nm 31.25 in./oz.	5,56 .219	90°	0,18 .007 (0,25°)	
As above except CCW actuation.	A	EX-AR230	0,22 Nm 31.25 in./oz.	5,56 .219	90°	0,18 .007 (0,25°)	

Nm = Newton meters

* CW (clockwise) or CCW actuation, when looking at nameplate.

** Hermetically sealed switching unit, furnished with 10.5 ft./3.2 m leadwire.

† Furnished with 0,91 m (3 ft.) leadwire

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

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

Explosion-Proof Switches

CROSS ROLLER LEVER ACTUATED SWITCH



ORDER GUIDE

Description	Elec. Rating Pg. A121	Catalog Listing	O.F. N oz.	P.T. max. mm in.	O.T. max.	D.T. max. mm in.
CW actuation* 15 amp. SPDT	A	EX-CR	2,22-5,56 8-20	5,56 .219	90°	0,18 .007

ONE-WAY ROLLER LEVER ACTUATED SWITCH



ORDER GUIDE

Description	Elec. Rating Pg. A121	Catalog Listing	O.F. N oz.	P.T. max. mm in.	O.T. max.	D.T. max. mm in.
CW actuation* 15 amp. SPDT	A	EX-AR128	2,22-5,56 8-20	5,56 .219	90°	0,18 .007

Limit/Enclosed

LOW FORCE ROD LEVER ACTUATED SWITCH



ORDER GUIDE

Description	Elec. Rating Pg. A121	Catalog Listing	O.F. max. N oz.	P.T. max.	O.T. min.	D.T.
Furnished without mounting bracket. CW actuation* 15 amp. SPDT	A	EX-AR1613	0,56 2	18°	40°	—

MANUALLY ACTUATED SWITCH



ORDER GUIDE

Description	Elec. Rating Pg. A121	Catalog Listing	O.F. max. N lb.
Large 3 x 3.5 inch paddle for fast, easy operation. 15 amp. SPDT	A	EX-AR50	11,1 2.5

OVERTRAVEL PLUNGER ACTUATED SWITCHES



ORDER GUIDE

Description	Elec. Rating Pg. A121	Catalog Listing	O.F. max. N lb.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.	O.P.** mm in.
15 amp. SPDT	A	EX-Q	13,34 3	1,98 .078	4,78 .188	0,10 .004	47,22 1.859
20 amp. SPDT	B	EXA-Q	8,90 2	1,27 .050	3,18 .125	0,23 .009	46,02 1.812
Also UL listed for Class I, Group B (hydrogen) atmospheres.	15 amp SPDT	EX-Q800	13,34 3	1,98 .078	4,78 .188	0,10 .004	47,22 1.859
	10 amps DPDT	EXD-Q-3†	13,34 3	3,96 .156	3,58 .141	1,52 .060	46,02 1.812
With seal boot on plunger. 10 amp. SPDT	D	EX-N15	13,34 3	1,98 .078	4,78 .188	0,10 .004	52,32 2.060

* CW (Clockwise) or CCW actuation, when looking at nameplate.

** Tolerance ± 1.52 in./0.060 mm.

† Furnished with 0,91 m (3 ft.) leadwire.

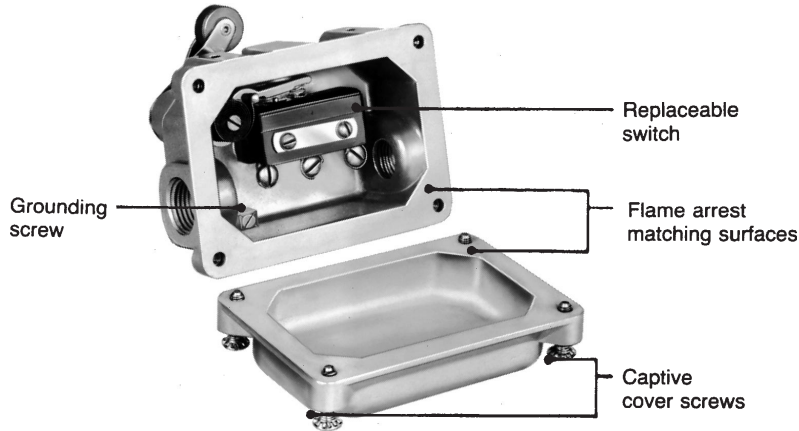
Characteristics: O.F. — Operating Force; P.T. — Pretravel; O.T. — Overtravel; D.T. — Differential Travel
N = Newtons

Limit and Enclosed Switches

Explosion-Proof Switches

EX Series

Double-conduit connect switch



EX switches on this page have conduit openings on each side of the enclosure which enable through-wiring. This feature also allows the user to split the wiring of a double-pole switch, with one-pole exiting from each side.

The enclosure is larger than EX switches with one conduit opening and provides additional space for wiring.

NEMA

Double-conduit connect EX switches also meet the applicable portions of the NEMA classifications listed on page A121.

ROLLER LEVER ACTUATED SWITCHES



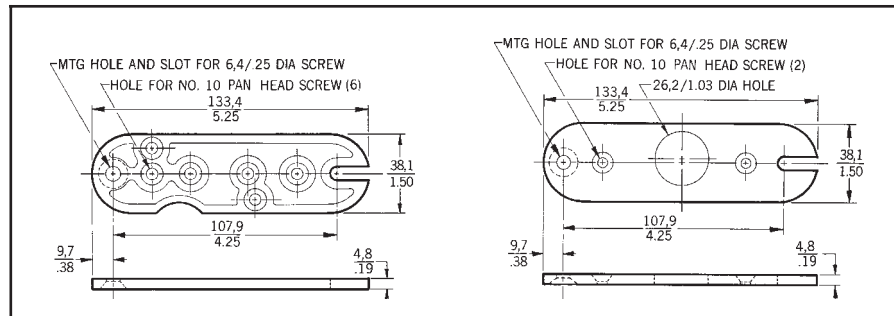
ORDER GUIDE

Description	Elec. Rating Pg. A121	Catalog Listing	O.F. N oz.	P.T. max. mm in.	O.T. max.	D.T. max. mm in.
Two 1/2 in. conduit openings. CW actuation.* 15 amp. SPDT.	A	1EX1	2,22-5,56 8-20	5,56 .219	90°	0,18 .007
Two 1/2 in. conduit openings. CW actuation.* 20 amp. SPDT.	B	2EX1	3,61-8,90 13-32	5,56 .219	25°	0,3 .012
Two 3/4 in. conduit openings. CW actuation.* 10 amp. DPDT.	C	4EX1-3†	2,22-6,67 8-24	6,35 .250	25°	2,77 .109

* CW (clockwise) or CCW actuation, when looking at nameplate.
N = Newtons
† Furnished with 0,91 m (3 ft.) leadwire.

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

MOUNTING BRACKETS



15PA85-EX is used for top, bottom, back or end mounting. It is furnished with each switch, except where noted in the order guides.

15PA86-EX is ordered separately for top mounting of plunger switches. EX switches may also be direct mounted, using 10-32 UNF screws.

Explosion-Proof Switches

REPLACEMENT PARTS

Switch Listing	Catalog Listing Replacement Part Numbers		
	Switching Unit	Actuator	Springs
EX-AR	BZ-2R-P4	6PA5-EX	33PA7-EX
EX-AR16	BZ-2RW88-P5	6PA5-EX	—
EX-AR20	BZ-2R-P4	*	33PA7-EX
EX-AR30	BZ-2R-P4	6PA5-EX	33PA5-EX
EX-AR50	BZ-2R-P4	6PA134-OP	33PA7-EX
EX-AR800	BZ-2R-P4	6PA5-EX	33PA7-EX
EX-CR	BZ-2R-P4	6PA131-EX	33PA7-EX
EX-Q	BZ-2R-P4	8PA15-EX	—
EX-N15	BZ-2R15-P4	8PA12-EX	—
EXA-AR	BA-2R-P4	6PA5-EX	33PA6-EX
EXD-AR-3	DT-2R4-A7	6PA5-EX	33PA6-EX
EXH-AR3	4HS202	6PA5-EX	33PA6-EX
EXH-AR33	4HS203	6PA5-EX	33PA5-EX
EXD-AR30-3	DT-2R711-A7	6PA5-EX	33PA5-EX

Switch Listing	Catalog Listing Replacement Part Numbers		
	Switching Unit	Actuator	Spring
EX-AR128	BZ-2R-P4	6PA130-EX	33-PA7-EX
EX-AR1613	BZ-2RW88-P5	6PA136-EX	—
EX-Q800	BZ-2R-P4	8PA15-EX	—
EXA-Q	BA-2R-P4	8PA15-EX	—
EXD-Q-3	DT-2R-A7	8PA77-EX	—
1EX1	BZ-2R-P4	6PA5-EX	33PA7EX
2EX1	BA-2R-P4	6PA5-EX	33PA6-EX
4EX1-3	DT-2R4-A7	6PA5-EX	33PA6-EX

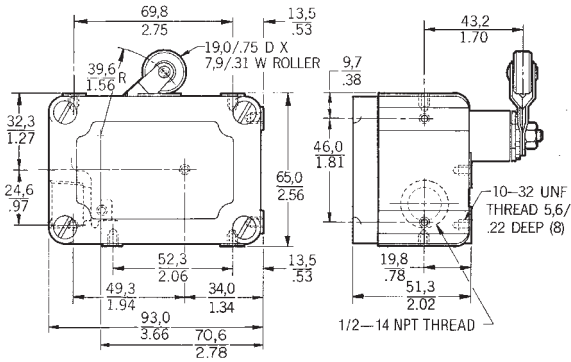
* Actuators for EX-AR20 are shown on page A122.

In addition to the items shown above, the following replaceable internal levers are available: **33PA1-EX** for EX-AR, EX-AR800, EXA-AR, EXD-AR-3, EXH-AR3, EX-AR20, EX-CR, EX-AR128, 1EX1, 2EX1, and 4EX1-3.

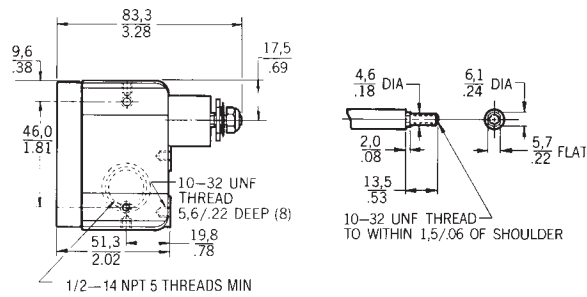
Limit/Enclosed

MOUNTING DIMENSIONS (For reference only)

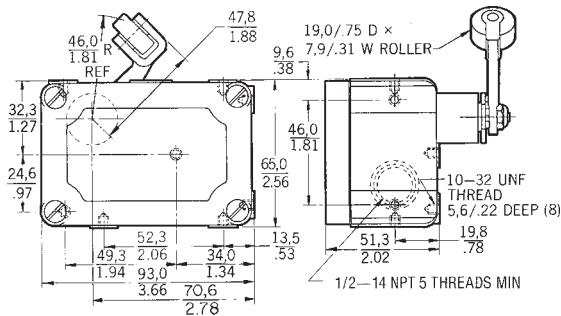
ROLLER LEVER



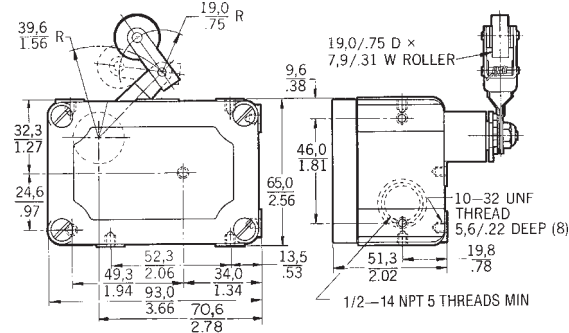
NO LEVER



CROSS ROLLER LEVER



ONE-WAY ROLLER LEVER



Key: 0,0 = mm
0.00 = inches

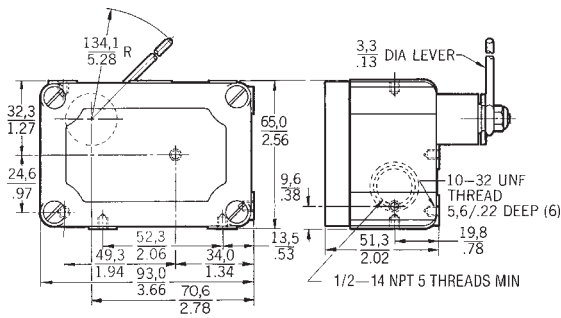
Limit and Enclosed Switches

EX Series

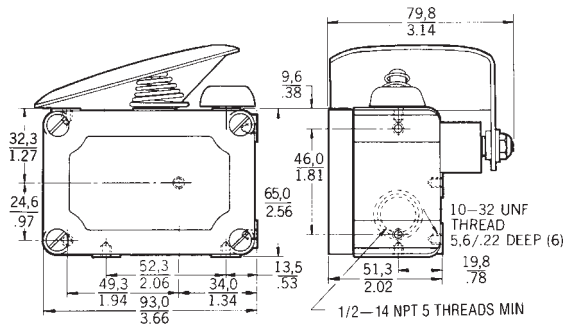
Explosion-Proof Switches

MOUNTING DIMENSIONS (For reference only)

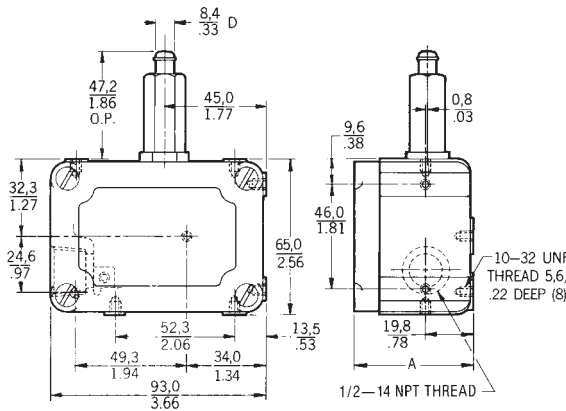
LOW FORCE ROD



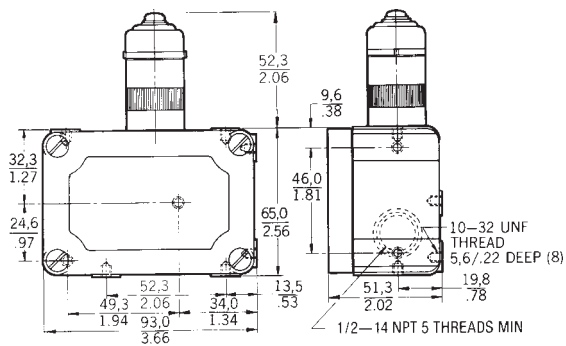
MANUAL ACTUATOR



PLUNGER

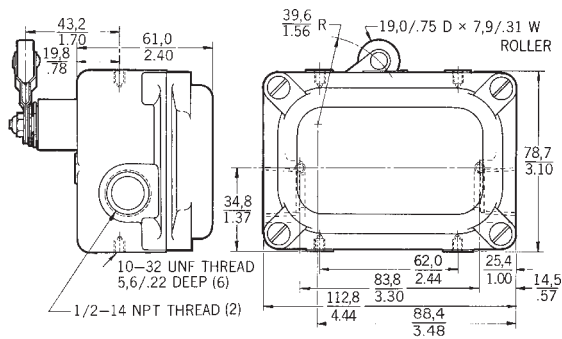


PLUNGER WITH SEAL BOOT



SWITCHES WITH DOUBLE CONDUIT OPENINGS

ROLLER LEVER



Weather-Sealed Explosion-Proof Switches

FEATURES

- Sealing - applicable portions of NEMA 1, 3, 4, 4X, 6, 6P, 7, 9, and 13
- Watertight and dusttight for outdoor use
- 4-20 mA analog output available
- UL Listed, file #E14274
- Analog UL file #E68247
- CSA Certified, file #LR57324
- Rugged cast aluminum housing
- Pretravel, overtravel, and actuating sequence can be field adjusted without tools (all basics individually)
- Rotary types convert in seconds to clockwise, counterclockwise, or both-way operation

CX switches are built especially for outdoor use in hazardous atmospheres. These enclosures are constructed to withstand the pressure of an internal explosion. Flame paths cool the exploded gases to a point less than the lowest safe operating temperature of the surrounding gas.

O-ring seals make the enclosure weather-proof but are outside of required flame paths so explosion proof requirements are maintained.

Analog output: either resistive or 4-20 mA is available.

Operating temperature range is -25° to +85°C (-13° to 185°F).

NEMA standards: 1, 3, 4, 4X, 6, 6P, 7, 9 and 13.

UL listed: Class I, Div. 1, Groups B (14CX, 16CX, 24CX, 26CX, 36CX, and 84CX only), C and D; and Class II, Div. 1, Groups E, F and G. CSA certified: Class I, Div. 1, Groups B (14CX, 16CX, 24CX, 26CX, 36CX and 84CX only), C and D; and Class II, Groups E, F and G.

For rapid response – off the shelf service, all **bold face** listings are normally stocked items.

ROTARY ACTUATED SWITCHES



Short housing



Standard housing

Actuators are not included with switch. Order them separately.

ROTARY LEVERS

Lever Type	Catalog Listing
1.5 in. lever, no roller	LSZ51
.75 in. roller, front	LSZ51A
.75 in. roller, back	LSZ51C
1.5-3.5 in. adjustable lever	LSZ52C
.75 in. roller	LSZ52J
1.0 in. roller	LSZ52K
1.5 in. yoke roller	LSZ53S
.75 in. rollers, back	LSZ53E
.75 in. rollers, each side	
5 in. rod lever	LSZ54M
Hub only	LSZ54
1.5 in. offset lever, no roller	LSZ55
.75 in. roller, back	LSZ55A
.75 in. roller, front	LSZ55C

Rollers are nylon. Non-sparking rollers must be used in hazardous locations.

ORDER GUIDE

As factory assembled, all basic switches operate on clockwise and counterclockwise rotation. Actuating mechanism can be field adjusted for CW or CCW operation only. No tools are required.

Description ¹	Catalog Listings Shaft Restoring Force To Center		Housing Size	Basic Switch(es) ²	Electrical Ratings
	With	W/O ²			
15 amp. SPDT.	11CX1 11CX2 21CX3 21CX4	11CX11 11CX12 21CX13 21CX14	Short Short Standard Standard	BZ(1) BZ(2) BZ(3) BZ(4)	A A A A
20 amp. SPDT.	12CX1 12CX2 22CX3 22CX4	12CX11 12CX12 22CX13 22CX14	Short Short Standard Standard	BA(1) BA(2) BA(3) BA(4)	B B B B
Also UL listed for Class I. Group B (hydrogen atmospheres). 10 amp. DPDT.	14CX1 24CX2 24CX3	14CX11 24CX12 24CX13	Short Standard Standard	DT(1) DT(2) DT(3)	C C C
Also UL listed for Class I, Group B (hydrogen atmospheres). 1 amp. SPDT.	16CX2 26CX4 16CX1 26CX3	16CX12 26CX14 16CX11 26CX13	Short Standard Short Standard	HS(2) HS(4) HS(1) HS(3)	D D D D
Analog position sensing.* Current output (4-20 mA).	— —	18CX10 281CX12 284CX12	Short Standard Standard	None BZ(2) DT(2)	— A C
Analog position sensing.* Resistive output.	19CX0 29CX1 29CX2	— — —	Short Standard Standard	None BZ(1) BZ(2)	— A A
1 amp. SPDT with gold contacts.	1172CX2 2172CX4	1172CX12 2172CX14	Short Standard	BZ(2) BZ(4)	F F

* Where noted, BZ basic switches are 15 amp, SPDT; DT basic switches are 10 amp DPDT. Refer to next page for analog position sensing specifications.

MOUNTING HOLES

Add the letter A to listings with side mounting holes tapped 5/16-18(8).

Example: 11CX2**A**

Add the letter B to listings with thru mounting holes tapped 3/8-24(4).

Example: 11CX2**B**.

¹ Basic switches operate nearly simultaneously in multiple switch devices.

² Shafts of devices without shaft restoring force can be rotated through 360°.

Basic switches will be in operated mode through two 105° sections.

Eight side mounting holes can be tapped 5/16"-18.






Limit/Enclosed

Limit and Enclosed Switches

Weather-Sealed Explosion-Proof Switches

CX Series

ELECTRICAL RATINGS

Circuitry	Electrical Ratings
 <p>A BZ Single-Pole Double-throw</p>	UL/CSA Rating: L96 15 amps, 120, 240 or 480 VAC, ind. and res. 1/8 Hp, 120 VAC; 1/4 Hp, 240 VAC. .5 amp, 125 VDC, .25 amp, 250 VDC., res.
 <p>B BA Single-Pole Double-throw</p>	UL/CSA Rating: L23 20 amps, 120, 240 or 480 VAC, ind. and res. 1 Hp, 120 VAC; 2 Hp, 240 VAC. .5 amp, 125 VDC, .25 amp, 250 VDC res.
 <p>C DT Double-pole Double-throw</p>	UL/CSA Rating: L59 10 amps, 120 or 240 VAC, ind. and res. .3 amp, 125 VDC, .15 amp, 250 VDC, res.
 <p>D HS Single-Pole Double-throw</p>	UL/CSA Rating: L22 1 amp, 120 VAC, ind. and res.
 <p>F BZ (Gold Contact) Single-Pole Double-throw</p>	UL/CSA Rating: L22 1 amp, 125 VAC

REPLACEMENT BASIC SWITCH ASSEMBLIES

These assemblies are factory adjusted to the same operating characteristics as a new CX switch. They include components subject to mechanical or electrical wear: basic switches, cam wheels and followers, and springs.

To order, change the first number in the complete switch catalog listing to 9 for rotary switches and 10 for plunger switches with short housings.

Example:
 Rotary switch **12CX5**
 Replacement = **92CX5**
 Plunger switch **36CX2**
 Replacement = **106CX2**

Note: Basic switch assemblies for rotary actuated switches, with or without shaft restoring force, will be the same.

For example:
 11CX1 and 11CX11 use 91CX1.

ANALOG POSITION SENSING SPECIFICATIONS

Current Output (4-20 mA)	Resistive Output	Replacement PC Board
Voltage compliance range: 12.5 to 40 VDC Maximum load resistance: RL, Max., -V Supply - 12.5 20 mA Current signal output: 4-20 mA Span: Adjustable from 15° to 90° of angular rotation. Null: 4 mA position may be set at any angular position.	500 ohms ± 10% in center (free position) 975 ohms max at 105° rotation clockwise (CW). 25 ohms min. at 105° rotation CCW. 2 watts power at 70°/150°F at full scale Different potentiometer values can be ordered. (Minimum order quantities may be required.)	For current output devices 15PA261-CX

PLUNGER ACTUATED SWITCHES



Standard housing shown.

ORDER GUIDE

Description ¹	Catalog Listing With Restoring Force	Housing Size	Basic Switch(es)	Electrical Ratings
15 amp. SPDT	31CX1 31CX2 41CX3 41CX4	Short Short Standard Standard	BZ(1) BZ(2) BZ(3) BZ(4)	A A A A
20 amp. SPDT	32CX1 32CX2 42CX3 42CX4	Short Short Standard Standard	BA(1) BA(2) BA(3) BA(4)	B B B B
Also UL listed for Class I, Group B (hydrogen atmospheres). 1 amp. SPDT.	36CX1 36CX2	Short Short	HS(1) HS(2)	D D

¹ Basic switches operate nearly simultaneously in multiple switch devices.

OPERATING CHARACTERISTICS (All CX Switches)

Basic Switch Type	Rotary Actuation				Plunger Actuation		
	BZ	BA	DT	HS	BZ	BA	HS
Pretravel (max.)*	15°	15°	30°	30°	.10 in./2,5 mm		
Differential Travel (max.)	10°	10°	25°	20°	.04 in./1.0 mm		
Overtravel (min.)*	90°	90°	75°	75°	.19 in./4,75 mm		
Operating Torque (max.)	11.1 in. lb./1,25 Nm				—		
Operating Force (max.)	—				8.82 lb./39,2 N		

* May be modified in field to suit application requirements.

N = Newtons
 Nm = Newton meters

LOW TEMPERATURE SWITCHES

Add the letter C to listings for low temperature versions.
 Example: 21CX14C -40°F (-40°C) Rotary
 36CX2C -35°F (-37°C) Plunger

Weather-Sealed Explosion-Proof Switches

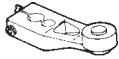
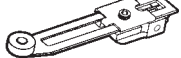
80CX SWITCHES ALSO WITHSTAND CORROSIVE ENVIRONMENTS

80CX switches have rugged bronze housings which are resistant to salt water and other corrosive environments. They comply with the NEMA 4X requirement for protection against corrosion, in addition to NEMA enclosure standards met by other CX switches. O-ring seals make the enclosure weather-proof, but are outside of required flame paths so explosion-proof requirements are maintained.

STAINLESS STEEL LEVER ACTUATORS

These levers match the corrosion resistance of the 80CX housing. Non-sparking rollers must be used in hazardous locations.

ORDER GUIDE STAINLESS STEEL LEVERS WITH NYLON ROLLERS

Std. Roller Lever 	Radius (In.)	Dia. In.	Width In.	Catalog Listing
		1.5	.75	.25
Std. Lever w/o roller	1.5	.75	.25	LS2Z51
Adjustable Radius 	1.5-3.5	.75	.25	LS2Z52A

Note: Refer to page A36 for lever dimensions.

ROTARY ACTUATED SWITCHES



80CX switches available with standard housing only.

Actuators are not included with switches. Order them separately.

MOUNTING HOLES

Add the letter A to listings with side mounting holes tapped 5/16-18(8).

Example: 82CX2A

Add the letter B to listings with thru mounting holes tapped 3/8-24(4).

Example: 81CX2B.

ORDER GUIDE

As factory assembled, all basic switches operate on clockwise or counterclockwise rotation. Actuating mechanism can be field adjusted for CW or CCW operation only. No tools are required.

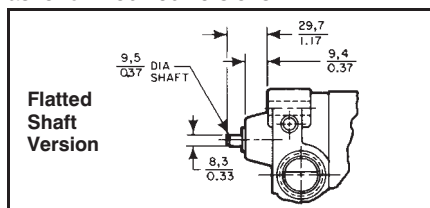
Description ¹	Catalog Listings Shaft Restoring Force To Center		Housing Size	Basic Switch(es)	Electrical Ratings Page A109
	With	Without ²			
15 amp. SPDT	81CX1	81CX11	Standard	BZ(1)	A
	81CX2	81CX12	Standard	BZ(2)	A
	81CX3	81CX13	Standard	BZ(3)	A
	81CX4	81CX14	Standard	BZ(4)	A
20 amp. SPDT	82CX1	82CX11	Standard	BA(1)	B
	82CX2	82CX12	Standard	BA(2)	B
	82CX3	82CX13	Standard	BA(3)	B
	82CX4	82CX14	Standard	BA(4)	B
Also UL listed for Class I, Group B (hydrogen atmospheres). 10 amp. DPDT	84CX1	84CX11	Standard	DT(1)	C
	84CX2	84CX12	Standard	DT(2)	C
Potentiometer-equipped versions. (Where noted, basic switches are 15 amps, SPDT.)	89CX0	—	Standard	Pot. only	E
	89CX1	—	Standard	BZ(1), pot.	A,E
	89CX2	—	Standard	BZ(2), pot.	A,E

Notes: Refer to page A127.

MODIFIED SHAFT ENABLES DIRECT COUPLING

CX switches are available with a 3/8 inch diameter by 3/4 inch long flatted shaft which conforms to standard NEMA motor shaft specifications. It accepts commercially available shaft couplers, permitting easy, direct coupling to most equipment actuators.

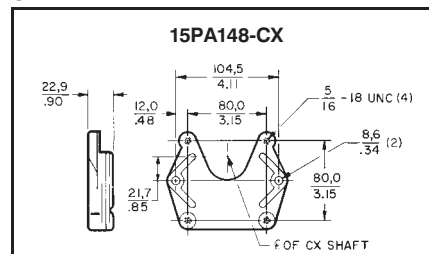
To specify a "direct-couple" CX switch, add **-DO1** to catalog listings shown in the order guides, i.e. 11CX12-DO1. Pricing is the same as for unmodified versions.



MOUNTING BRACKET

An aluminum mounting bracket is available for adapting CX switches to existing 2-hole mounting arrangements.

To order, specify Catalog Listing **15PA148-CX**.



Limit/Enclosed

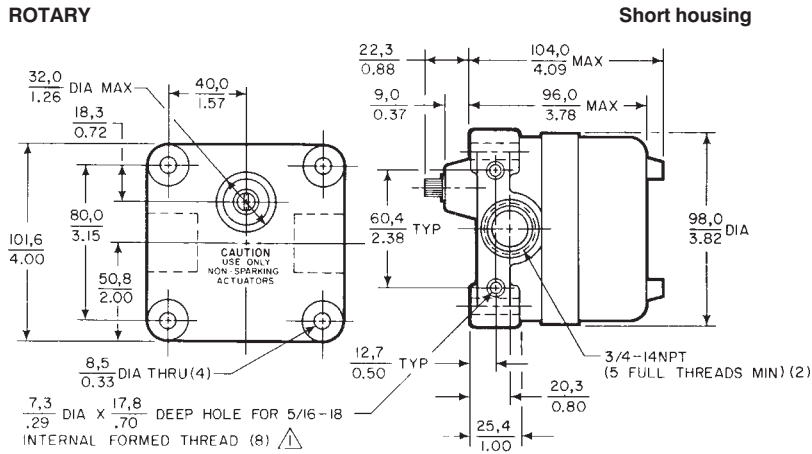
Limit and Enclosed Switches

CX Series

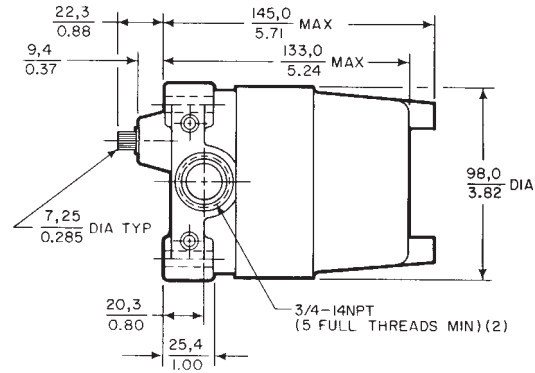
Weather-Sealed Explosion-Proof Switches

MOUNTING DIMENSIONS (For reference only)

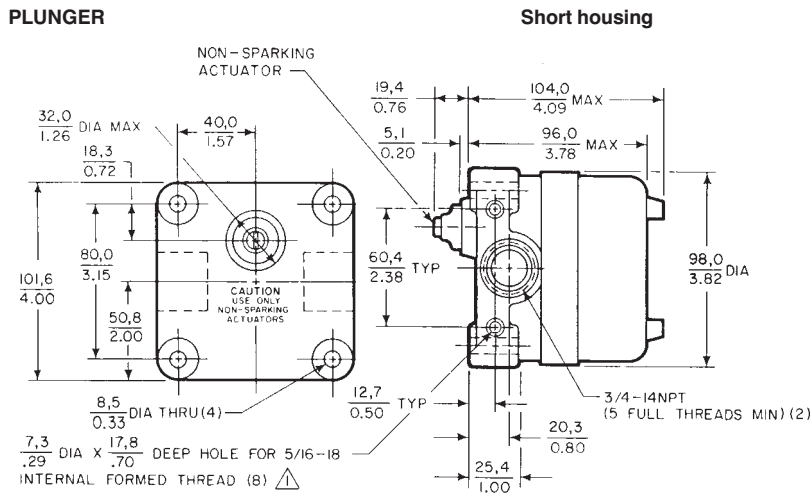
ROTARY



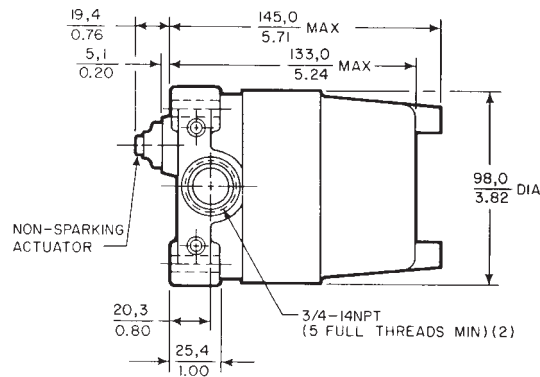
Standard housing



PLUNGER



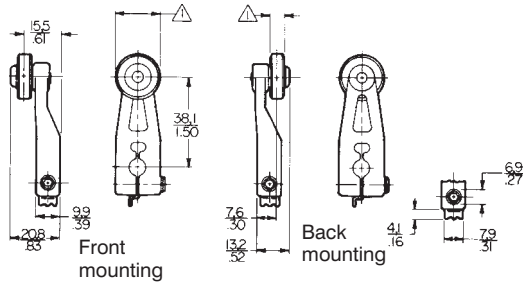
Standard housing



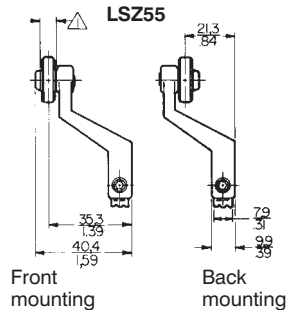
⚠ THESE HOLES NOT FURNISHED ON 80CX SERIES

LEVER ACTUATORS

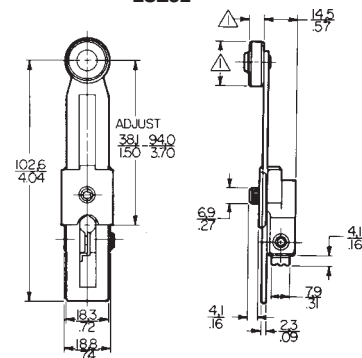
LSZ51



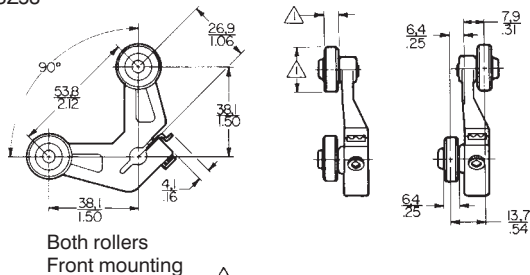
LSZ55



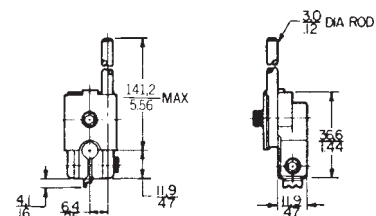
LSZ52



LSZ53



LSZ54



Both rollers
Front mounting

⚠ See order guides for roller dimensions.

Limit and Enclosed Switches

Operating Characteristics

Definitions below explain the meaning of operating characteristics. Characteristics shown in tables throughout catalog were chosen as most significant. Sketches show how characteristics are measured for in-line plunger actuation and rotary actuation.

Linear dimensions for in-line actuation are from top of plunger to a reference line, usually the center of the mounting holes. In the case of flange or bottom mounted switches, the reference line is the bottom of the switch. Rotary actuated HDLS, LS and ML limit switches have the characteristics in degrees of angular rotation. The operating characteristic dimensions on enclosed switches such as E6, OP, and EX with rotary actuators are listed in linear dimensions with the adjustable lever in one extreme position.

Differential Travel (D.T.) — Plunger or actuator travel from point where contacts “snap-over” to point where they “snap-back.”

Free Position (F.P.) — Position of switch plunger or actuator when no external force is applied (other than gravity).

Full Overtravel Force — Force required to attain full overtravel of actuator.

Operating Position (O.P.) — Position of switch plunger or actuator at which point contacts snap from normal to operated position. Note that in the case of flexible or adjustable actuators, the operating position is measured from the end of the lever or its maximum length. Location of operating position measurement shown on mounting dimension drawings.

Operating Force (O.F.) — Amount of force applied to switch plunger or actuator to cause contact “snap-over.” Note in the case

of adjustable actuators, the force is measured from the maximum length position of the lever.

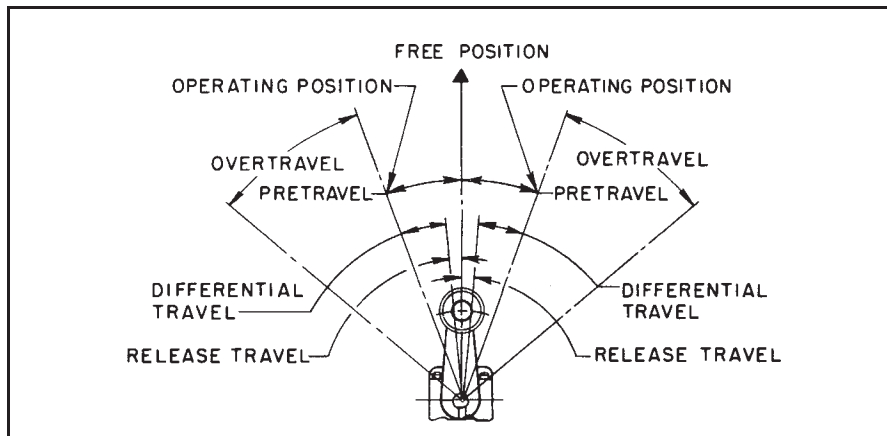
Overtravel (O.T.) — Plunger or actuator travel safely available beyond operating position.

Pretravel (P.T.) — Distance or angle traveled in moving plunger or actuator from free position to operating position.

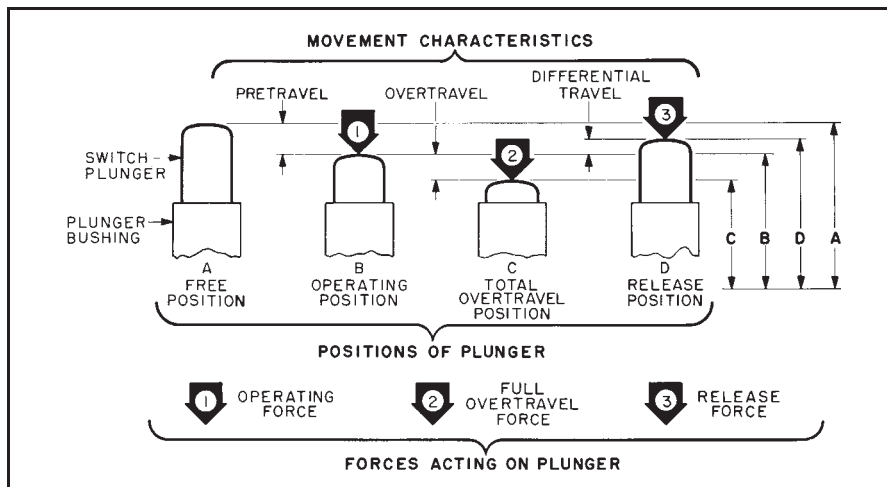
Release Force (R.F.) — Amount of force still applied to switch plunger or actuator at moment contacts snap from operated position to unoperated position.

Total Travel (T.T.) — Distance from actuator free position to overtravel limit position.

ROTARY ACTUATION



IN-LINE PLUNGER ACTUATION



FULL LOAD AND LOCKED ROTOR CURRENTS FOR SINGLE PHASE AND DC MOTORS.

HP	Alternating Current				Direct Current			
	115 Volts		230 Volts		115 Volts		230 Volts	
	Full Load	Locked Rotor	Full Load	Locked Rotor	Full Load	Locked Rotor	Full Load	Locked Rotor
2	24.0	144.0	12.0	72.0	17.0	170.0	8.5	85.0
1½	20.0	120.0	10.0	60.0	13.2	132.0	6.6	66.0
1	16.0	96.0	8.0	48.0	9.6	96.0	4.8	48.0
¾	13.8	82.8	6.9	41.4	7.4	74.0	3.7	37.0
½	9.8	58.8	4.9	29.4	5.4	54.0	2.7	27.0
¼	7.2	43.2	3.6	21.6	3.8	38.0	1.9	19.0
¼	5.8	34.8	2.9	17.4	3.0	30.0	1.5	15.0
⅙	4.4	26.4	2.2	13.2	2.4	24.0	1.2	12.0
⅙	3.8	22.8	1.9	11.4	2.2	22.0	1.1	11.0
⅒	3.0	18.0	1.5	9.0	2.0	20.0	1.0	10.0
⅒	1.5	9.0	—	—	—	—	—	—

Limit/Enclosed

Limit and Enclosed Switches

Reference Standards

MICRO SWITCH ENCLOSURES IN THIS CATALOG

	NEMA TYPES													
	Non-Hazardous Locations								Hazardous Locations					
	1	3	4	4X	6	6P	12	13	7B	7C	7D	9E	9F	9G
HDLS*	●	●	●	● ⁹	●	● ¹⁰		●						
LS	●	●	●		●			●						
E6/V6	●													
BZG/BZH	●	● ³	● ₃					● ³						
BAF1	●	● ²	● ²					● ²						
OP	●	● ³	● ³					● ³						
914CE	●	●	● ⁴		● ⁴	● ⁴	● ⁴	● ⁴						
LN	●	●	●					●						
LSX	●	●	●		●			●	●	●	●	●	●	●
EX	●								● ⁵	●	●	●	●	●
CX	●	●	●	● ⁶				●	● ⁷	●	●	●	●	●
BF	●	●	●					●						
CLS	●	●	●					●						
2CLS	●	●	●					●						
CLSX	●	●	●					●	●	●	●	●	●	●

Note 2 — Not applicable to BAF-1-2RQ9 listings.

Note 3 — Not applicable to Q-plunger types.

Note 4 — 914CE1, 914CE2, and 914CE3 listings comply with NEMA 1 and 3 only.

Note 5 — Only EX series 800, EXD, EXH, and EXN.

Note 6 — Only CX series 80.

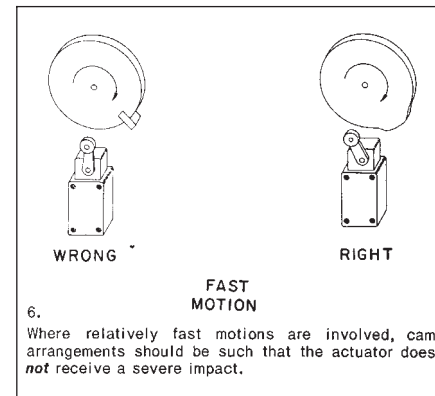
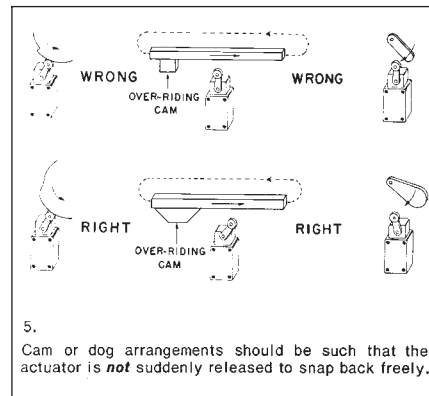
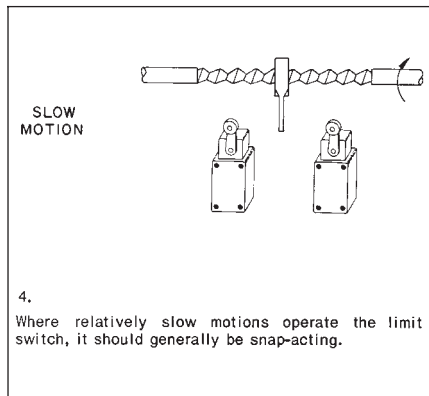
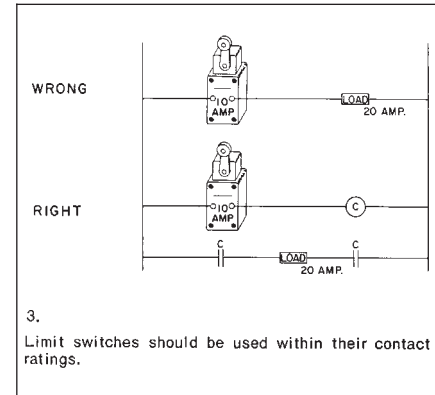
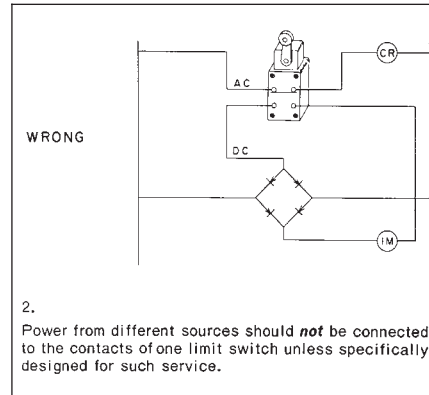
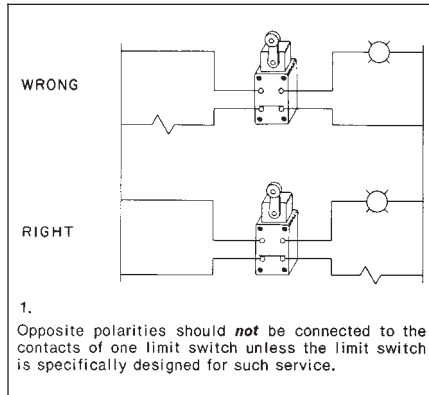
Note 7 — Only listings with HS or DT basic switches.

Note 8 — Not applicable to LZ side lever types.

Note 9 — Stainless steel LS2.

Note 10 — Pre-wired HDLS.

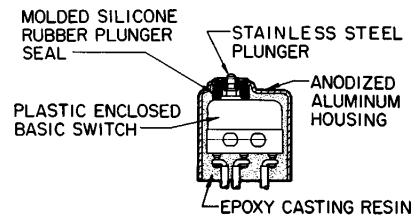
APPLICATION INFORMATION



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	A 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.	D UL Rating 7 amps, 250 vac 60 Hz
	B UL and CSA Rating 5 amps, 250 vac, 60 Hz	E 7 amps res., 4 amps ind., (sea level), 7 amps res., 2.5 amps ind., (50,000 feet), 28 vdc.
	C 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	R 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



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

XE SWITCHES ORDER GUIDE

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

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

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

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

Position Sensors

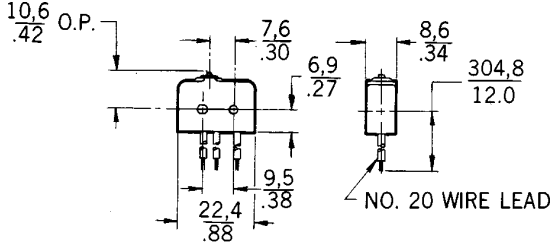
Position Sensors

SE Series

Environment-Sealed Basic Switches

SE MOUNTING DIMENSIONS (For reference only)

SE switches



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

Fig. 1

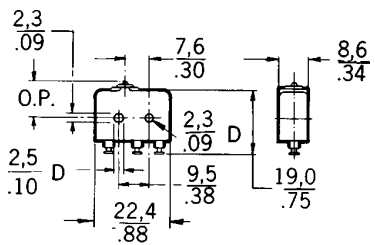


Fig. 2

SE auxiliary actuators

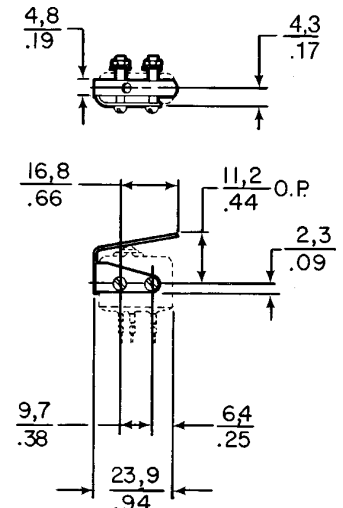


Fig. 3

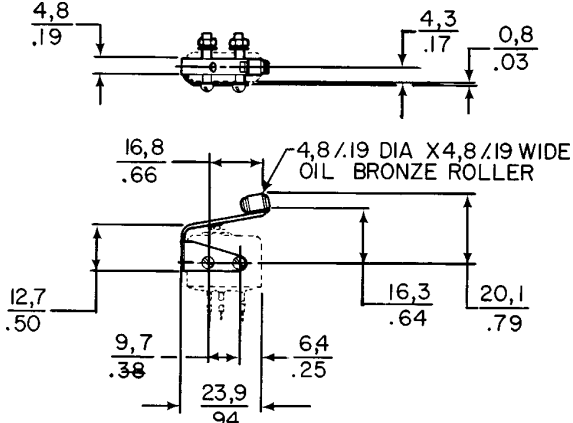


Fig. 4

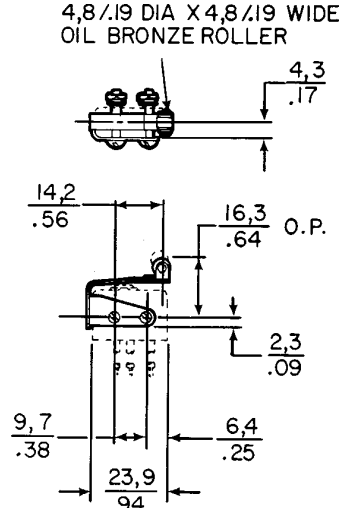


Fig. 5

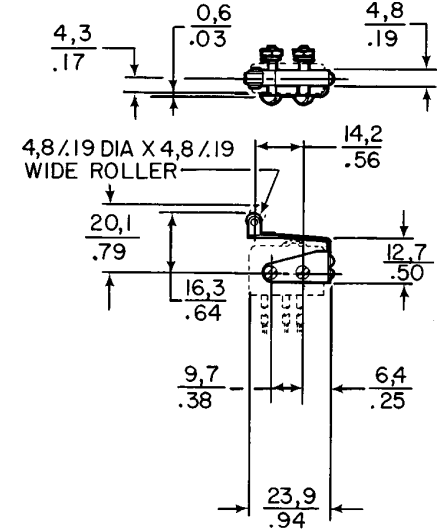


Fig. 6

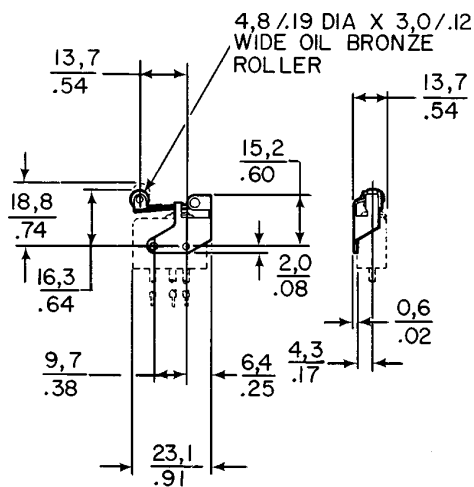


Fig. 7

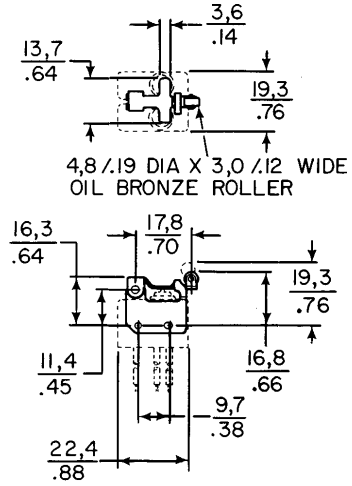


Fig. 8

Key: 0,0 = mm
0.00 = inches

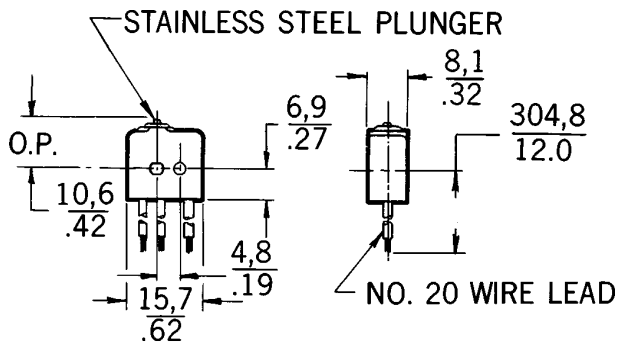
Position Sensors

XE Series

Environment-Sealed Basic Switches

XE MOUNTING DIMENSIONS (For reference only)

XE switches



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

Fig. 9

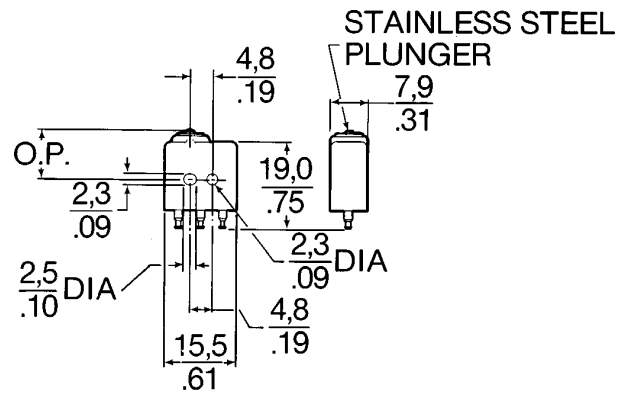


Fig. 10

XE auxiliary actuators

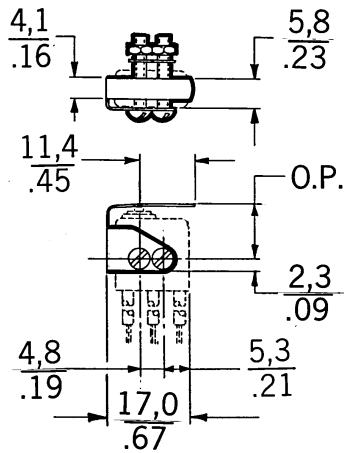


Fig. 11

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

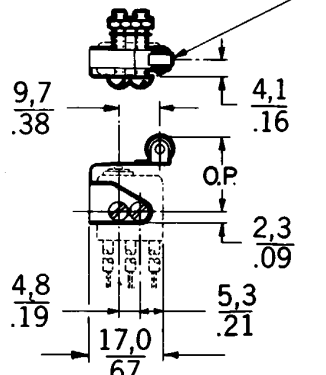


Fig. 12

Key: 0,0 = mm
0.00 = inches

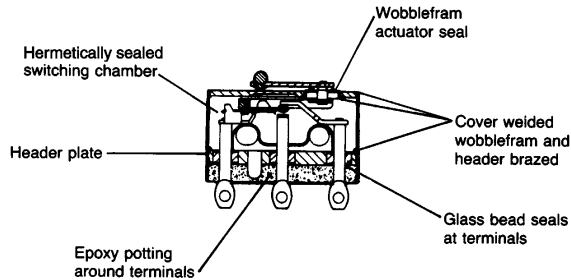
Position Sensors

Position Sensors

Miniature Hermetically Sealed Switches



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



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

ELECTRICAL RATINGS

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

APPLICATION NOTES

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





Position Sensors

Miniature Hermetically Sealed Switches

HM Series

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

HM ORDER GUIDE

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

HM MOUNTING

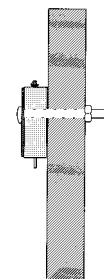
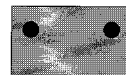
A force spreading plate is recommended to reduce the chance of product damage due to excessive mounting force.

MOUNTING PLATE

19PA137-HM

NOTICE

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






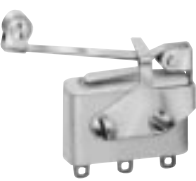
Position Sensors

Position Sensors

Miniature Hermetically Sealed Switches

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

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

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

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

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

Position Sensors

HM Series

Miniature Hermetically Sealed Switches

HM MOUNTING DIMENSIONS (For reference only)
Pin plunger switches

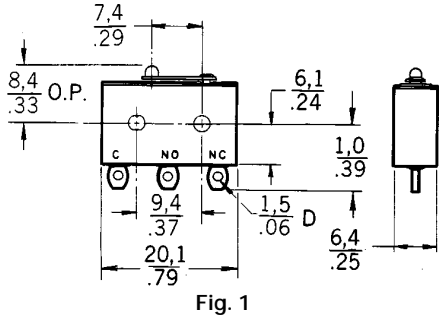


Fig. 1

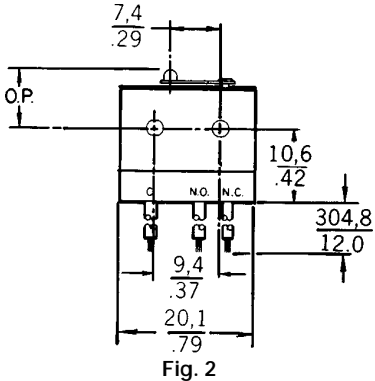


Fig. 2

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

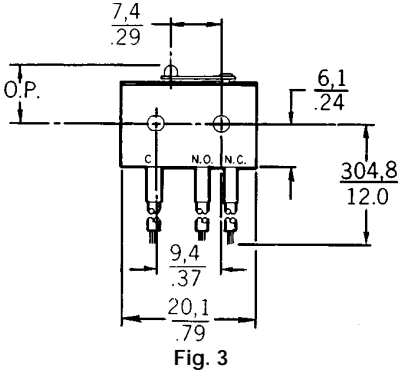


Fig. 3

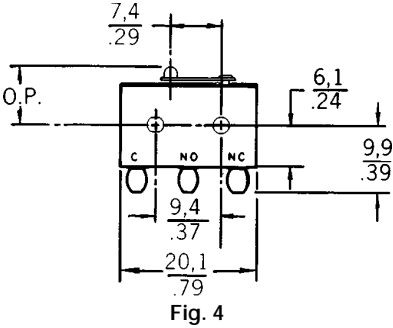


Fig. 4

Auxiliary actuators

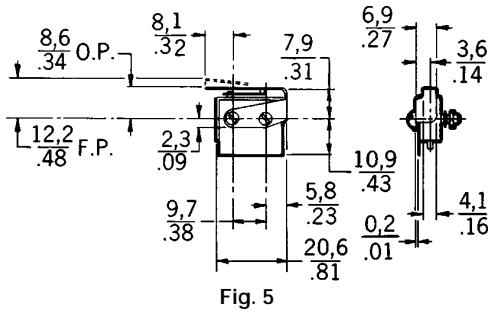


Fig. 5

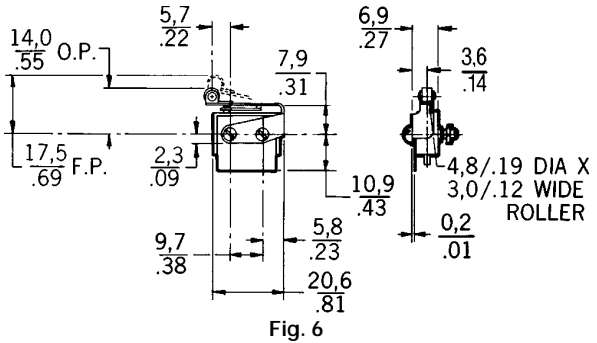


Fig. 6

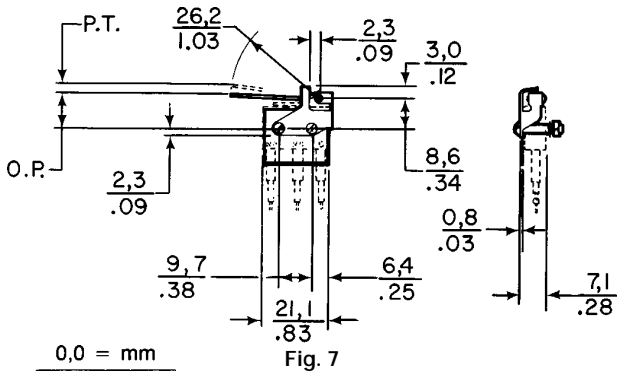


Fig. 7

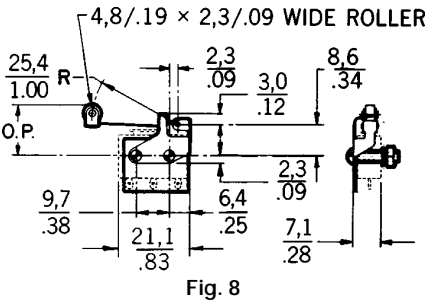


Fig. 8

Key: 0,0 = mm
0.00 = inches

Position Sensors

Position Sensors

Hermetically Sealed Switches

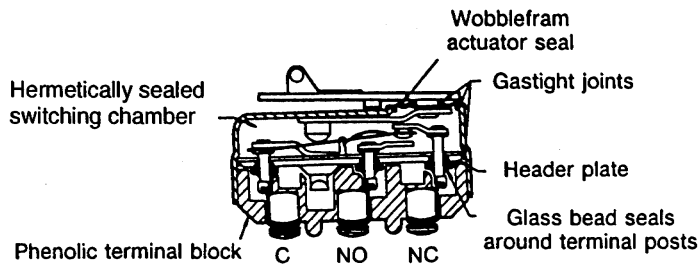


GENERAL INFORMATION

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

FEATURES

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



ELECTRICAL RATINGS

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






Position Sensors

Hermetically Sealed Switches

HS Series

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

HS ORDER GUIDE

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

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

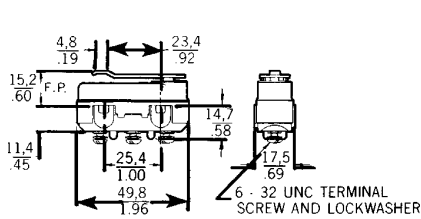


Fig. 1

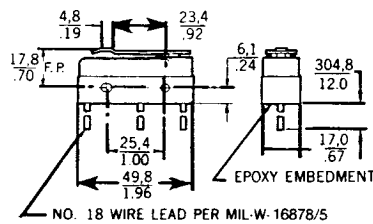


Fig. 2

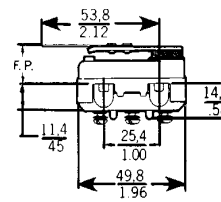


Fig. 3

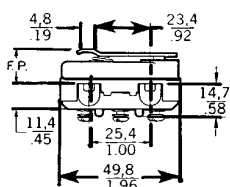


Fig. 4

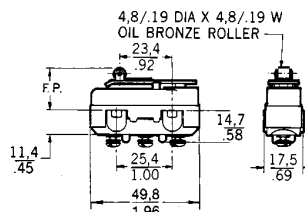


Fig. 5

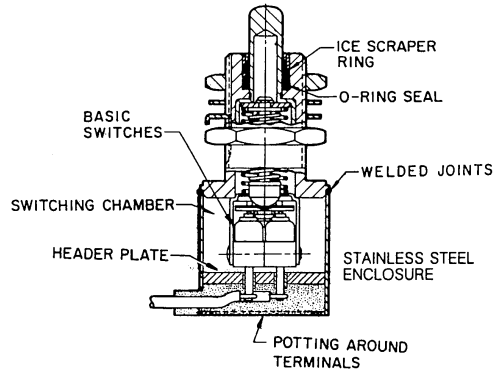
Key: $\frac{0,0}{0.00} = \frac{\text{mm}}{\text{inches}}$

Position Sensors

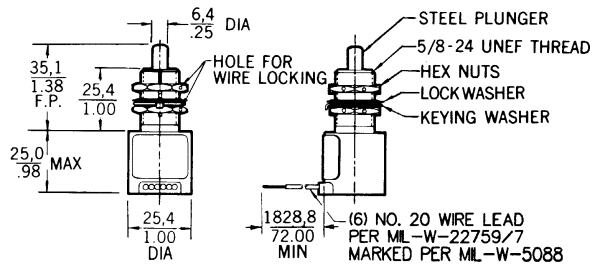
Position Sensors

Environment-Sealed Limit Switches

EN Series



1EN1-6



FEATURES

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

ELECTRICAL SPECIFICATIONS

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

DC RATINGS (Amps)

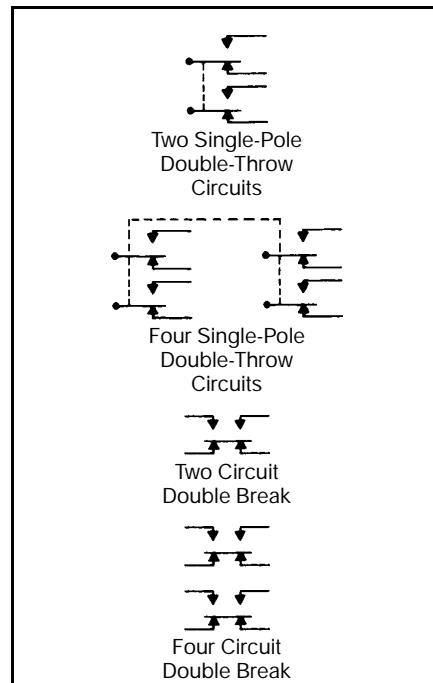
Rating ² Code	Voltage	Sea Level				50,000 Feet			
		Inrush	Motor	Res.	Ind.	Inrush	Motor	Res.	Ind.
A	28 VDC	24	4	4	2	24	4 ³	4 ¹	2
B	28 VDC	36	6	10	3	36	6 ³	10	3
C	28 VDC	30	5	15	10	30	5 ³	15	10
D	28 VDC	24	4	5	3	N/A			
E	28 VDC	N/A		1	.5	N/A		1	.5
F	28 VDC	24	4	7	4	24	4 ³	7	2.5

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

AC RATINGS (Amps)

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

CIRCUITRY



Position Sensors

Position Sensors

Environment-Sealed Limit Switches

TERMINATION

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

MOUNTING

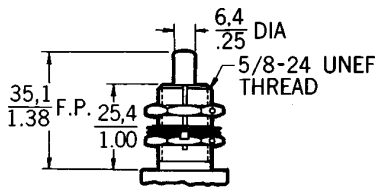
Plunger actuator switches mount through $\frac{5}{8}$ inch or $\frac{15}{32}$ inch diameter holes. Lock washer, keyed washer, and wire lock hexagon mounting nuts lock the switches in their mounting holes.

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

OPERATION

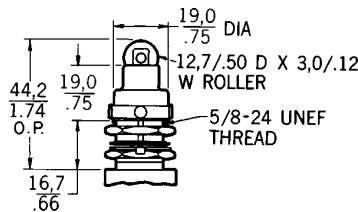
Plunger Actuators

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



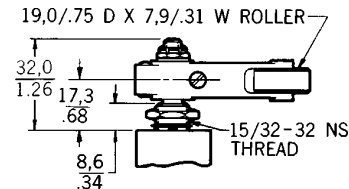
Roller Plunger Actuators

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



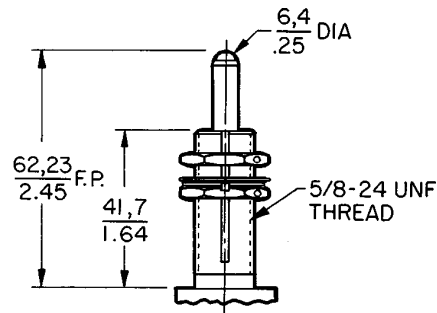
Rotary Roller Lever Actuator

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



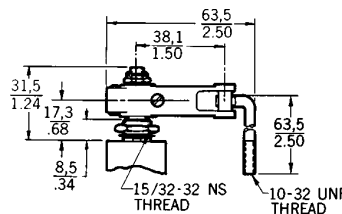
Ball Bearing Plunger Actuator

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



Rotary Linkage Lever Actuator

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



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

DIMENSIONS SHOWN ARE FOR REFERENCE ONLY

Position Sensors

Environment-Sealed Limit Switches

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

Position Sensors

Notes:

¹ Electrical ratings are on page 25.
² Combine housing diameter and height with actuator on page 26 for overall size.
³ Maximum length rather than housing diameter.

⁴ 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.
⁵ These listings have pin receptacles (mating connectors should be ordered from a local supplier).

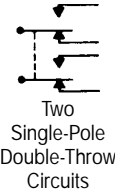
⁶ See page 33 for replacement mounting hardware packet catalog listings.
 N = Newtons

Position Sensors
Environment-Sealed Limit Switches



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

EN STANDARD SIZE SWITCHES ORDER GUIDE

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

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

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

⁴ See page 33 for replacement mounting hardware packet catalog listings.
 N = Newtons

Position Sensors

EN Series

Environment-Sealed Limit Switches



5EN1-6



25EN9-6



3EN1-6



23EN9-6



33EN1-6



4EN1-6



24EN9-6





34EN1-6



44EN1-6

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

EN STANDARD SIZE SWITCHES ORDER GUIDE

Circuitry	Actuator	Termination	Elec. Rating ¹ Code	Catalog Listing	Characteristics					Housing Dimensions ²		Wgt. max. g oz.	Repl. Mtg. Hdw. Pkt. ³
					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

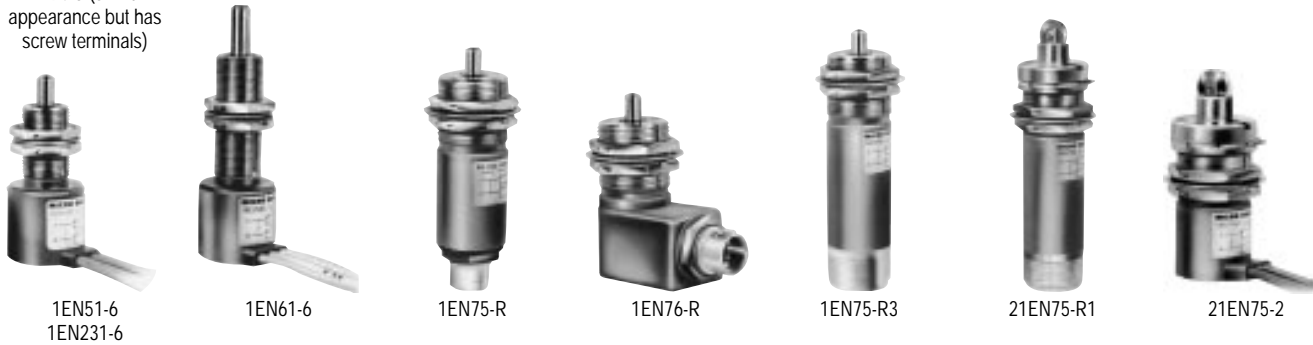
Position Sensors

Notes:
¹ Electrical ratings are on page 25.
² Combine housing diameter and height with actuator dimension on page 26 for overall size.
³ 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 ² Requirement	Actuator	Termination	Circuitry	Elec. Rating ¹ Code	Catalog Listing	Characteristics					Wgt. max. g oz.	Repl. Mtg. Hdw. Pkt. ³
						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:
¹ Electrical ratings are on page 25.

² 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.

³ See page 33 for replacement mounting hardware packet catalog listings
 N = Newtons

EXPLANATIONS OF SWITCHES WITH SPECIAL REQUIREMENTS

High velocity actuation

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

Low force operation

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

Increased overtravel

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

High impact shock

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

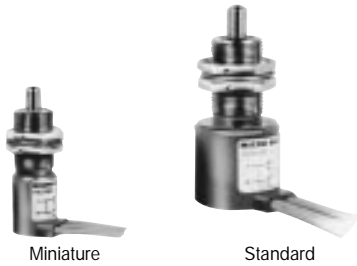
Terminations of these listings are:

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

MICRO SWITCH does not furnish mating connectors with these products.

Position Sensors

Environment-Sealed Limit Switches



FEATURES

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

MINIATURE TYPE SWITCHES

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

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

ELECTRICAL RATINGS

Refer to page 25.

MIL-S-8805 PERFORMANCE APPROVED SWITCHES

EN Miniature Switches

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

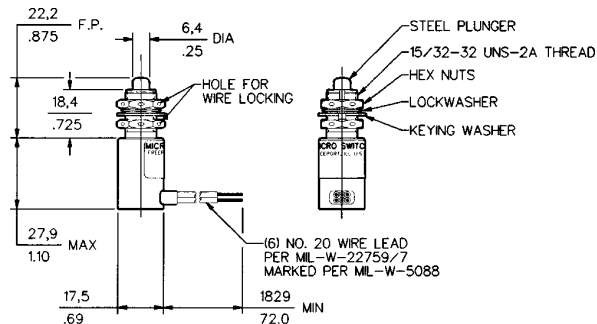
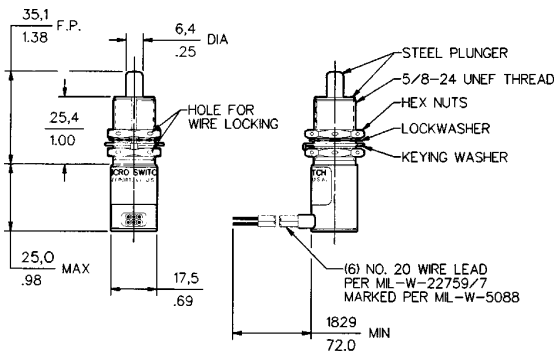
Notes:
¹D.A. = double amplitude or displacement.



402EN1-6



602EN1-6



Position Sensors

Position Sensors

Environment-Sealed Limit Switches

EN Series



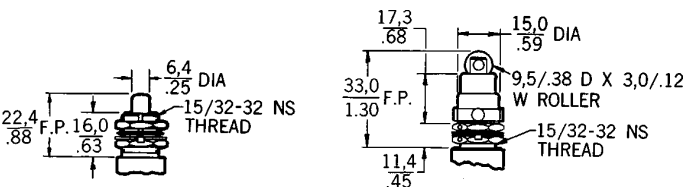
Characteristics: O.F. – Operating Force; R.F. – Release Force;
P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

EN MINIATURE SWITCHES ORDER GUIDE

Circuitry	Actuator	Elec. Rating Code	Catalog Listing	Characteristics					Housing Dimensions ¹		Wgt. g oz.	Repl. Mtg. Hdw. Pkt ²
				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)									10
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:
¹ Combine housing diameter and height with actuator dimension on this page or page 26 for overall size of the switch.
² 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.
³ 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		

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

Position Sensors

Position Sensors

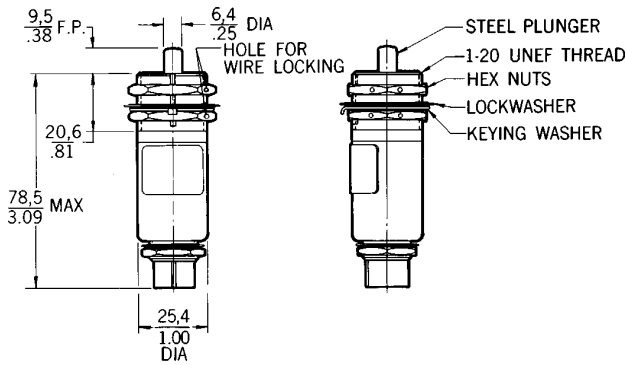
Environment-Sealed Limit Switches

EN Series

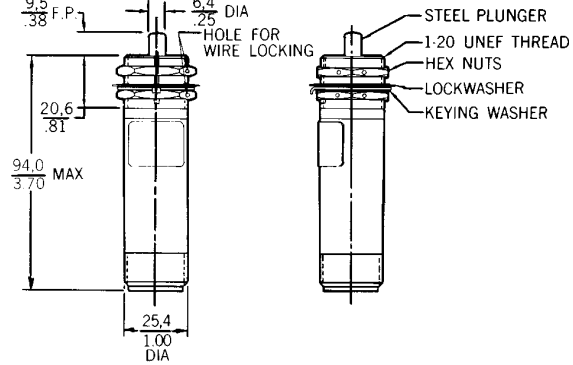
EN MOUNTING DIMENSIONS (For reference only)

Standard size EN switches

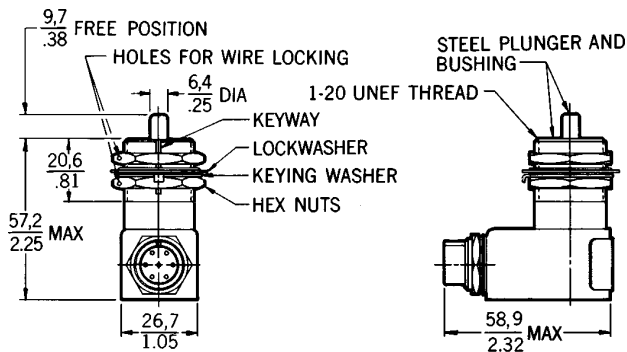
1EN75-R



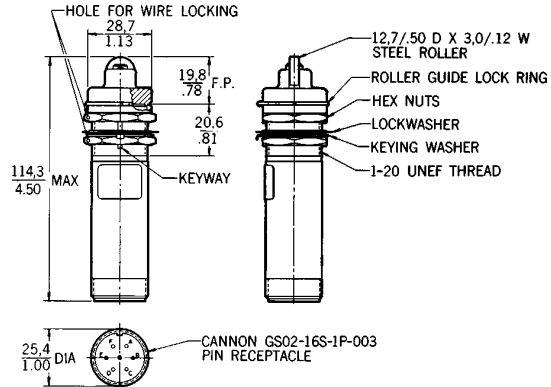
1EN75-R3



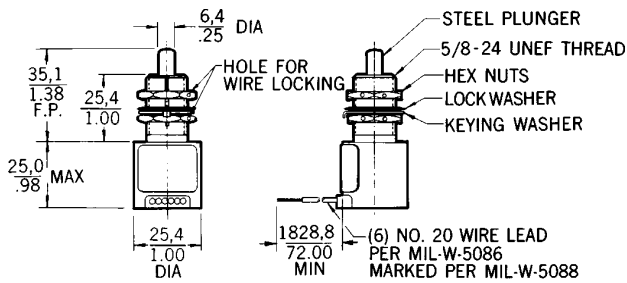
1EN76-R



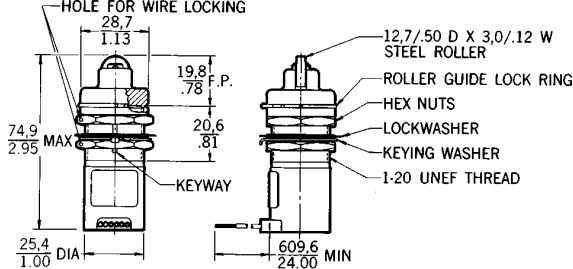
21EN75-R1



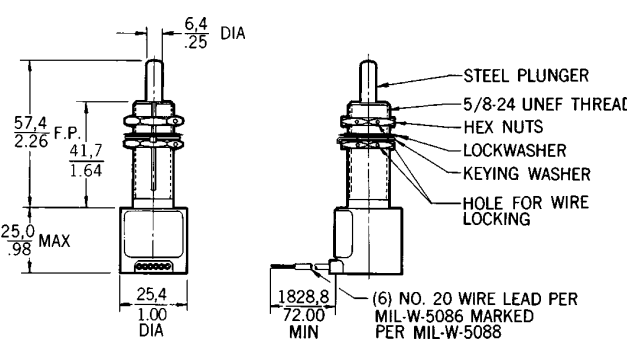
1EN51-6
1EN231-6



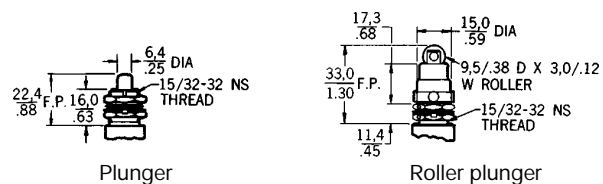
21EN75-2



1EN61-6

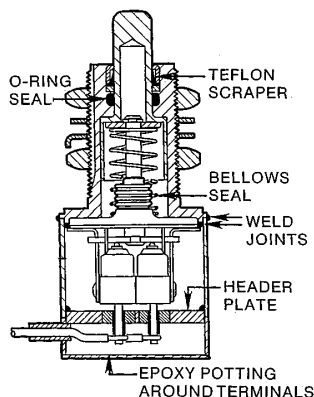


600EN actuators



Key: 0,0 = mm
0.00 = inches

Hermetically Sealed Limit Switch



GENERAL INFORMATION

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

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

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

FEATURES

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

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

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

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

Position Sensors

Position Sensors


Hermetically Sealed Limit Switch

HE Series



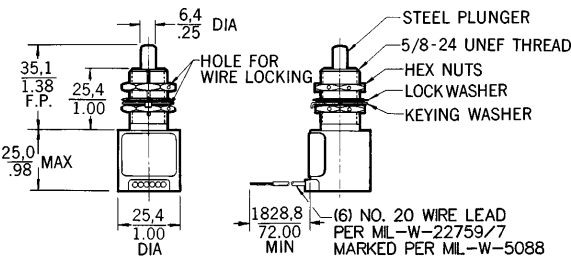
Characteristics: O.F. – Operating Force; R.F. – Release Force;
P.T. – Pretravel; O.T. – Overtravel; D.T. – Differential Travel.

HE ORDER GUIDE

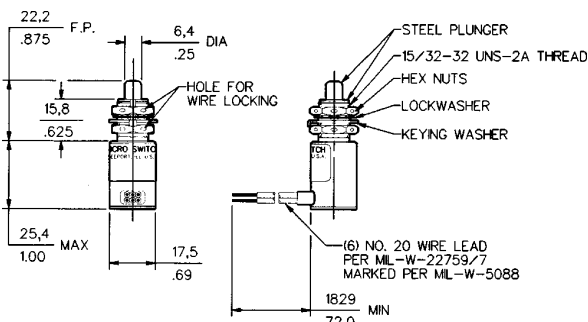
Circuitry	Catalog Listing	Actuator	Characteristics				
			O.F. Newtons lbs.	R.F. min. Newtons lbs.	P.T. max. mm in.	O.T. min. mm in.	D.T. max. mm in.
 Two Single-Pole Double-Throw Circuits	1HE1-6 (MS8805/80-01)	Plunger	26,7-53,4 6-12	17,8 4	1,02 .040	6,35 .250	0,51 .020
	602HE1-6	Plunger	22,2-53,4 5-12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

HE MOUNTING DIMENSIONS (For reference only)

1HE1-6

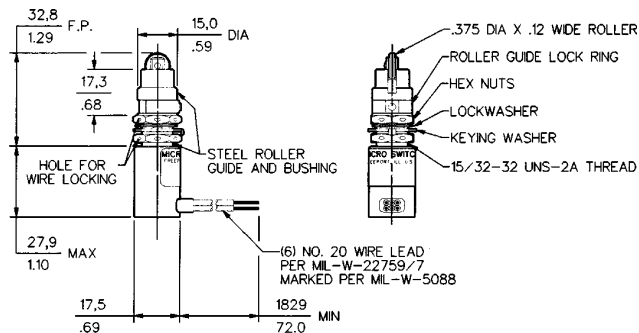


602HE1-6



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

622HE1-6



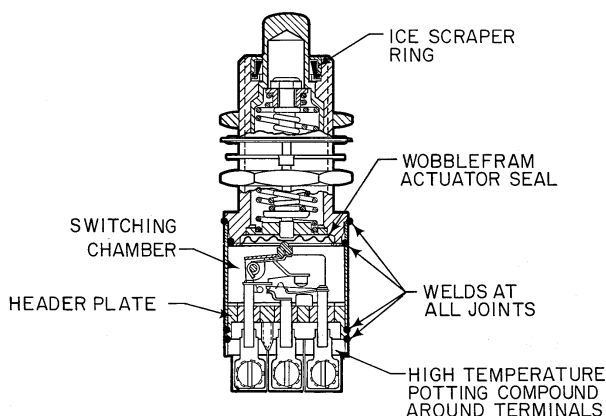
624HE1-6 has same dimensions as 622HE1-6, except housing dia. is 1.0/25,4; and housing height is 1.2/30,5.

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

Position Sensors

HR Series

High Temperature Hermetically Sealed Switches



FEATURES

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

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

GENERAL INFORMATION

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

MOUNTING

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

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

ACTUATORS

Plunger

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

Roller plunger

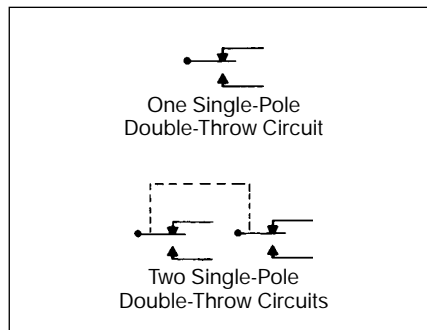
For cam and slide actuation not to exceed 20° rise. Roller adjusts laterally in 45° increments. An ice scraper ring clears the actuator with each operation. Material is stainless steel.

ELECTRICAL RATING

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

Voltage	Amperage	
	Ind.	Res.
28 DC	2	5

CIRCUITRY



Position Sensors



Position Sensors

HR Series

High Temperature Hermetically Sealed Switches

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

HR ORDER GUIDE

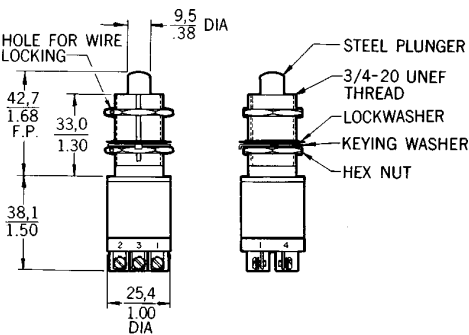
	Catalog Listing	Actuator	Circuitry	Terminals ¹	Characteristics					Weight g oz.
					O.F. Newtons lbs.	R.F. min. Newtons lbs.	P.T. max. mm inches	O.T. min. mm inches	D.T. max. mm inches	
	12HR1-S ² (MS24594-1)	Plunger	(2)SPDT	Screw	26,7-53,4 6-12	22,2 5	1,27 .050	6,35 .250	0,38 .015	127 4.5
	12HR8-6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

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

MOUNTING DIMENSIONS (For reference only)

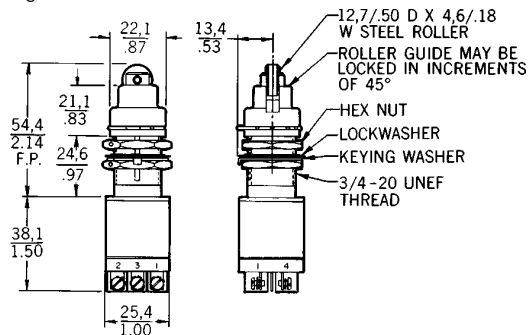
12HR1-S

Fig. 1



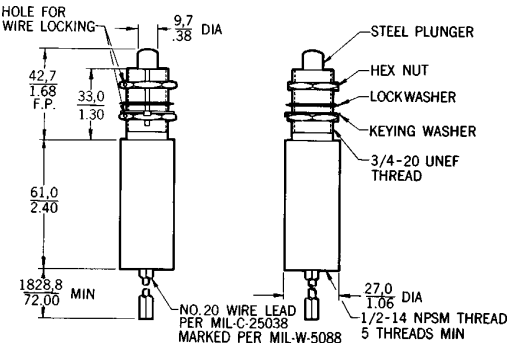
22HR1-2

Fig. 2



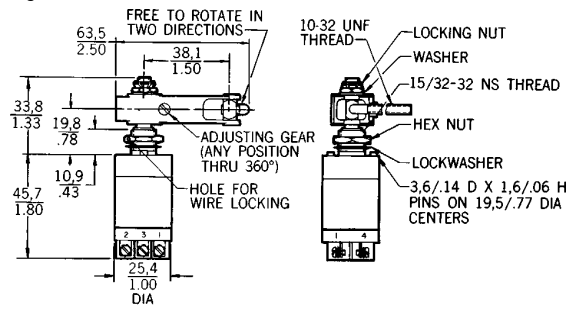
12HR8-6

Fig. 3



41HR1-S

Fig. 4

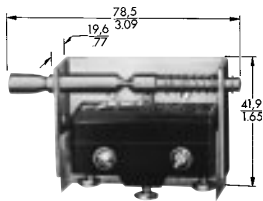


Key: 0,0 = mm
0.00 = inches

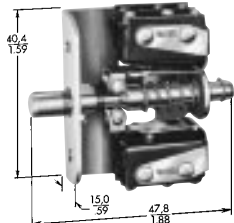
Basic Switches

Door

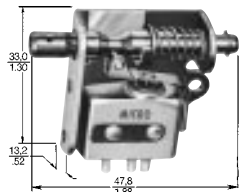
AC Series



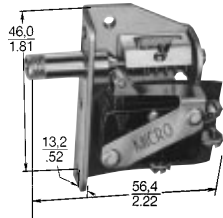
Style 1



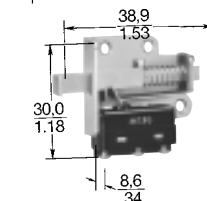
Style 2



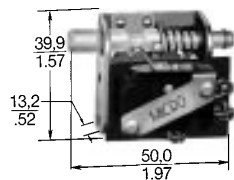
Style 3



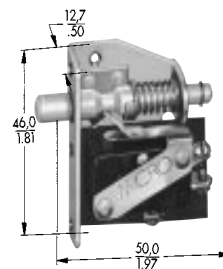
Style 4



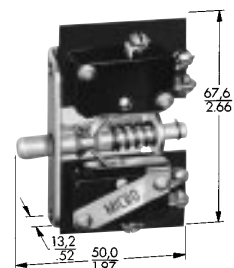
Style 5



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.)
- Basic switches are component recognized by UL to UL1054 special use switches.
- UL recognized AC are available

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.

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

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.	Temp. Ratings
1	15 amps, SPDT.	BZ	A	1AC2	11,1 .438	6,35 .250	3,18 .125	-65°F to +180°F
2	5 amps, Four SPDT ckts.	SM(4)	B	8AC1	9,53 .375	5,16 .203	3,18 .125	-65°F to +250°F
3	Three 6-foot leads. Sealed basic switches 5 amps, SPDT	SE	B	9AC4	9,53 .375	5,16 .203	3,18 .125	-65°F to +221°F
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	-65°F to +221°F
4	Can be reset without momentary ckt. break. 15 amps, SPDT.	V3	C	13AC1	15,9 .625	12,3 .485	6,68 .263	-67°F to +300°F
5	Miniature size. 5 amps, SPDT	SM	B	17AC1-T 17AC18-T† (MS16106-4)	9,53 .375	5,59 .220	4,45 .175	-65°F to +250°F -67°F to +185°F
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	-67°F to +185°F

†-These are military approved listings and the temperature range shown is for the finished product. All other listings are not military approved and the temperature range shown is the range for the basic switch only.

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 .375	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 the 800 number.

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

Sealed/High Temperature

Basic Switches

Snap-in Panel Mount

DM/DP Series

Momentary Action



Bullet nose plunger (SPDT shown)

Alternate Action



Bullet nose plunger (DPDT shown)

Push-Pull



Finger grip plunger (DPDT shown)

Pull-to-Cheat



Finger grip plunger with flat tip (SPDT shown)



Finger grip plunger with spherical tip (DPDT shown)

FEATURES

- Attractive, rugged snap-in panel mount design — easy installation
- Choice of momentary, alternate push-pull and pull-to-cheat operation
- Quick-connect terminals
- Expected mechanical life: 1 million operations, 95% survival
- Temperature range: -35° to $+180^{\circ}$ F (-37° to 82° C)
- UL recognized file #E22779, CSA certified file #LR4442

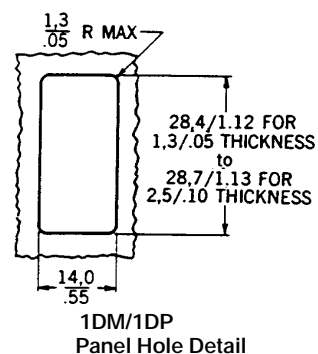
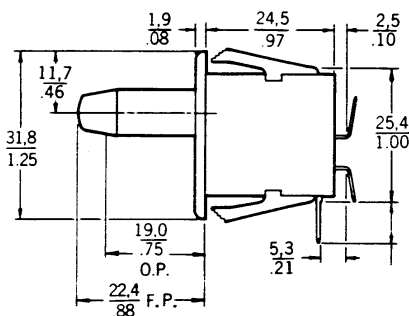
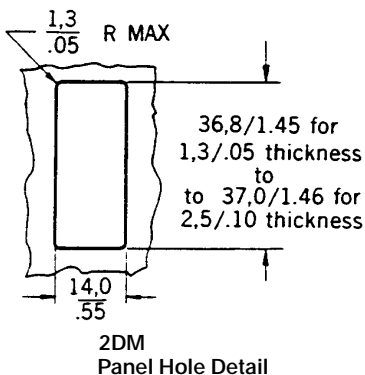
DM electrical rating — UL and CSA rating: 10 amps, 1/2 HP, 125, 250 or 277 VAC

DP electrical rating — UL standard 508, 14 amps 3/4 hp, 125, 250 VAC; Pilot Duty: 150 V A — 125, 250 VAC; 16 amps, 125, 250, 277 VAC, 3/4 hp, 125, 250 VAC; Pilot Duty: 150 V A — 125, 250 VAC.

NOTE: Refer to MICRO SWITCH Catalog 30 for DM switches with snap-on pushbuttons.

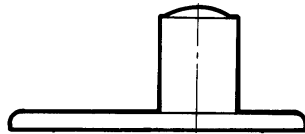
MOUNTING DIMENSIONS

Dimensions shown are for reference only.

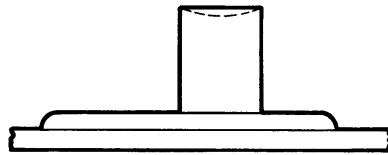


MOMENTARY ACTION

Momentary action switches are available in a choice of concave, convex, or bullet nose plunger styles.



Convex plunger



Concave plunger

ALTERNATE ACTION

These switches have push-on, push-off operation. The alternate action is at two levels, with the maintained On position of the plunger at a lower level than the normal Off.

PUSH-PULL

When plunger is depressed, it remains down and maintains circuit transfer. Switch contacts return to the previous position when the plunger is pulled to the extended position.

PULL-TO-CHEAT

Pull-to-cheat operates normally as a momentary action switch. However, by pulling the plunger beyond the normal free position, a maintained On position is achieved.

POSSIBLE VARIATIONS

In addition to the standard quick-connect .188 x .020" (4,78 x 0,51 mm) terminals, angled forms and .250 x .032" (6,35 x 0,81 mm) terminals can be provided. DM plungers and faceplates are available in any combination of white, black, gray, or red.

Basic Switches

Snap-in Panel Mount

DM/DP Series

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

ORDER GUIDE – DM

Catalog Listing	Action	Circuitry	Plunger Type/Color	Faceplate Color	F.P. mm in.	O.P. mm in.	O.T. max. mm in.	O.F. max. N oz.	R.F. min. N oz.
1DM1	Momentary	SPDT	Bullet nose/White	White	22,4 .880	19,1±1,5 .750±.060	9,53 .375	4,17 15	0,83 3
1DM2	Momentary	SPNC	Bullet nose/White	White	22,4 .880	19,1±1,5 .750±.060	9,53 .375	4,17 15	0,83 3
1DM3	Momentary	SPNO	Bullet nose/White	White	22,4 .880	19,1±1,5 .750±.060	9,53 .375	4,17 15	0,83 3
1DM18	Momentary	SPDT	Concave/Black	Gray	11,4 .450	—	3,05 .120	4,17 15	0,83 3
1DM19	Momentary	SPDT	Concave/Red	Gray	11,4 .450	—	3,05 .120	4,17 15	0,83 3
1DM21	Momentary	SPDT	Convex/White	White	11,4 .450	9,02±1,5 .355±.060	3,05 .120	4,17 15	0,83 3
1DM38	Momentary	SPNO	Convex/White	White	11,4 .450	9,02-1,5 .355±.060	3,05 .120	4,17 15	0,83 3
1DM301	Push-Pull	SPDT	Finger grip/Black	Gray	24,1 .950	—	15,9 .625	—	—
1DM401**	Pull-to-Cheat	SPDT	Finger grip/White	White	17,8 .700	—	13,2 .520	4,17 15	0,83 3
2DM1	Momentary	DPDT	Bullet nose/Black	Black	22,4 .880	19,6±1,0 .770±.040	10,2 .400	6,67 24	1,67 6
2DM5	Momentary	DPDT	Concave/Black	Gray	11,4 .450	—	3,05 .120	6,67 24	1,67 6
2DM6	Momentary	DPDT	Concave/Red	Gray	11,4 .450	—	3,05 .120	6,67 24	1,67 6
2DM301	Push-Pull	DPDT	Finger grip/Black	Gray	24,1 .950	—	15,9 .625	—	—
2DM409	Pull-to-Cheat	DPDT	Finger grip/Black	Black	21,6 .850	18,9±1,3 .745±.050	15,0 .590	6,67 24	—
2001DM1*	Alternate	SPDT	Bullet nose/White	White	22,4 .880	—	15,4 .605	5,56 20	—

* Latch position 16,9 mm ± 0,76 mm (.665 in. ± .030 in.)

** Extended position 23,6 mm (.930 in. max.)

ORDER GUIDE – DP

Catalog Listing	Action	Circuitry	Plunger Type/Color	Faceplate Color	F.P. mm in.	O.P. mm in.	O.T. max. mm in.	O.F. max. N oz.	R.F. min. N oz.
1DP5	Momentary	SPNO	Bullet nose/White	White	22,4 .880	15,1±1,5 .595±.060	9,53 .375	4,45 16	0,83 3
1DP801	Momentary	SPDT	Concave/White	White	11,4 .45	9,0±1,5 .355±.060	3,0 .120	6,67 24	0,83 3

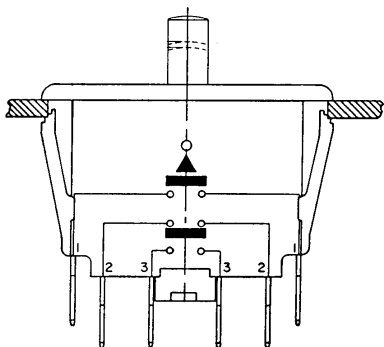
Door Switches



GENERAL INFORMATION

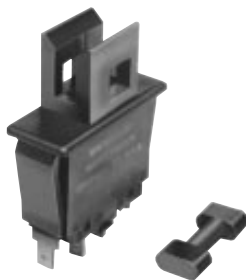
The WW Series switching mechanism is a non-snap double break shorting bar type construction. One, two or three circuit versions are available.

The three-circuit unit has two poles. The term "pole" denotes the number of completely separate circuits that can pass through the switch at one time. On a three-circuit switch in the unoperated condition (see drawing) circuit #2 is closed and circuit #1 and #3 are open. As the plunger is depressed, circuit #2 opens and circuit #1 and #3 are closed. The switch is two-pole since it makes and breaks two separate circuits (#1 and #3). When the plunger is released, circuit #1 and #3 are broken and circuit #2 is closed.



FEATURES

- Snap-in panel mounting
- Variety of terminal sizes
- Accepts quick-connect insulated terminals
- 10-16 amps electrical rating at 125 or 250 VAC depending on number of circuits and termination
- Same panel cutout as double-pole DM switch
- Quick-connect D7 and D9 termination complies with VDE requirements for 3mm air gap
- Switches with plunger guards and D7, D9 terminations are VDE approved
- UL recognized, CSA certified
- Meets UL's 100,000 operations requirement for operator-accessible interlock switches
- Covered under UL standard 508 Industrial Motor Controls



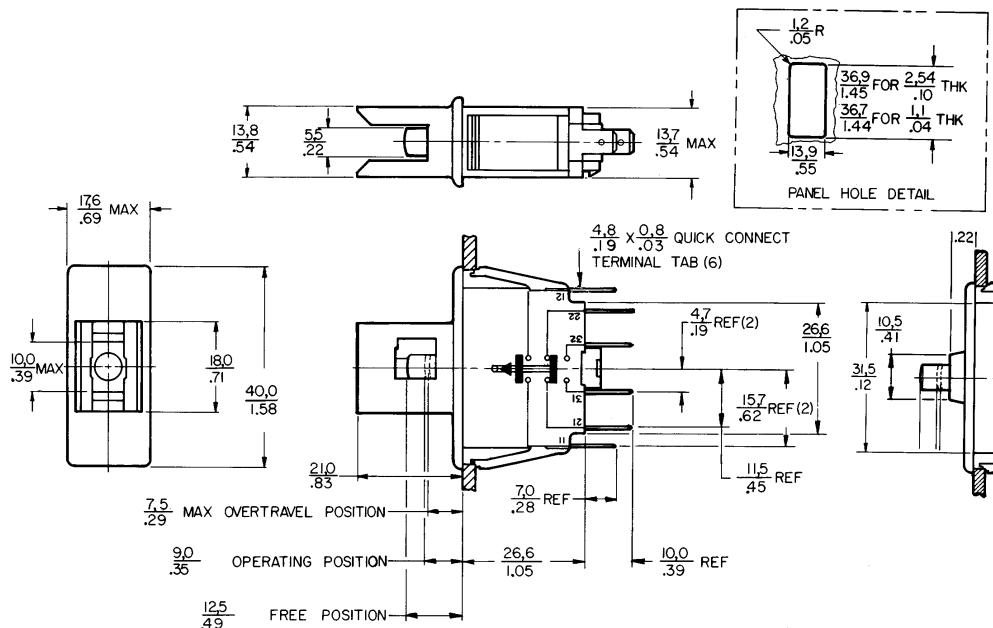
Plunger guard version and cheat-key.



With cheat-key installed.

WWs are available with or without a plunger guard. A cheat-key can be furnished for use with the plunger guard to maintain the switch plunger in the depressed condition (see photos →).

MOUNTING DIMENSIONS (For reference only)



NOTE: Terminals will accept quick-connect receptacles available from AMP, Hollingsworth and others.

Basic Switches

Door

ELECTRICAL RATINGS

UL and CSA * Asterisked loads tested for 100,000 cycles

Electrical Rating	3-Pole	Electrical Rating	2-Pole	Electrical Rating	1-Pole
C	Contacts 1-1, 3-3: †*15A, 125VAC, *10A, 250VAC: ½ hp @ 125, 250VAC; 3A "L", 125VAC; 150VA pilot duty @ 125/250VAC	A	Contacts 1-1, 3-3: †*16A, 125/250VAC: ½ hp, 125/250 VAC; 3A "L", 125VAC; 150 VA pilot duty 125/250 VAC; *2A, 24VDC	B	Contacts 1-1: *16A, 125/250VAC; ¾ hp, 125/250VAC; 150VA pilot duty 125/250 VAC; 3A, "L", 125VAC
D	Same as C with 0.1A, 125 VAC; *2A, 24VDC	F	Same as A with 0.1A, 125VAC		
E	†Contacts 2-2: 0.1A, 125VAC/VDC	G	*5A, 125VAC, 2A, *24VDC		

VDE †

Flagged loads tested for 10,000 cycles

Circuits #1 and #3 †16 (4)A, 250VAC Circuit #2 †0.1 (0.05) A, 250VAC

ORDER GUIDE

Catalog Listings*	Circuitry	Electrical Rating	Plunger Guard
WW1A04A-D7	#1 - N.O.	A	No
WW1G03A-D7	#1 & #3 - N.O.	A	No
WW1K06D-D7	#1 & #3 - N.O. #2 - N.C.	C E	No
WW1G02A-D9	#1 & #3 - N.O.	A	Yes
WW1K05D-D9	#1 & #3 - N.O. #2 - N.C.	C E	Yes

Cheat-key: Catalog Listing 15PA256-WW

Termination Options

To order other termination options, substitute the option letter and number at the end of the catalog listing.

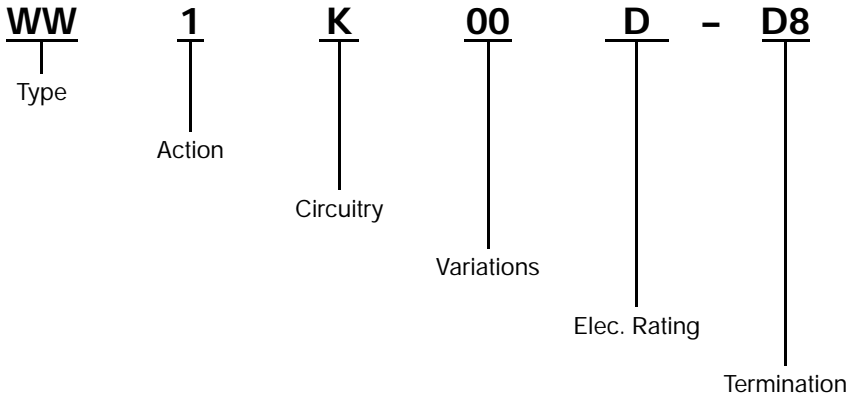
D7: .187 x .032 in. (4,75 x 0,8 mm).

D8: .187 x .020 in. (4,75 x 0,5 mm).

D9: .250 x .032 in. (6,35 x 0,8 mm).

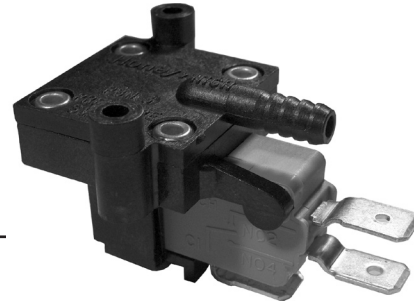
D7 and D9 terminals are VDE certified.
VDE limits D7 terminals to 12A.

CATALOG LISTING CODE



PBN Series

Pressure Switches and Sensors



DESCRIPTION

The Honeywell PBN series is a range of versatile, low-cost, ultra-low pressure switches and sensors.

PBN products are compact, lightweight, feature high reliability, and are designed to yield a repeatable response over millions of cycles. They can be mounted in virtually any orientation

and their rugged construction allows use in the most rigorous environments.

Product specifications such as operating characteristics, termination type and contact materials can be customised for certain applications.

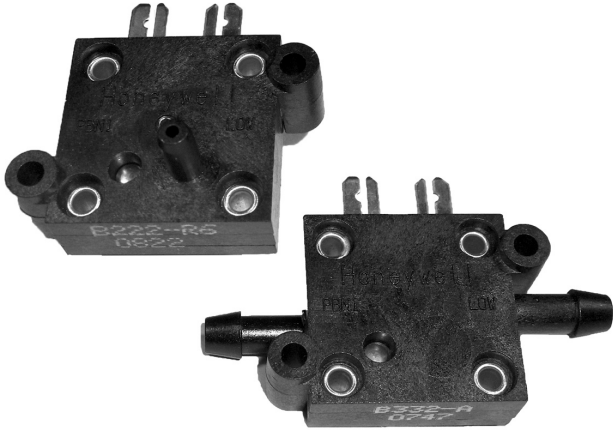
FEATURES

- Sensitive to ultra-low pressures
- Gage, vacuum and differential measurement
- Miniature size
- Lightweight
- Fast response
- Rugged housings
- Shock and vibration resistant
- Low and high current versions

POTENTIAL APPLICATIONS

- Arc fault detection
- Filter restriction
- Safety interlock
- HVAC
- Vacuum control
- Liquid level sensing
- Pick and place machinery
- Pump control
- Counters
- Edge detection
- Traffic counters
- Motor control

PBN1



DESCRIPTION

The PBN1 series is available in a wide range of actuation pressures. The required pressure can be supplied factory set or as an adjustable unit. Smooth 4 mm diameter ports perpendicular to the housing and 5 mm barbed radial ports are available. Nominal actuation pressure varies from 1 in-H₂O to 50 in-H₂O on factory set models. Adjustable models have actuation pressures which can be set up to 416 in-H₂O.

FEATURES

- Sensitive to ultra-low pressure
- Gauge, vacuum and differential measurement
- Miniature size
- Lightweight
- Fast response
- Rugged housings
- High shock and vibration resistant versions available
- Adjustable and non-adjustable models

POTENTIAL APPLICATIONS

- Arc fault detection
- Filter restriction
- Safety interlock
- HVAC
- Vacuum control
- Liquid level sensing
- Pick and place machinery
- Pump control
- Counters

MECHANICAL SPECIFICATIONS

Characteristic	Measure
Output	SPST normally open
Sensing medium	Air
Expected mechanical life	Up to 20 million cycles depending on load
Proof pressure	8 psi for units where set point is 3.0 in-H ₂ O or less; 15 psi for units where set point is greater than 3.0 in-H ₂ O
Weight	Less than 10 grams
Operating temperature	4 °C to 66 °C with Polyurethane (standard) diaphragm; -40 °C to 96 °C with Teflon (optional) diaphragm
Action pressure	Tolerance ±20 % for non-adjustable sensors except for PBN1XXXX-A which has a tolerance of +0 %/-100 %

PHYSICAL SPECIFICATIONS

Characteristic	Measure
Mounting	2,6 mm (No 4), thread size screws through mounting lugs or 2 mm (No 2) thread size screws through eyelets
Case material	Polycarbonate standard (other materials available upon request)
Contact material	Gold inlay 18 carat on phosphor bronze
Diaphragm material	Polyurethane (standard) Teflon (optional)
Electrical connections	Terminals: 4,8 x 0,5 mm tab-type (bifurcated) for use with female quick disconnects (ref. AMP 2-520182-2 or equivalent)
Pressure ports	Smooth perpendicular and barbed radial
Pressure settings	Factory set or field adjustable (see chart). Switching hysteresis = 0 %

ELECTRICAL SPECIFICATIONS

Characteristic	Measure
Current rating	40 mA resistive for life up to 20 million cycles
Operating voltage	ac/dc – 30 V or less with resistive load or 120 Vac neon lamp load
Contact resistance	1 Ω or less at 150 % of actuation pressure

Ultra-Low Pressure Sensors

ORDERING INFORMATION

Model Number		Nominal Actuation Pressure			Proof Pressure
4mm smooth perpendicular ports	5mm barbed radial ports	in-H ₂ O	mbar	psi	psi
PBN1B222-A	PBN1B332-A	0.5	1,24	0.018	8
PBN1B222-B	PBN1B332-B	1.0	2,49	0.036	8
PBN1B222-C	PBN1B332-C	1.5	3,73	0.054	8
PBN1B222-D	PBN1B332-D	2.0	4,97	0.072	8
PBN1B222-E	PBN1B332-E	3.0	7,46	0.108	8
PBN1B222-F	PBN1B332-F	4.0	9,95	0.144	15
PBN1B222-G	PBN1B332-G	6.0	14,92	0.217	15
PBN1B222-J	PBN1B332-J	8.0	19,89	0.289	15
PBN1B222-K	PBN1B332-K	10.0	24,86	0.361	15
PBN1B222-L	PBN1B332-L	12.0	29,84	0.433	15
PBN1B222-M	PBN1B332-M	15.0	37,30	0.541	15
PBN1B222-N	PBN1B332-N	20.0	49,73	0.722	15
PBN1B222-P	PBN1B332-P	30.0	74,59	1.083	15
PBN1B222-Q	PBN1B332-Q	40.0	99,46	1.444	15
PBN1B222-S	PBN1B332-S	50.0	124,32	1.804	15
Adjustable models					
PBN1B222-R6	PBN1B332-R6	10.0 to 50.0	24,9 to 124,5	0.36 to 1.80	15
PBN1B222-R7	PBN1B332-R7	51.0 to 416.0	127.0 to 1036.0	1.84 to 15.01	15

Note: Electrical ratings – 40 mA. 30 V ac/dc. 120 Vac neon lamp load

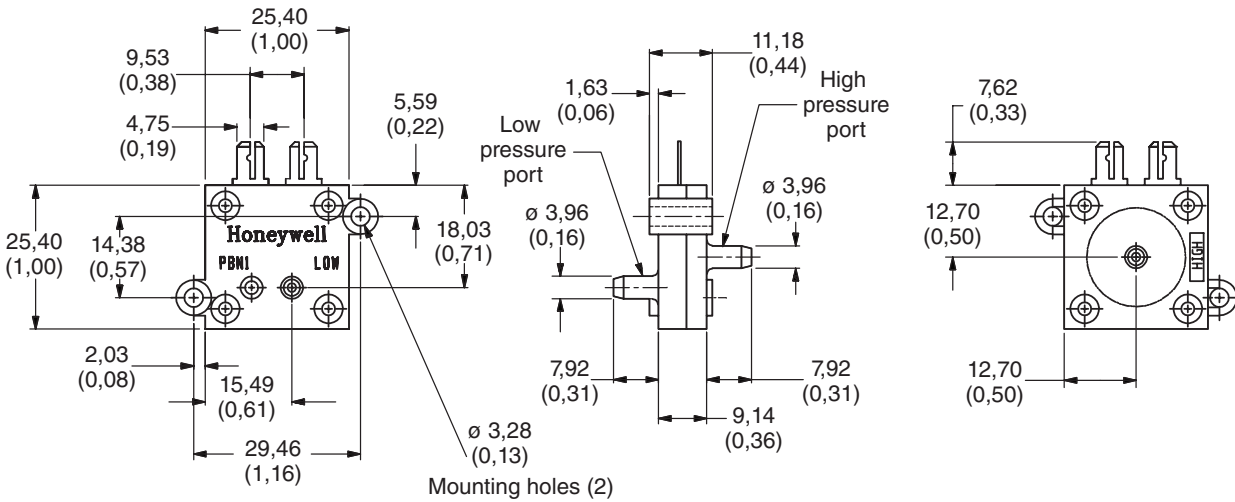
Note: Adjustable models – following adj.. set screw should be sealed using suitable RTV sealant

PBN1

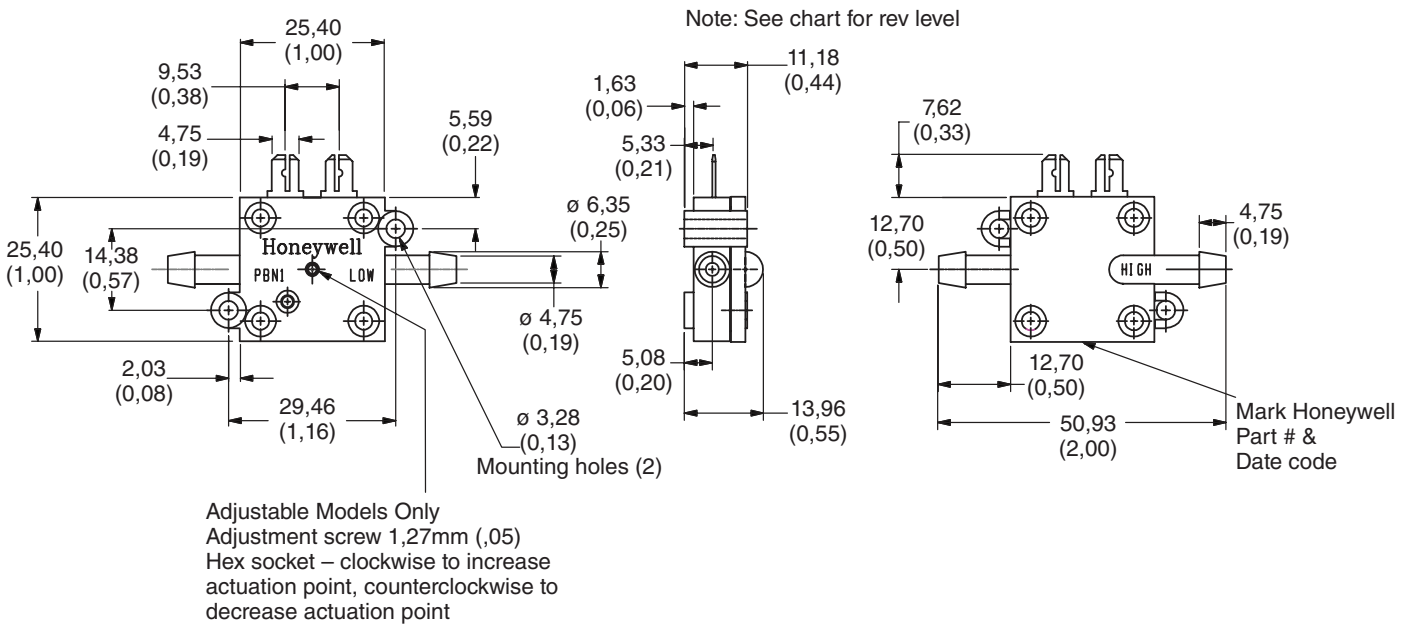
Ultra-Low Pressure Sensors

DIMENSIONS

4 mm smooth perpendicular ports

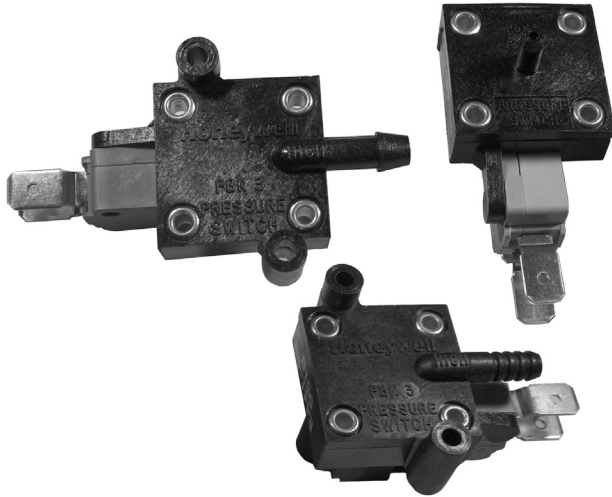


5 mm barbed radial ports



PBN3

High-Current, Low Pressure Sensors



DESCRIPTION

The PBN3 series is a range of miniature, high-current, low-pressure devices which measure gauge pressure and can switch up to 16(4) A. Smooth 4 mm perpendicular ports and 5 mm barbed radial ports are available. Nominal actuation pressure varies from 1 in-H₂O to 6,5 in-H₂O. Adjustable models have actuation pressures which can be set from 10 in-H₂O to 1109 in-H₂O.

PBN3 devices comprise a snap-action SPDT pressure switch which contains an actuator assembly and miniature micro switch. The devices are designed to respond to positive air pressure but may also be activated by non-corrosive liquids at low pressures.

FEATURES

- High current switching capacity
- Sensitive to low gauge pressures
- Miniature size
- Lightweight
- Fast response
- Rugged housings
- Adjustable and non-adjustable models

POTENTIAL APPLICATIONS

- Counting
- Edge detection
- Liquid level sensing
- Traffic counters
- Motor control

MECHANICAL SPECIFICATIONS

Characteristic	Measure
Switch type	SPDT normally open or normally closed
Switching medium	Air or compatible fluids
Expected mechanical life	Up to five million cycles depending on load
Proof pressure	15 psi for units where set point is 75 in-H ₂ O or less; 80 psi for units where set point is greater than 75 in-H ₂ O
Weight	Less than 20 grams
Operating temperature	4 °C to 66 °C with Polyurethane (standard) diaphragm; -40 °C to 96 °C with Teflon (optional) diaphragm

PHYSICAL SPECIFICATIONS

Characteristic	Measure
Mounting	2,6 mm (No 4), thread size screws through mounting lugs or 2 mm (No 2) thread size screws through eyelets
Case material	Polycarbonate and Polyetherimide standard (other materials available upon request) (see chart)
Contact material	Silver (gold available on special order for "dry contact" applications)
Electrical connections	6,3 mm x 0,8 mm quick connect terminals supplied on all listings except PBN3XXXX-B and -D which have 4,8 mm x 0,5 mm connections
Pressure ports	Smooth perpendicular and barbed radial
Pressure settings	Factory set or field adjustable (see chart) Switching hysteresis = 25 % to 50 % of set point

ELECTRICAL SPECIFICATIONS

Characteristic	Measure
Switch type	Single pole double throw
Switch rating	Dependent on actuation pressure (see chart)
Contact voltage	250 Vac

PBN3

ORDERING INFORMATION

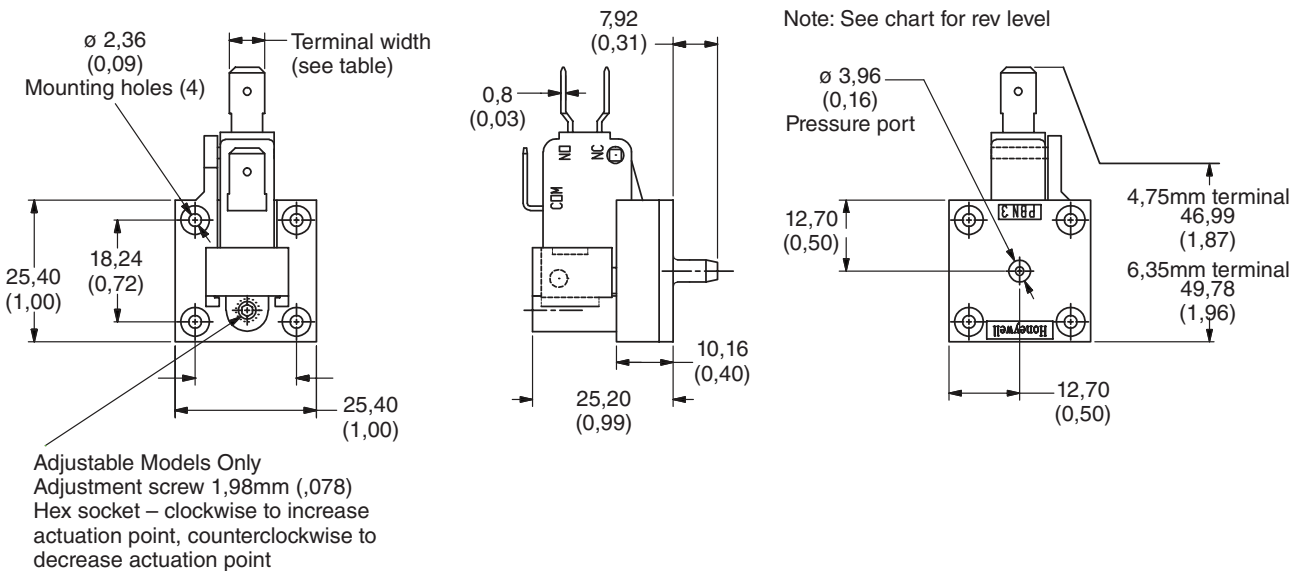
Model Number			Actuation Pressure		Tolerance from nominal	AMP rating	Terminal width mm	Proof pressure psi
4 mm smooth perpendicular ports	5 mm barbed radial ports		in-H ₂ O	mbar				
	Same side as terminals	Opposite side from terminals						
PBN3C421-B*	PBN3C441-B*	PBN3C451-B*	1.0	2,49	+100% -50%	3	4,75	15
PBN3C421-D*	PBN3C441-D*	PBN3C451-D*	2.0	4,98	±20 %	3	4,75	15
PBN3C421-H	PBN3D441-H	PBN3D451-H	6.5	16,19	±30 %	5	6,35	15
Adjustable models								
PBN3D421-R1	PBN3D441-R1	PBN3D451-R1	10.0 to 28.0	24,9 to 69,8	N/A	5	6,35	15
PBN3E421-R2	PBN3E441-R2	PBN3E451-R2	35.0 to 75.0	87,0 to 187,0	N/A	16	6,35	15
Listings with polyetherimide as case material								
PBN3E421-R8	PBN3E441-R8	PBN3E451-R8	83.0 to 416.0	207,0 to 1034,0	N/A	16	6,35	80
PBN3E421-R9	PBN3E441-R9	PBN3E451-R9	416.0 to 1109.0	1034,0 to 2758,0	N/A	16	6,35	80

Note: Contact voltage 250 Vac max

*Supplied with terminals 4, 8mm x 0,5 mm instead of standard 6,3 mm x 0,8 mm

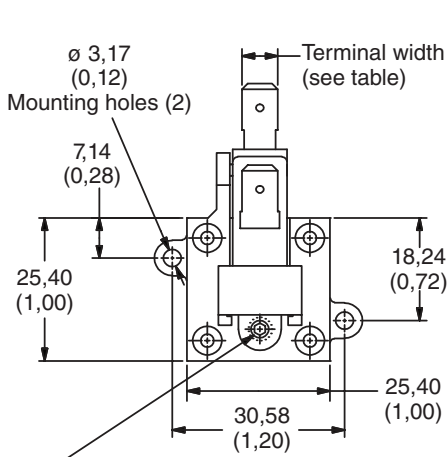
DIMENSIONS

4mm smooth perpendicular ports

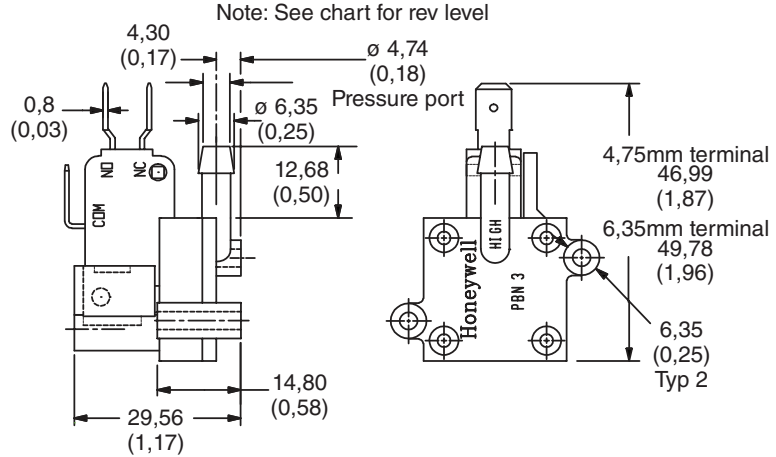


High-Current, Low Pressure Sensors

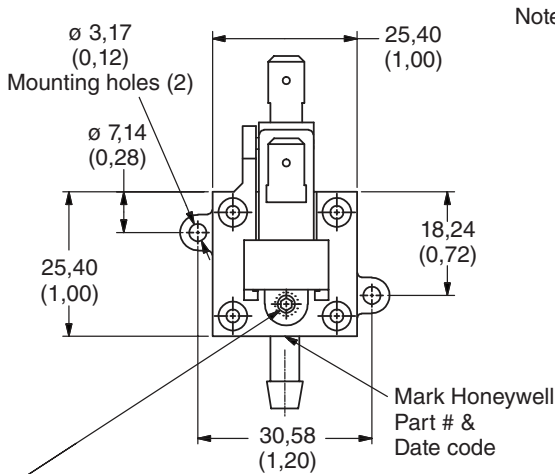
5 mm barbed radial ports, opposite side from terminals



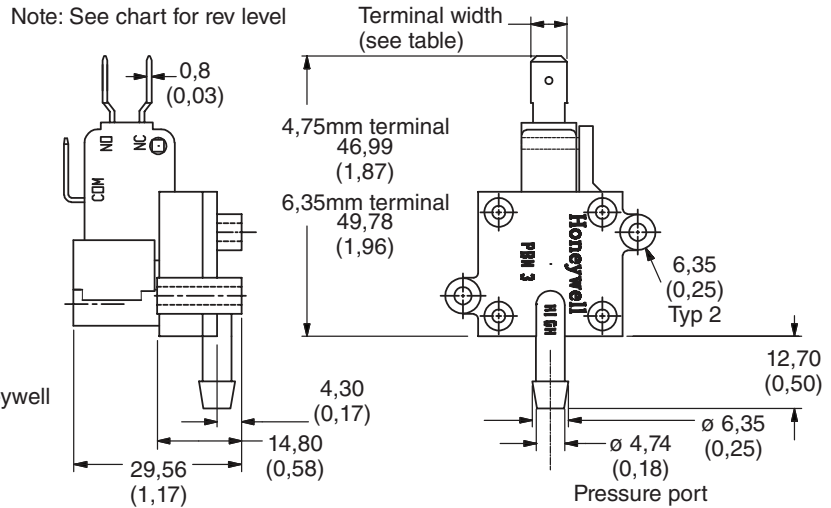
Adjustable Models Only
Adjustment screw 1.98mm (.078)
Hex socket – clockwise to increase
actuation point, counterclockwise to
decrease actuation point



5 mm barbed radial ports, same side from terminals



Adjustable Models Only
Adjustment screw 1.98mm (.078)
Hex socket – clockwise to increase
actuation point, counterclockwise to
decrease actuation point



Warranty. Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

For more information about Sensing and Control products, visit www.honeywell.com/sensing or call +1-815-235-6847

Email inquiries to info.sc@honeywell.com

WARNING

PERSONAL INJURY

- DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this catalogue is for reference only. DO NOT USE this document as product installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

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www.honeywell.com/sensing

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Honeywell

Series 1000

Hydraulic Brake Pressure Switch



DESCRIPTION

The Honeywell Series 1000 pressure switch is a small, low-cost switch actuated by hydraulic fluid or gas. The switch is highly responsive for low-set-point and high burst rating requirements, and may also be used when converting the brake system to hydraulic applications.

With its IP65 sealing and high burst rating, Honeywell's Series 1000 switch often excels in harsh environments such as extreme weather conditions or particle-filled areas. In addition to its high resistance to shock and vibration, this pressure switch is designed to maintain its tolerances across temperature ranges in high system pressure environments.

FEATURES

- Low set point: actuates at 20 psi
- Reduced part count
- High burst rating (for high cost-of-failure applications)
- Banjo bolt fitting
- Sealed to IP65

POTENTIAL APPLICATIONS

- Small vehicle brake light actuation
- Compact agricultural tractors
- Utility vehicles (UTVs)
- Trucks and lift trucks
- Small self-propelled vehicles

BENEFITS

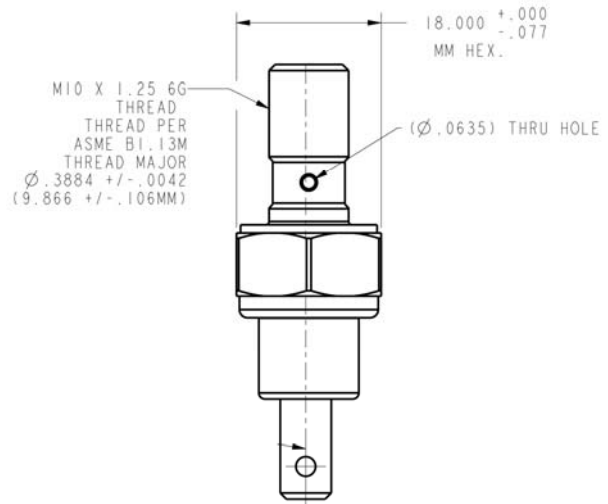
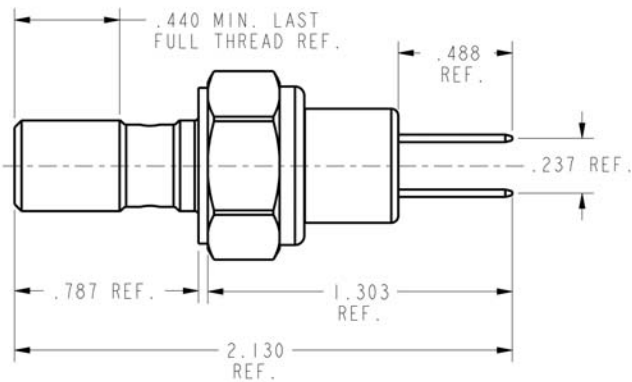
- Low set point is highly responsive
- Reduced field failures at part level
- Enhanced reliability, lowers warranty costs
- Minimized footprint
- Designed for use in high shock and vibration along with most extreme weather conditions

Series 1000

SPECIFICATIONS

Characteristic	Parameter
Type	Direct acting
Circuitry	Normally open
Connector size	M10 x 1.25 banjo fitting
Terminals	6,3 mm [0.25 in] blade
Set point	20 psi \pm 10 psi [1,37 bar \pm 0,69 bar]
Operating pressure, max.	1200 psi [82,74 bar]
Proof pressure	2400 psi [165,47 bar]
Burst pressure	4800 psi [330,95 bar]
Operating temperature	-40 °C to 121 °C [-40 °F to 250 °F]
Operating media	DOT 3 or 4 brake fluid
Electrical rating	12 Vdc with two-1157 bulbs (4.4 A)
Contacts	Silver plated copper
Diaphragm	EPDM
Housing	Rynite 545 glass filled
Base	Trivalent plated steel
Spring	17-7 PH stainless steel
Connector options	M10 x 1.25 double banjo; M10 x 1, 1/8-27 NPT

DIMENSIONS



Hydraulic Brake Pressure Switch

ORDER GUIDE

Catalog Listing	Description
83355	Series 1000 hydraulic brake pressure switch, normally open, 20 psi, M10 x 1.25 single banjo fitting, blade terminals
83354	Series 1000 hydraulic brake pressure switch, normally open, 20 psi, M10 x 1.25 double banjo fitting, blade terminals

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

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+65 6445-3033 Fax
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Sensing and Control

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Honeywell

Set Points from 0.5 to 150 psi

5000 Series Extended Duty Pressure Switch With Direct Action Blade Contacts

The 5000 Series switch is specifically designed to stand up to extended duty applications. This switch is factory set but capable of field adjustment. It features a Kapton diaphragm for compatibility with a wide variety of fluids, and various terminations including a Metri-Pack connector that forms a tight seal when connected. Among the outstanding design benefits are its durable construction, compact size, and enhanced set point integrity.

Standard Specifications

Type: Direct action blade contact

Contacts: Silver alloy, gold plated

Set Point: Factory set from 0.5 to 150 PSI

Operating Pressure: 150 PSI for 0.5-24 PSI set point range, 250 PSI for 25-150 PSI set point range

Proof Pressure: 500 PSI

Burst Pressure: 750 PSI for 0.5-24 PSI set point range, 1250 PSI for 25-150 PSI set point range.



Switch Boot P/N 79380 for Vacuum and Pressure

Ratings:

Resistive:	15 AMP-	6 VDC
	8 AMP-	12 VDC
	4 AMP-	24 VDC
Inductive:	1 AMP-	120 VAC
	0.5 AMP-	240 VAC

Diaphragm: Polyimide film

Temperature

Range: -40° F to + 250° F

Connector: 1/8 -27 NPT male thread

Terminals: #8-32 screws, 1/4" blade,

280 Series Metri-Pack

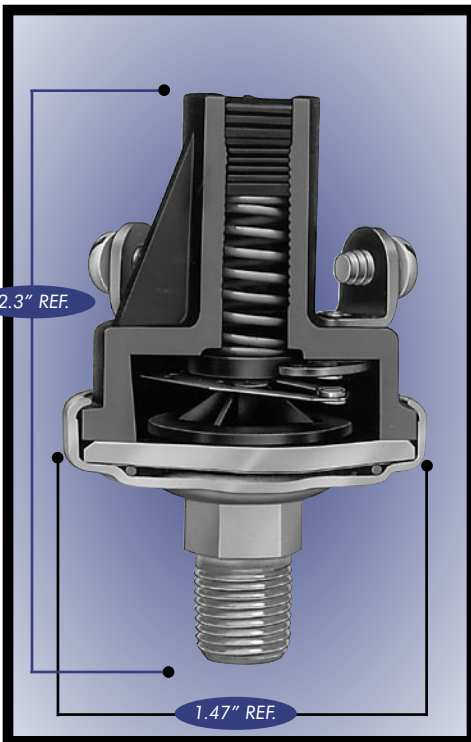
Circuitry: SPST-N.O., N.C., 1 circuit adjustable dual circuit, or 2 circuits adjustable dual circuit.

Also available are N.O./N.O. dual circuit and N.C./N.C. dual circuit.

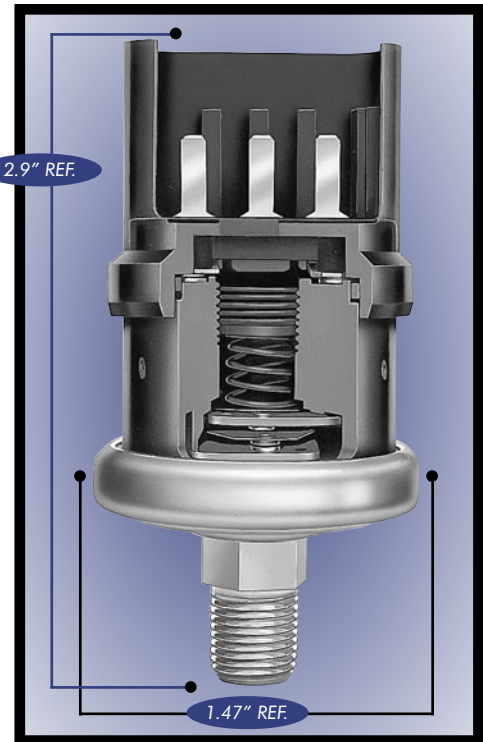
Base: Plated Steel

Cover: Glass reinforced polyester

Options: Brass, plastic or stainless steel base; various base connector thread sizes; wire leads (potted & sealed).



5000 Series Switch with Screw Terminals



5000 Series Switch with Metri-Pack Terminal

NOTE: OPERATING MEDIA (PRESSURE SWITCH)

The pressure switch is designed to operate with air, motor oils, transmission oils, jet fuels and other similar hydrocarbon media.

5000 Series Pressure Switch With Standard Terminal

			Single Circuit 1 Terminal		Single Circuit 2 Terminals		Dual Circuit One circuit adjustable ¹		Dual Circuit Both circuits adjustable ²		
Contact Setting	Factory Set At	Circuitry	Part Number		Part Number		Part Number		Contact Setting ³	Part Number	
			Screw	Blade	Screw	Blade	Screw	Blade		Screw	Blade
0.5-1 PSI ±0.3	1 PSI	N.O.	78630	78631	78628	78629	78711	78712	3-4 PSI ±0.5	76081	76086
		N.C.	78634	78635	78632	78633					
1.1-3 PSI ±0.5	2 PSI	N.O.	78142	78399	76051	76056	76071	76076	5-8 PSI ±1	76582	76590
		N.C.	78149	78406	76061	76066					
3.1-7 PSI ±1	4 PSI	N.O.	78143	78400	76575	76583	76579	76587	9-24 PSI ±2	76082	76087
		N.C.	78150	78407	76577	76585					
8-13 PSI ±2	10 PSI	N.O.	78144	78401	76576	76584	76580	76588	25-50 PSI ±3	76083	76088
		N.C.	78151	78408	76578	76586					
14-24 PSI ±3	15 PSI	N.O.	78145	78402	76052	76057	76072	76077	51-90 PSI +5/-2	76084	76089
		N.C.	78152	78409	76062	76067					
25-50 PSI ±5	35 PSI	N.O.	78146	78403	76053	76058	76073	76078	91-150 PSI +8/-2	76085	76090
		N.C.	78153	78410	76063	76068					
51-90 PSI ±7	60 PSI	N.O.	78147	78404	76054	76059	76074	76079			
		N.C.	78154	78411	76064	76069					
91-150 PSI ±10	100 PSI	N.O.	78148	78405	76055	76060	76075	76080			
		N.C.	78155	78412	76065	76070					

5000 Series Pressure Switch With Metri-Pack Terminal

			Single Circuit (Mates with Packard P/N 15300027)		Dual Circuit One circuit adjustable ¹ (Mates with Packard P/N 12034147)		Dual Circuit Both circuits adjustable ² (Mates with Packard P/N 12034147)	
Contact Setting	Factory Set At	Circuitry	Part Number	Part Number	Contact Setting ³	Part Number		
1-3 PSI ±0.5	2 PSI	N.O.	77029	77038	3-4 PSI ±0.5	77047		
		N.C.	77020					
4-6 PSI ±1	5 PSI	N.O.	77030	77039	5-10 PSI ±1	77048		
		N.C.	77021					
7-12 PSI ±2	10 PSI	N.O.	77031	77040	11-24 PSI ±2	77049		
		N.C.	77022					
13-24 PSI ±3	20 PSI	N.O.	77032	77041	25-46 PSI ±3	77050		
		N.C.	77023					
25-46 PSI ±5	35 PSI	N.O.	77033	77042	47-76 PSI +5/-2	77051		
		N.C.	77024					
47-76 PSI ±6	60 PSI	N.O.	77034	77043	77-100 PSI +7/-2	77052		
		N.C.	77025					
77-100 PSI ±7	85 PSI	N.O.	77035	77044	101-126 PSI +9/-2	77053		
		N.C.	77026					
101-126 ±9	115 PSI	N.O.	77036	77045	127-150 PSI +10/-2	77054		
		N.C.	77027					
127-150 PSI ±10	135 PSI	N.O.	77037	77046				
		N.C.	77028					

Notes:

- The N.C. circuit is the reference circuit for the dual circuit switch; the normally open circuit is not adjusted. The expected dead band between the N.C. & N.O. circuit is shown in the chart below. For applications requiring the normally open circuit as the reference circuit the N.C. circuit is not adjusted.
- Switch may be adjusted so that:
 - N.C. circuit opens before N.O. circuit closes.
 - N.C. and N.O. circuit have same set point.
 - N.O. circuit closes before the N.C. circuit opens. (There is no dead band and both circuits are on for a brief period of time.)
- The tolerances given in the table are applicable to a switch adjusted so that the N.O. circuit closes before the N.C. circuit opens and applies to the N.C. circuit. The N.O. set point and tolerances are such that a minimum overlap of 1 PSI exists during which both circuits are on.

Note 1: Expected Dead Band (Higher than N.C. circuit)

Contact Setting	Dead Band
0.5-3 PSI	1.5 PSI
4-7 PSI	2.5 PSI
8-13 PSI	3.5 PSI
14-24 PSI	8 PSI
25-50 PSI	15 PSI
51-90 PSI	23 PSI
91-150 PSI	40 PSI

Manual Switches



Selection

Pushbutton panels. Low profile SLP pushbutton panels feature standard matrices and custom arrays tailored to your requirements. They use a conductive rubber technology for operator feedback. Plus full-face LED lighting and legends, and a variety of button sizes and colors.

Manual switches. Designed by industrial designers to achieve a balance between harmonious appearance and ergonomics, AML Advanced Manual Line has pushbuttons, paddles, and rockers; with LED, incandescent, and neon illumination. Plus matching indicators and LED annunciators. A smaller cousin, MML Miniature Manual Line, offers many AML features in a space-saving size.

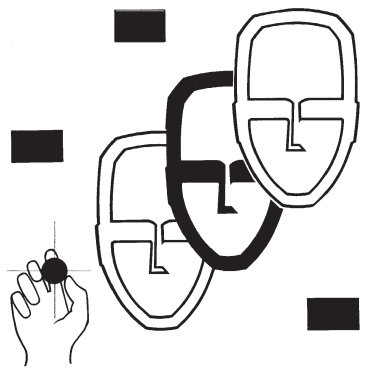
Pushbuttons. A wide array of different pushbutton families, many with lighted display and matching indicators. Includes Series 2, an easily assembled modular design with many color display/control options; low-cost DM pushbuttons and compact PB unlighted pushbuttons.

Toggles/Rockers. NT/TL, TS, TW and AT toggles, and NR/TP rockers feature various degrees of sealing, choice of many circuitry combinations, and 2 or 3-position operation.

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Applying Manual Controls and Displays



Adherence to good human factors principles can help your product make good first impressions as it is being evaluated by your customers; and increase long-term user satisfaction. You can gain a competitive edge that may translate into better acceptance by your customer and the user.

The panel, being the surface provided for display and control components, serves as the direct interface for human/machine dialogue. We'd like to offer the following guidelines to help you achieve ergonomically pleasing panels where communication flows operator-to-machine, and back again.

PREPARATION

Begin with procedures common to any design process. Prepare a list of the requirements related to the job to be performed. Then ask yourself such questions as:

- What is the panel (control station) to do?
- Who will be the users?
- Is there a special sequence of procedures to follow?
- Are there special environmental conditions or military requirements?
- Will the equipment be used inside or outside; in a shop, home or office?
- Will barriers, guards or protective shields be needed to safeguard components and/or users?
- Will the maintenance tasks be performed by the equipment user or a technician? How often and how easy to do?
- Who will install or set up the equipment?
- Are elaborate instructions required or can you design to make them unnecessary?
- What components are available?
- Will you do the specifying?
- What are the cost constraints?
- What elements should be added to estimate total installed cost?

Explore as many alternate means of achieving the desired results as possible. Then select the most effective combination of components. The earlier the foregoing questions are asked and answered in the concept or selection process, the more closely the panel design will match the requirements of a given application.

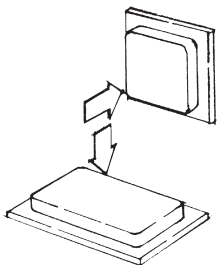
MATCH CONTROL TO FUNCTION

People expect controls to move in certain ways. Where possible, component selection should be an extension of normal habit patterns. For example, the wall-mounted toggle switch found in homes conveys a habit pattern for turning on lights. The upward flipping motion generally associated with "ON" can be used with other toggle, rocker and paddle switches for a natural transfer of a previously learned habit.

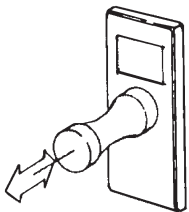
The clockwise motion of a rotary knob is frequently used to select an appliance function, such as the desired washer cycle. This same familiar action may be adapted to a control panel as an extension of a normal habit pattern.

When a panel uses control actions well-established in our daily lives:

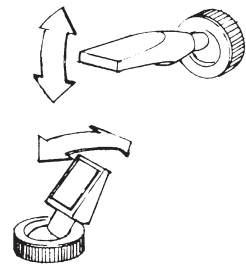
- Reaction time is reduced.
- The first control movement by an operator is usually correct.
- An operator can perform faster, and can make adjustments with greater precision.
- An operator can learn control procedures faster.



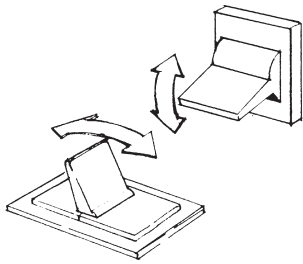
Pushbuttons (alternate-action or momentary)



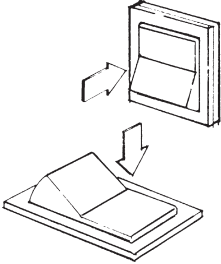
Push/pull switches



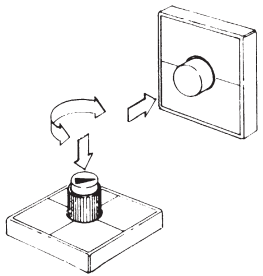
Toggles for 2- or 3-position select



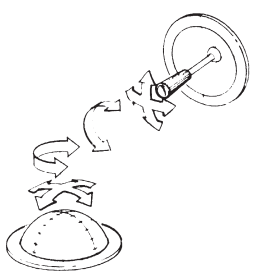
Paddles for 2- or 3-position select



Rockers for 2- or 3-position select



Pushbutton and rotary pushbutton/selector



Trackball and joystick controls for 3-D maneuvering of CRT cursors in mapping or tracking tasks

Applying Manual Controls and Displays

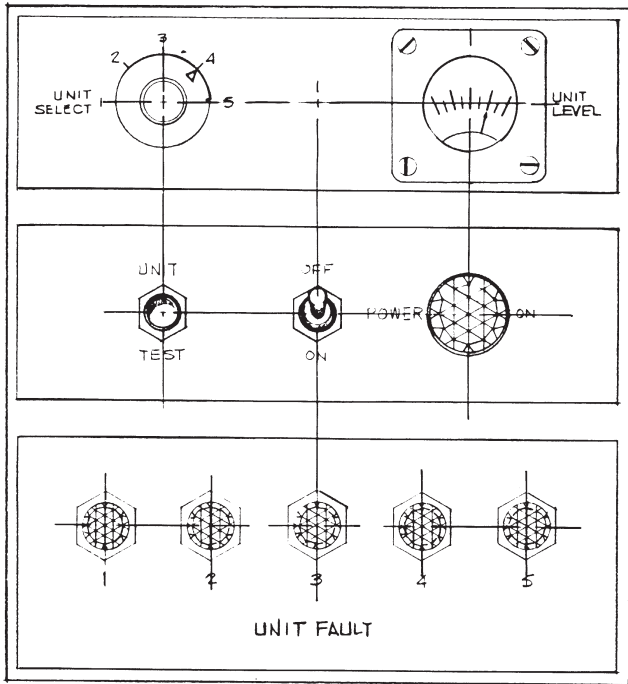
COMPONENT ARRANGEMENT

Some control panels become overly complex because of the number and different types of components, or because the designer failed to explore enough alternative arrangements.

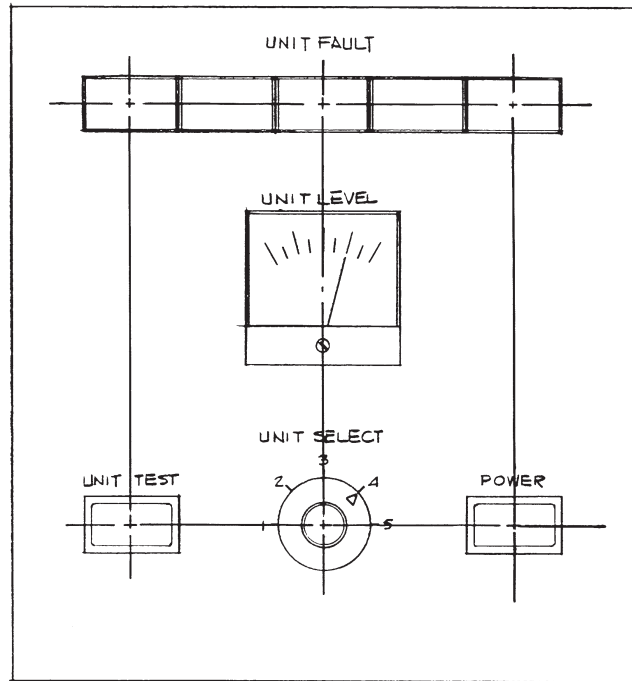
Before drawing the elements on a panel outline, it is helpful to make paper cutouts of the separate switches, indicators, etc. These cutouts can be easily shifted into various groups, and relationships until the most effective arrangement is found. You will save hours of tedious drawing, erasing and redrawing, and should achieve a better layout. Also, you are more likely to resist the temptation to stop looking for the optimal solution too early in the design process.

Here are some suggestions for good arrangement:

1. Frequently used components should be the most accessible.
 - for manually operated controls, somewhere between elbow and shoulder height.
 - for displays, nearest the normal line of sight.
2. Arrange controls and displays for a conventional sequence of operation, left-to-right and top-to-bottom, just as we normally read.
3. Define functional areas by leaving space between component groups. Avoid outline borders, color patches and brackets extending from group titles (except in cases of extreme density.)
4. Locate emergency controls and displays prominently on the panel to assure easy viewing and access by the operator.
5. Where large layouts are necessary, distribute the workload between both hands of the operator — for ease of operation and increased productivity.
6. Locate displays above (preferable) or to the left of corresponding manual controls to prevent visual interference while the manual controls are being operated. (When manual controls are at the extreme left of a panel, displays should be above the controls.)



Poor



Preferred

Alternative panel layouts. These before-and-after views illustrate how an existing design may be upgraded to better communicate through layout revision and component substitution. Both function and appearance are improved.

For example, the left hand panel uses outline frames to unnecessarily separate related functions. The frames serve merely as a decorative feature and contribute to a crowded look. In the right hand panel, the frames are eliminated, as the components themselves define their functional space.

The uniform use of square and rectangular panel elements in the right hand panel serves to further simplify and harmonize the appearance. Note that the UNIT FAULT indicators and the analog meter are located in the top half of the panel to help prevent the operator's hand from obscuring them when the controls are being used. The POWER switch-indicator combination eliminates the separate POWER ON light. Also, legends appear above their respective components, rather than in the left hand version's random arrangement.

PANEL DESIGN

Applying Manual Controls and Displays

GRAPHICS CONSIDERATIONS

Panel graphics need not overwhelm the operator with their size, since they are normally viewed at about arm's length.

Legibility is reinforced when the color chosen for the graphics contrasts strongly with the background. Type is most legible when it is shown as dark lettering on a light panel.

Panel Titles

Titles applied to the panel itself should normally appear above the controls to prevent them from being obscured when a control is in use. An exception would be when panel components must be placed at a height that would block the operator's line of sight to the title.

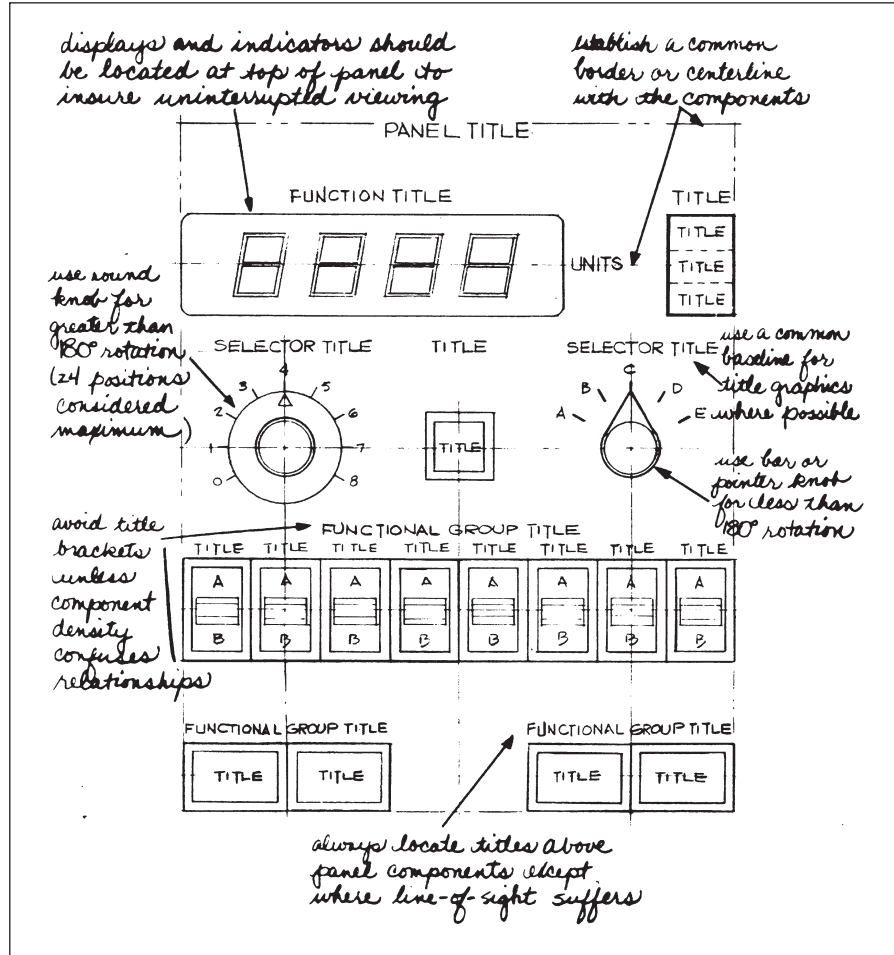
If different-sized components are used in a horizontal array, pick a common baseline for all their associated titles to avoid a stepped, disorderly look.

Whenever possible, apply graphics directly on the manual controls or lighted indicators themselves. This not only conserves valuable panel space, but enhances overall design flexibility. Recommended graphic colors for component surfaces are white on red, green, and blue; black on yellow and white; and white or black on amber.

Alphanumeric and symbol legends can be added or easily changed merely by replacing a switch or indicator button, lens, or rocker-button operator.

Type Selection. All titles should be composed of a simple sans serif typeface for optimum clarity (see examples, at right). Lettering should be horizontal, never vertical. Type sizes should conform to panel component priorities (refer to typical letter heights for titles in descending order, as shown on page 184).

Avoid abbreviations whenever possible; spell out the entire word. If horizontal space is tight, try condensed type, but use it consistently, not interspersed with a standard width type. Inconsistent use of the type styles, sizes, or line weights add visual "noise" to the overall panel scheme and should be avoided.



Layout and graphic design considerations

Typeface Examples

Helvetica Medium (This is the preferred type proportion and weight for most titles).

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
1 2 3 4 5 6 7 8 9 0

Helvetica Medium Condensed

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
1 2 3 4 5 6 7 8 9 0

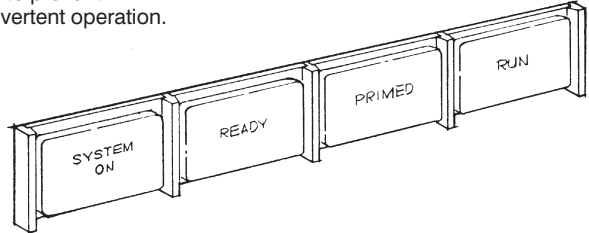
Helvetica Bold

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
1 2 3 4 5 6 7 8 9 0

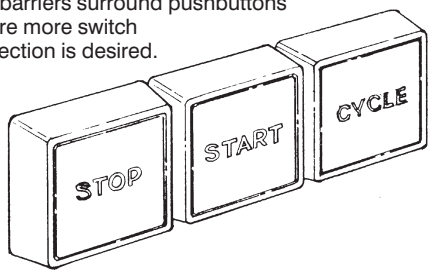
PANEL DESIGN

Applying Manual Controls and Displays

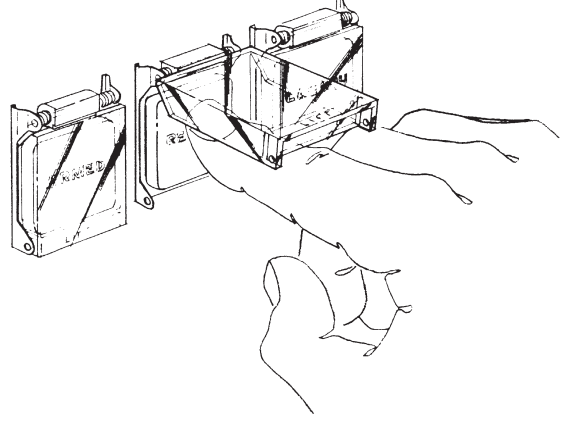
Strip barriers between switches help to prevent inadvertent operation.



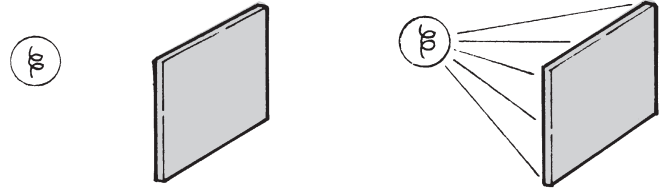
Full barriers surround pushbuttons where more switch protection is desired.



Hinged guards over pushbuttons in high risk control situations. Guards may also be locked for additional security.



ILLUMINATED COLOR TECHNIQUES

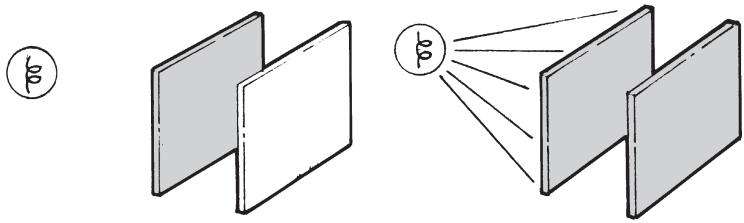


Transmitted color achieved with colored lens (color is visible even when display is unlighted).

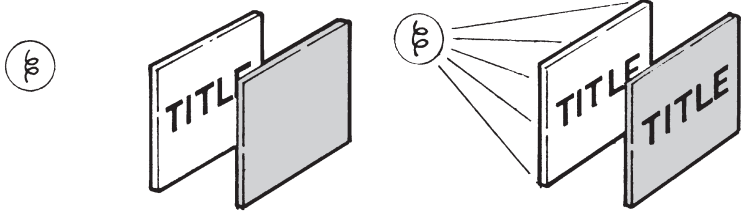
Transmitted color refers to the use of colored buttons in applications when the color must be apparent when the display is lighted or unlighted.

Projected color is achieved with a white lens and a color filter/lens. When the lamps are off, the display is white. It becomes colored when illuminated. Though effective in dimly lit or dark rooms, the color signal tends to weaken in high ambient light.

Dead front is a hidden legend/color display which generally uses a transparent, smoky gray lens with a legend on a color insert. The display appears black and unobtrusive when the lamps are off. When illuminated, color and legend appear.



Projected color achieved with colored filter behind white lens (color not visible until lamp is lighted).



Hidden legend/hidden color (dead front). Dark lens hides color/message until display is lighted.



Ready-to-install low-profile pushbutton matrices can serve as panel elements or an entire panel. Intelligence can be provided by on-board microprocessors which terminate to a plug-in connector.

Reference/Index

PANEL DESIGN

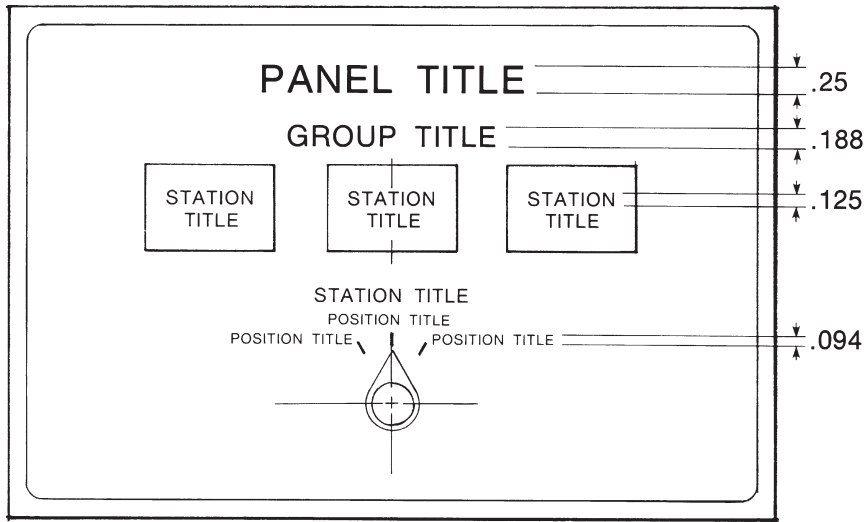
Applying Manual Controls and Displays

TYPE SIZES

The type sizes chosen should always correspond to the functional priorities of the control panel components, in a descending order, e.g., Panel Title, Group Title, Station Title. Individual application requirements may vary, but grossly oversized letters should be avoided (see drawing).

COLOR CODING

Follow accepted human factor standards when you color code interface components. Since many colors relate to certain well established meanings, e.g., red for STOP, green for GO, they should be used wherever appropriate.



Color	Meanings	Examples
Red	Alerts an operator that an incompatible or dangerous condition exists and corrective action should be taken.	Stop, No-go, Error, Failure, Malfunction, Danger, Warning, Hazard, Take Cover
Yellow	Marginal condition exists	Pressure Below Normal, Check Hopper Level, Caution, Inspection Port Open
Green	Monitored equipment is in tolerance, or a condition is satisfactory and it is all right to proceed	On, Power On,* Go-ahead, Safe, Ready
Blue	May use as an advisory indicator, but has limited coding value; however blue is ideally suited for use at periphery of vision where it can be apparent, but not intrusive	High Beam (automobile headlights)
White	Indicates system conditions or transitions, neither positive nor negative; doesn't imply success or failure	Boiler #1 On Line, Reservoir Cycling

* Note: The power generating industry is an exception, since it traditionally has used the color red to indicate Power On. Their rationale is that red connotes a "hot" electrical condition. However, green is definitely the preferred human factors choice for Power On indication.

PANEL FINISH

Non-reflecting, matte-textured colors from light gray to black, beige, and white will yield a panel that contrasts well with controls and indicators of any color. Neutral color backgrounds will focus attention on the controls. But color effectiveness is muted when interface components are surrounded by a panel of a like or similar color.

When in doubt, keep it simple and in good taste – and you will achieve the most satisfying, long-term results.

FINAL EVALUATION

Prior to finalizing your design, evaluate the total panel layout experimentally. Assess its communication effectiveness with a test situation, using a mock-up or prototype. Describe the application to typical operators, individually.

Observe the procedures used by the operators. If there are basic design errors, they should show up, along with the operator's preferences for certain control features. Separate individual prejudices from valid criticisms. Then apply the data to a revised layout. Check and recheck.

In actual practice, there are normally several revisions made beyond an initial proposal. Rarely, if ever, does the first scheme prove acceptable as the final design; so don't be disheartened when new insights from associates or test results necessitate change. Even after a design goes into production, it is not unusual for revisions to be made because of undiscovered problems.

Manual Switches

Advanced Manual Line

AML Series



IN FRONT OF THE PANEL

Coordinated, attractive appearance. AML features innovations designed by industrial designers to achieve the best balance of human factors and aesthetic appearance. Operator height, bezel size, and the compatibility of square and rectangular shapes blend with other components to harmonize your panel. There's no visual clutter to distract from man/machine communication.

This comprehensive line of lighted and unlighted manual controls features:

- Pushbuttons for high and intermediate frequency functions;
- Rocker and paddle switches, with 2 or 3 positions, for less frequent control functions;
- Plus lighted indicators and annunciators which complement AML's universal appeal.

Various controls can be matched with their functions to accommodate the most natural and efficient habit pattern reflex. Keylock operated switches can be used to assure "authorized personnel only" access.

Display flexibility. AML offers a choice of five legend sizes, four button heights, full or split section display, and illumination by incandescent lamps, LED's or neons. Colors are bright and uniform, providing a strong definition and good visibility. (Non-illuminated devices have the same attractive colors.)

Color display options include:

- Transmitted color — color can be distinguished whether lamp is On or Off.
- Dead front — display appears black, until illumination causes legend and color to appear.
- Projected color — white display is diffused with color when illuminated.

BEHIND THE PANEL

AML's simple, cost effective design provides many behind-panel benefits for the designer and installer/user.

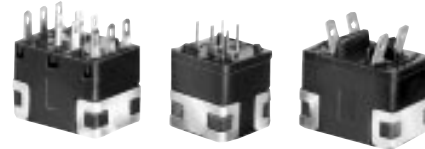
Simple to install. They snap in from the panel front individually or in vertical or horizontal strips; or in subpanel mounted strips and matrices that can be pre-assembled and pre-wired to assure accurate alignment and efficient panel building.

Electrical flexibility. Solid state switches with Hall effect integrated circuits interface directly with microprocessors and other logic level devices. These IC's were first applied in MICRO SWITCH solid state keyboards. Today, many MICRO SWITCH products incorporate the Hall effect technology to meet a wide range of position sensing and manual control needs.

Electronic control switches with gold or silver contacts, and 1, 2, or 4 poles, will handle up to 3 amps. Including an encoded version which generates different binary coded outputs merely by changing cam-keyed buttons.

Power duty switches meet line disconnect application needs with 10-amp push-buttons and 15-amp paddle and rocker switches.

Easy to wire. All AML devices present single level termination. This means faster, easier, neater, and more economical wiring. And there is a choice of solder, quick-connect, push-on, and printed circuit termination.



MATING RECEPTACLES

The .110 × .020 quick-connect/solder terminal (types 2 and 8) is designed for use with receptacles that comply with the UL standard for insertion and withdrawal forces. Maximum insertion force is 12 lbs. max., withdrawal force is 14 lbs. These receptacles are supplied by: AMP Inc., Berg, Augat, Hollingsworth, MALCO, Zierick, and others. Refer to Thomas Register or the Yellow Pages for the location of your local supplier.

Manual Switches

Advanced Manual Line

AML Series

FEATURES

- Complete selection of pushbutton, rocker and paddle (toggle type) switches accommodates different functions and promotes operator efficiency.
- Solid state, electronic, and power duty control.
- Full or split screen incandescent display switches and indicators provide vivid transmitted color, projected color (for neutral display when unlit), and dead front (hidden color).
- Wide-angle visibility LED and line voltage neon display switches and indicators.
- Annunciators back-lighted by LED's enable high density message display.
- Keylock switches available for controlled access applications.
- All AML terminations at the same shallow depth (1.7 in. /43,1 mm) for convenient wiring or PC board termination.
- Snap-in surface mount or sub-panel (hidden bezel) mount with mounting hardware.
- Pad printed legends with a clear polyurethane overcoat available in a choice of five standard sizes.
- Metric design for worldwide acceptance.
- UL recognized, CSA certification.
- Selected listings are certified by VDE, CEE, SEV, and FINKO (for compliance status, contact the 800 number).

MICRO SWITCH AML Advanced Manual Line combines functional flexibility with electrical versatility to provide a broad range of options to choose from.

EASY TO RELAMP



Relamping of T-1-3/4 incandescent AML91 lamps is accomplished from the front of the panel without tools. (AML92 T-1-3/4 LEDs can be added in the same manner.)

FULL GUARD BEZEL OPTION



As an alternative to standard height bezels (.06 in./1,5 mm), pushbutton switches can be furnished with full guard bezels extending .19 in./5.0 mm from the mounting surface. In the free position, standard buttons are flush with full guard bezels.

The raised bezel guards against accidental operation by someone leaning against or dropping something on a control console.

High Intensity LEDs For Full-face AML Lighted Display AML92 Series



- Full-face illumination for high visibility lighted colors.
- Advanced illumination technology combines high-intensity LED in standard T-1-3/4 wedge base lamp package.
- Easy plug-in installation in AML lighted switches and indicators.
- Low operating temperature permits high density, continuous operation with minimal heat build-up.

AML92 Series LEDs have a quad chip assembled in a T-1-3/4 wedge base lamp package. They provide full-face illumination when used with lighted pushbutton, rocker and paddle switches, or indicators equipped with incandescent lamp sockets. For ordering information, refer to page 59.

Manuals

Manual Switches

Advanced Manual Line

AML Series

AML CHARACTERISTICS

	AML 10 Series	AML 20 Series	AML 30 Series	AML 40 Series
Electrical/Mechanical Life*				N/A
Pushbuttons–Momentary	1,000,000	100,000	25,000	---
Pushbuttons–Alternate	25,000	25,000	25,000	---
Rockers	25,000	25,000	25,000	---
Paddles	25,000	25,000	25,000	---
Agency Ratings (May not apply to every series division)				
UL	File E53576	File E12252	File E12252	File E58932
CSA	File LR4442	File LR4442	File LR4442	File LR4442
VDE	None	File 0630/10.78+ Rating 1710 No. 4275.5788	File 0630/10.78+ + Rating 1710 No. 4275.5788	None

*95% Survival
 + Exception: Four-Pole AML's are not included in VDE Approval
 + + Exception: Only the 2-pole AML33 and AML34 are certified by VDE

AML ELECTRICAL DATA

● AML10 Series

Electrical Characteristics						Absolute Maximum Rating 4			
Integrated Circuit Function	Supply Current (Max.)	Output Voltage (Operated)	Output Leakage Current max. (Released)	Switching Time Max.		Supply Voltage (V _s)	Voltage Externally Applied to Output	Loads to Output	Storage Temperature
				Rise 10% to 90%	Fall 90% to 10%				
5 VDC Sinking 1	3.5 mA (Released) 6.5mA (Operated — no load)	+ .4 Volt (Sinking 8 mA)	2.0 μA	1.0 μsec (Sinking 8 mA)	1.0 μsec (Sinking 8 mA)	-.5 to +7.0 VDC 0° to +65°C (+32° to +149°F)	-.5 Volt min. +15 Volts max. (Off condition)	20 mA (Sinking)	-40°C to +65°C (-40° to +149°F)
6-16 VDC Sinking 2	6.5 mA @ 6 VDC. 10.0 mA @ 16 VDC (Plus load current) 3	+ .4 Volt (Sinking 20mA max.)	20 μA	1.5 μsec (Sinking 20 mA)	0.5 μsec (Sinking 20 mA)	-1.2 to +20 VDC	+20 VDC max. in Off condition only -0.5 VDC min. in Off or On condition.	40 mA	-40°C to +65°C (-40° to +149°F)
4.5-24 VDC Sinking	5 V 7.0 mA (Released) 24 V 9.0 mA (Released) 14.0 mA (Operated-no load)	+ .4 Volt (Sinking 10 mA)	10 μA	1.5 μ sec (Sinking 10 mA)	0.5 μ sec (Sinking 10 mA)	-30 to +30 VDC	-0.5 Volt min. +24 Volts max. (Off condition)	20 mA (Sinking)	-40 – C to +65°C (-40° to +149°F)
5 VDC Scan	3.8 mA @ .6V max. input at Logic "0"	2.4 VDC min. (Sourcing 11 mA)	1.0 μA	1.5 μ sec (Sourcing 5 mA)	1.5 μ sec (Sourcing 5 mA)	-.5 to +7.0 VDC	-.5 VDC min. 7.0 max. (Off Condition)	25 mA (Scan)	-40°C to +65°C (-40° to +149°F)

1 Over temperature range of 0° to +55°C (+32° to +131°F) and supply voltage of 4.5 to 5.5 VDC.
 2 Over temperature range of 0° to +55°C (+32° to +131°F) and supply voltage of 16 VDC.
 3 At 24°C. (+75°F)
 4 As with all solid state components, performance can be expected to deteriorate as rating limits are approached; however, they will not be damaged unless the limits are exceeded.

● AML20 Series

Contacts	Voltage	Current	Load Type
Silver or Gold-plated Silver	250 VAC 125 VAC 24 VDC	2 Amps 3 Amps 2 Amps	75% Power Factor 75% Power Factor Resistive
Gold	125 VAC/DC	100 mA	Resistive

● AML30 Series

Voltage	Current		Load Type
	Pushbuttons	Rockers or Paddles	
125 VAC	10 amps	15 amps	60% power factor
250 VAC	10 amps	15 amps	60% power factor

Manual Switches

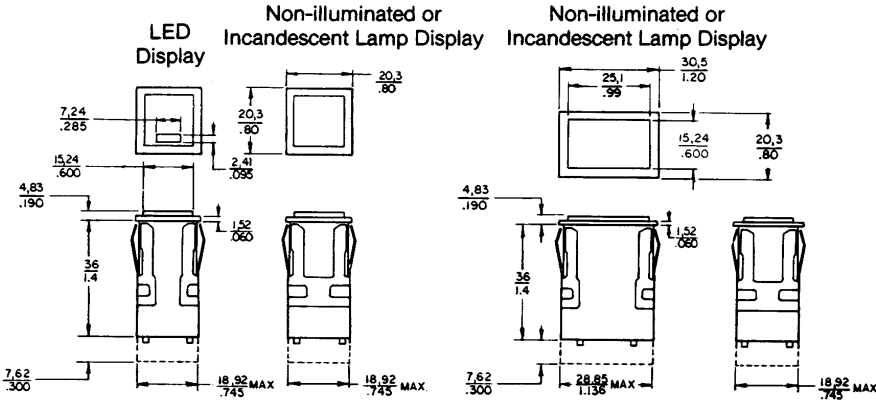
AML Series

Mounting Dimensions (For Reference Only)

AML11/12 and 21/22 SWITCHES AML41C/D and AML42C INDICATORS

Note: Top of full guard bezel housing
.19/5,0 from panel.

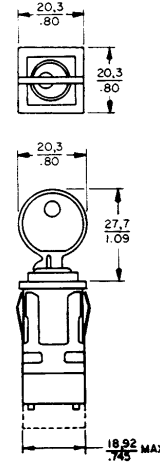
PUSHBUTTONS



For terminal locations, see page 62.

AML27 SWITCHES

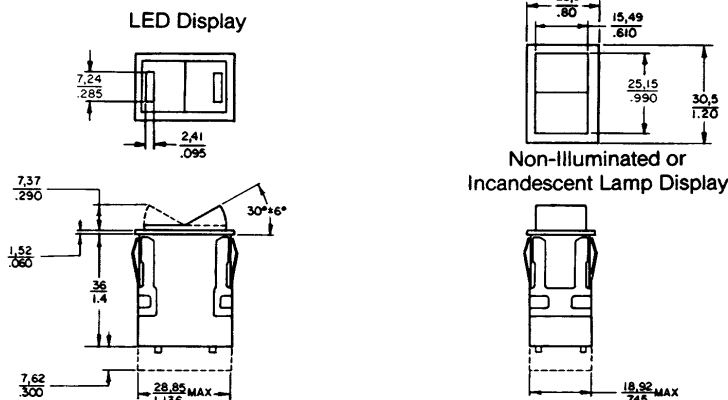
KEYLOCK



For terminal locations, see page 63.

AML14/16 and AML24/26 SWITCHES

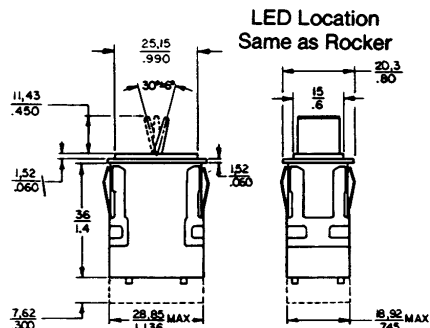
ROCKERS



For terminal locations, see page 62, 63.

AML13/15 and 23/25 SWITCHES

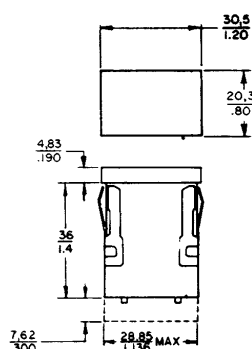
PADDLES



For terminal locations, see page 62, 63.

AML41 INDICATOR

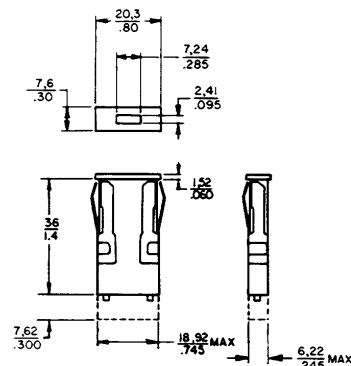
LENS STYLE



For terminal locations, see page 62.

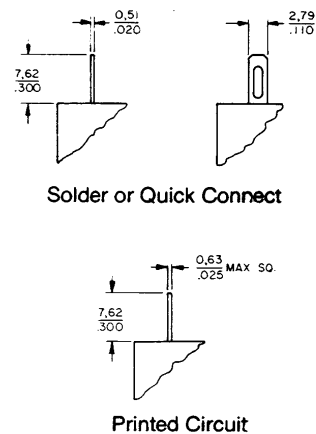
AML42 INDICATOR

MINIATURE



NOTE
1 Dimensions are mm or mm/IN
IN

TERMINAL TYPES



Solder Hole will accept two #22 AWG Stranded Conductor (per NEMA publication DC-2 1976)

Manual Switches

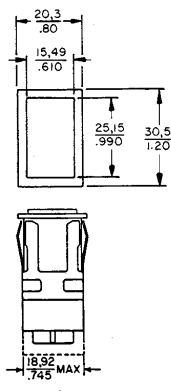
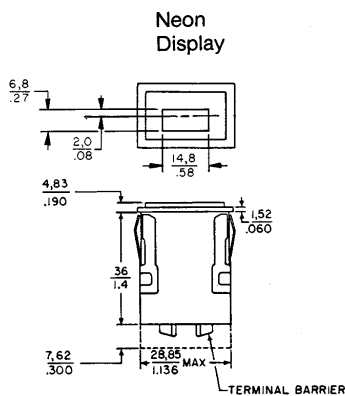
AML Series

Mounting Dimensions (For Reference Only)

AML31/32 SWITCHES

PUSHBUTTON

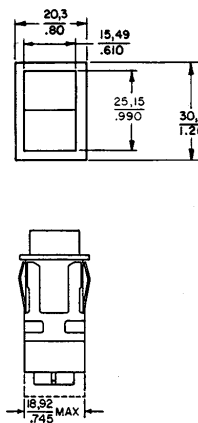
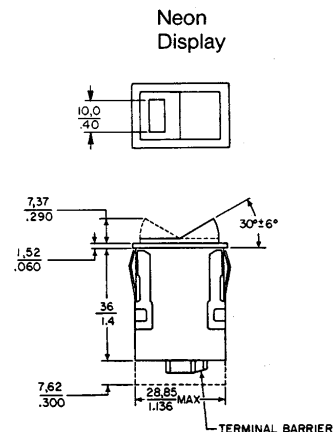
Non-illuminated or Incandescent Lamp Display



AML34/36 SWITCHES

ROCKER

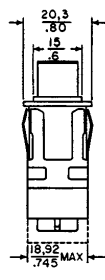
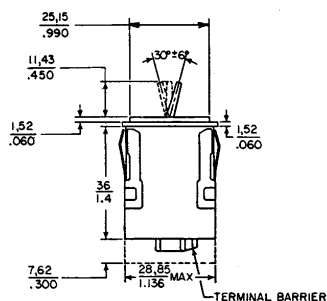
Non-illuminated or Incandescent Lamp Display



AML33/35 SWITCHES

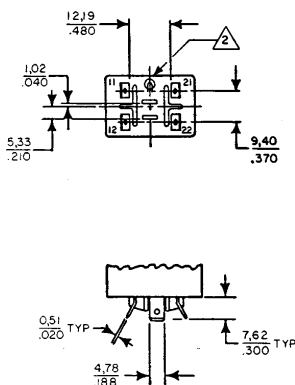
PADDLE

Neon Location Same as Rocker

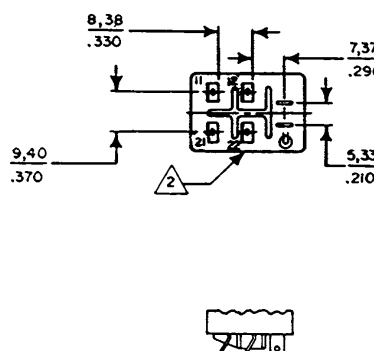


TERMINAL LOCATIONS

PUSHBUTTON



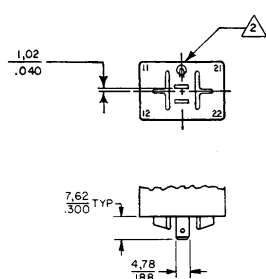
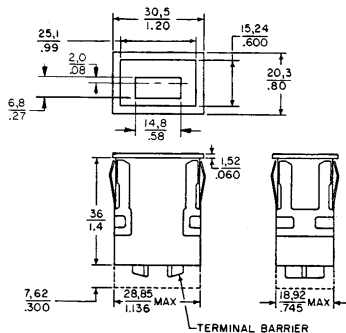
ROCKER AND PADDLE



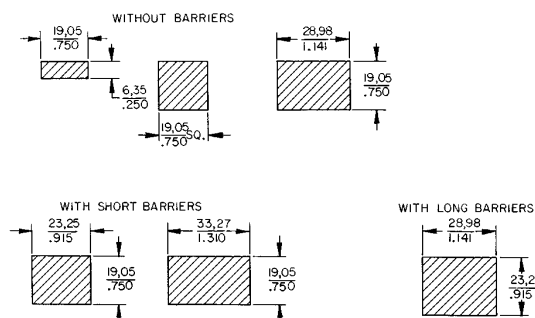
AML43 INDICATORS

Neon Display

Terminal Locations



PANEL CUTOUT FOR SINGLE-STATION FRONT-OF-PANEL MOUNTING



Recommended panel thickness: .060-.187/1,52-4,75

NOTES

1 Dimensions are **mm** or **mm/IN**

Manufacturers logo on this side of housing
Solder Hole Will Accept One #14 AWG Stranded Conductor
(Per NEMA Publication DC-2 1976)

PANEL PUNCH FOR AML SERIES

A panel punch is manufactured by Greenlee-Textron Tool Co., Rockford, IL (815-926-3011).

Manuals

Manual Switches

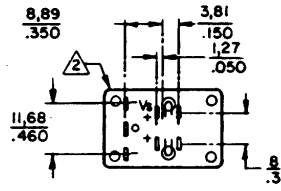
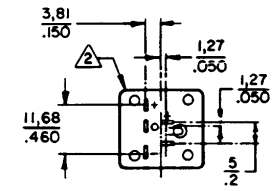
AML Series

Mounting Dimensions (For Reference Only)

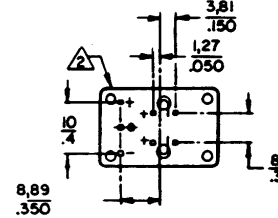
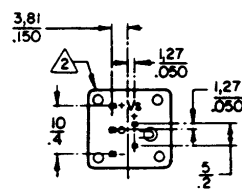
TERMINAL LOCATIONS FOR AML10 SWITCHES

PUSHBUTTONS

Solder and Quick-Connect



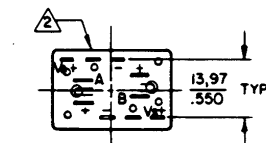
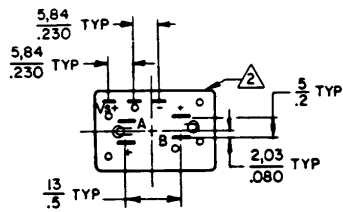
Printed Circuit



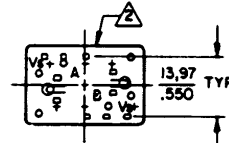
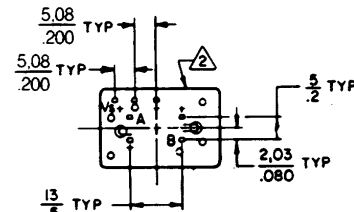
Illuminated devices shown (non-illuminated devices do not have lamp terminals).

ROCKERS AND PADDLES

Solder and Quick-Connect



Printed Circuit



One Integrated Circuit

Two Integrated Circuits

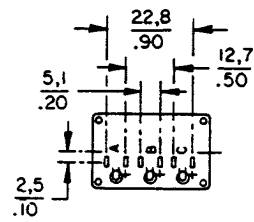
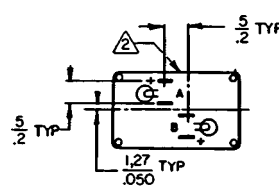
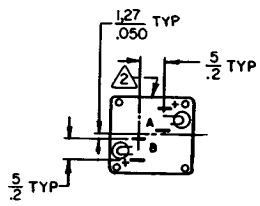
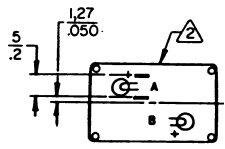
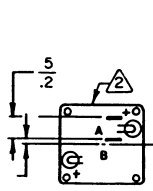
One Integrated Circuit

Two Integrated Circuits

Illuminated devices shown (non-illuminated devices do not have lamp terminals)

TERMINAL LOCATIONS FOR AML41 INDICATORS

Solder and Quick-Connect



1 Incandescent Lamp Circuit

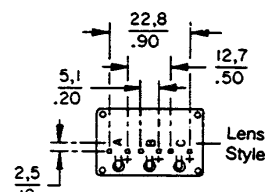
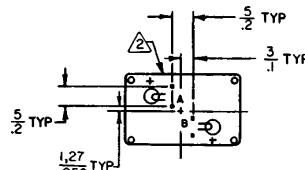
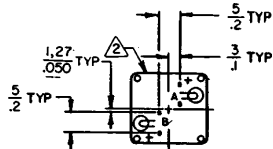
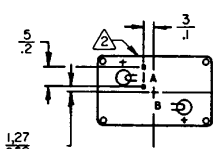
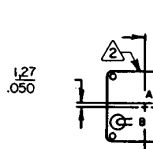
1 Incandescent Lamp Circuit

2 Incandescent Lamp Circuits

2 Incandescent Lamp Circuits

1-3 Incandescent Lamp Circuits

Printed Circuit



1 Incandescent Lamp Circuit

1 Incandescent Lamp Circuit

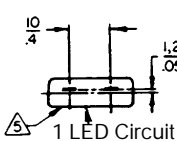
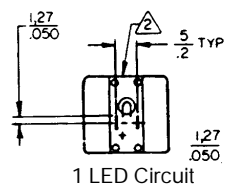
2 Incandescent Lamp Circuits

2 Incandescent Lamp Circuits

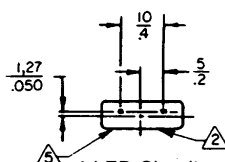
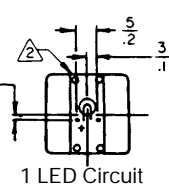
1-3 Incandescent Lamp Circuits

TERMINAL LOCATIONS FOR AML42 INDICATORS

Solder and Quick-Connect



Printed Circuit



NOTE

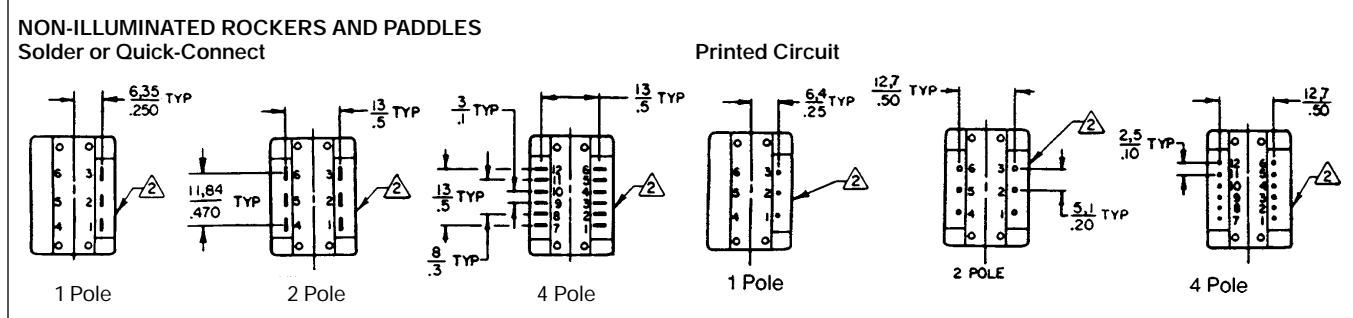
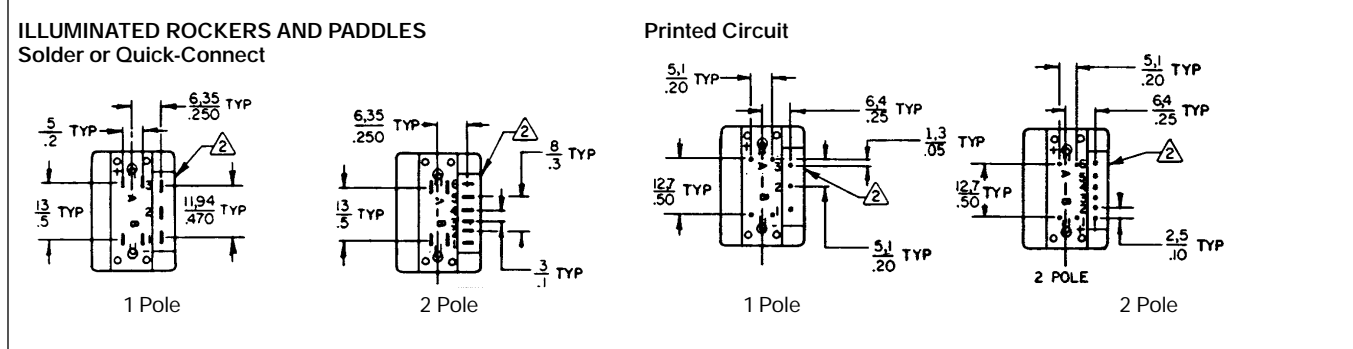
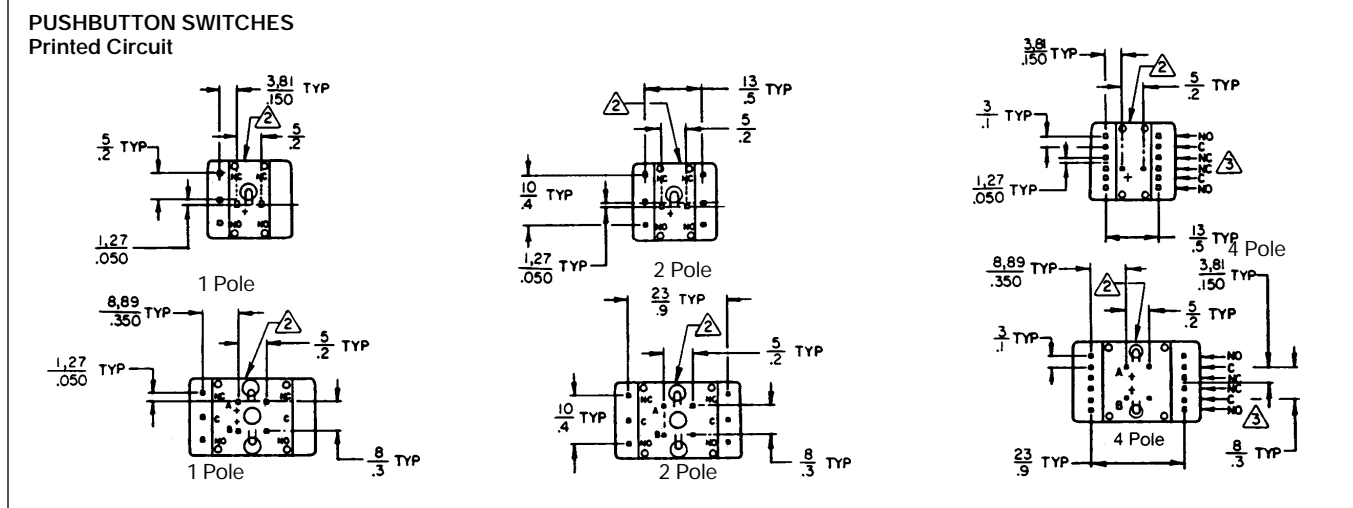
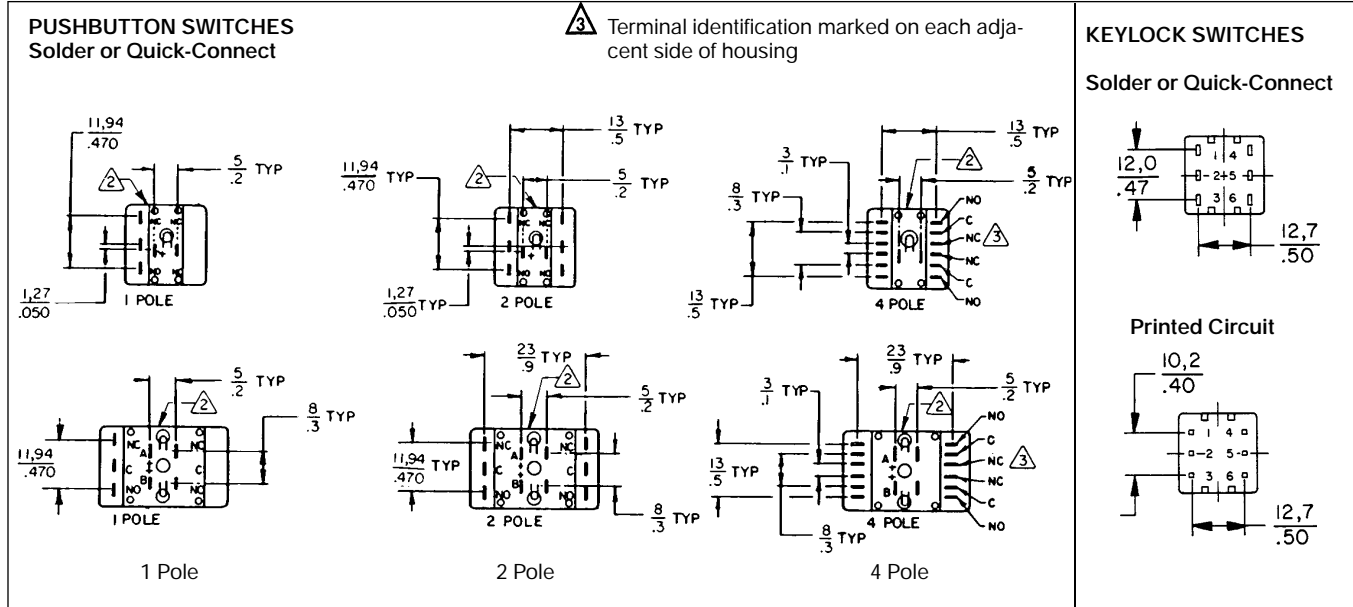
- 1 Dimensions are MM or MM/IN
IN
- 2 Manufacturer's logo on this side of housing
- 4 - Lamp terminals are not provided for non-illuminated devices
- 5 positive terminal ident. (+) marked this side of housing
- 6 1 - lamp termination identified by "B".
2 - lamp termination identified by "A" and "C".

Manual Switches

AML Series

Mounting Dimensions (For Reference Only)

TERMINAL LOCATIONS FOR AML20 SWITCHES



Manuals

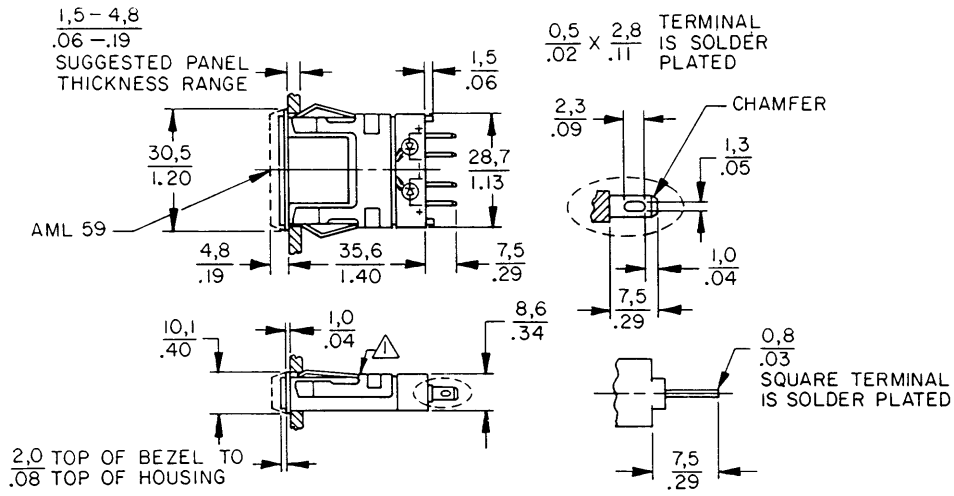
Manual Switches

Mounting Dimensions (For Reference Only)

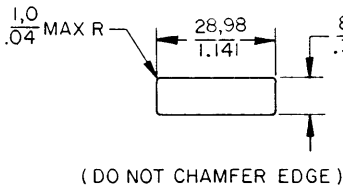
AML Series

ANNUNCIATORS

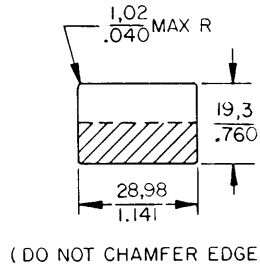
AML45 SERIES



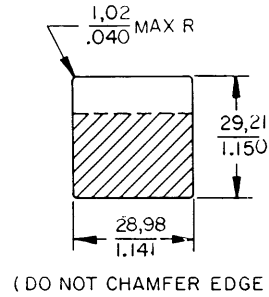
PANEL CUTOUT



PANEL CUTOUT FOR MOUNTING TWO ANNUNCIATORS IN ONE CUTOUT (USING ONE 30PA1-AML)



PANEL CUTOUT FOR AML 45 ABUTTING AML SWITCH (USING ONE 30PA1-AML)



Manufacturer's logo on this side of housing

For panel punch manufacturer, see page 61.

Manual Switches

Mounting Dimensions (For Reference Only)

AML Series

MULTI-STATION FRONT-PANEL MOUNTING

Panel cutouts (See page 61 for panel punch manufacturer.)

Square Switches & Indicators	Rect. Switches & Indicators	Annunciator
(.8) (No. of units) — .045*	(1.20) (No. of units) — .045*	(.40) (No. of units) — .045*
(20,3) (No. of units) — 1,14*	(30,5) (No. of units) — 1,14*	(10,1) (No. of units) — 1,14*

For each barrier, add .053/1,35

* Note: If barriers are used, do not subtract .045 in./1,14 mm from the panel cutout formula. (.045 in./1,14mm is the allowance for the width of the bezel.)

AML61 MULTI-STATION SUBPANEL MOUNTING

Panel cutouts for AML61

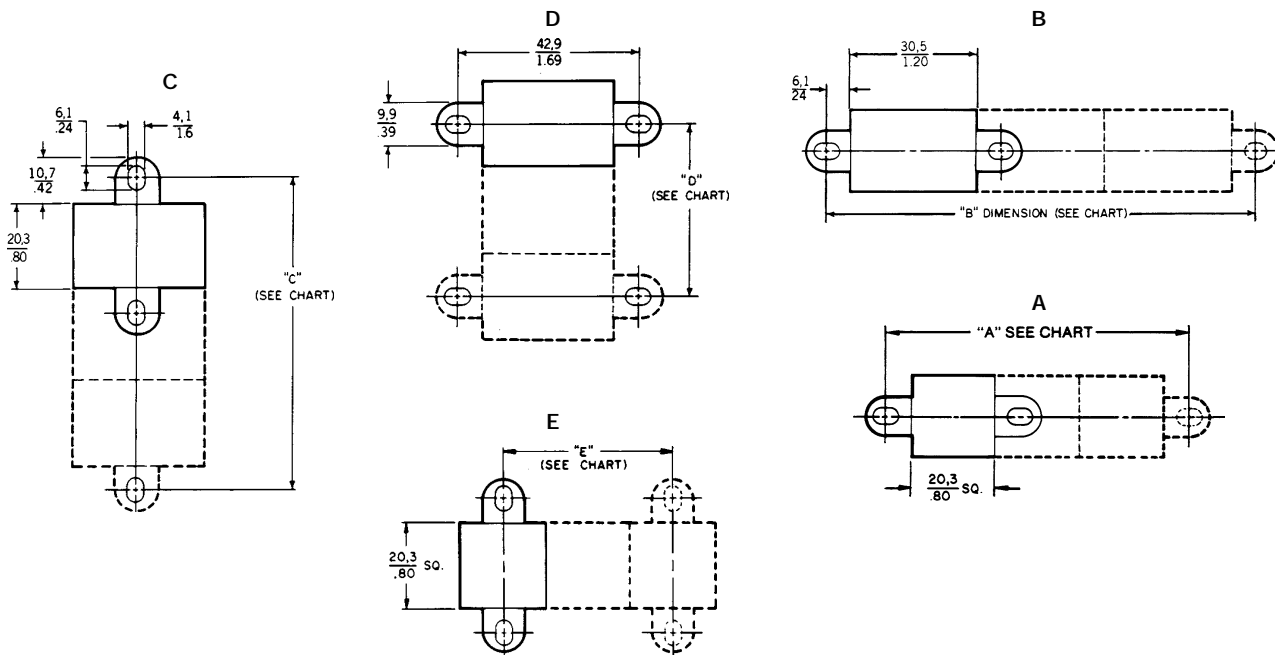
Mounting Bracket Orientation	Width	Length
A* in. mm	.810 20,57	(.810)(No. of units)
B in. mm	.810 20,57	(1.210)(No. of units)
C or D* in. mm	1.210 27,94	(.810)(No. of units)

* More than two cans with mounting brackets required for strips of more than 10 units.

AML61 MOUNTING CENTERS

Mounting Bracket Orientation	Mounting Centers/Number of Cans											
	1	2	3	4	5	6	7	8	9	10	11	12
"A" or "C" in. mm	1.285 32,64	2.095 53,21	2.905 73,79	3.715 94,36	4.525 114,94	5.335 135,51	6.145 156,08	6.955 176,66	7.765 197,23	8.575 217,81	9.385 238,38	10.195 258,95
"B" in. mm	1.685 42,80	2.895 73,53	4.105 104,27	5.315 135,00	6.525 165,74	7.735 196,48	8.945 227,20	10.155 257,94				
"D" or "E" in. mm	on C _L on C _L	.807 20,50	1.614 41,00	2.421 61,49	3.228 81,99	4.035 102,49	4.842 122,99	5.649 143,48	6.456 163,98	7.263 184,48	8.070 204,98	8.877 225,48

Tolerance = ±.015



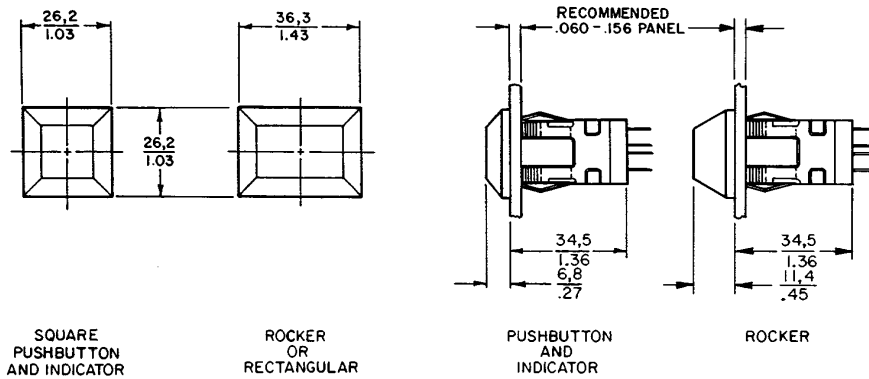
Manuals

Manual Switches

Mounting Dimensions (For Reference Only)

AML Series

AML75 PANEL SEAL ACCESSORY

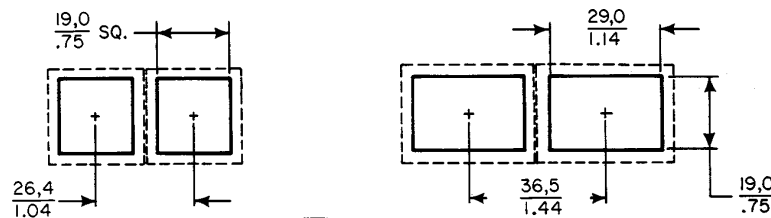


Panel cutouts

Multiple panel sealed units should not be mounted together in a single elongated slot, since this would create an unsealed space between each unit.

Side-by-side mounting can be achieved, per the center-to-center dimensions shown in the drawing. (Dotted lines indicate the seal bases which are abutting at front of panel.)

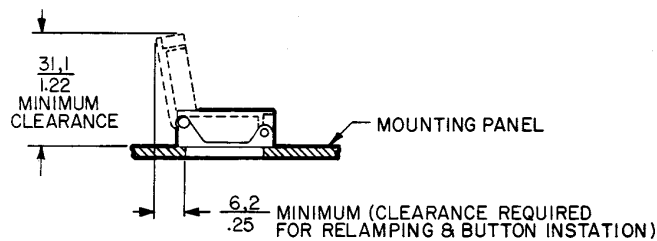
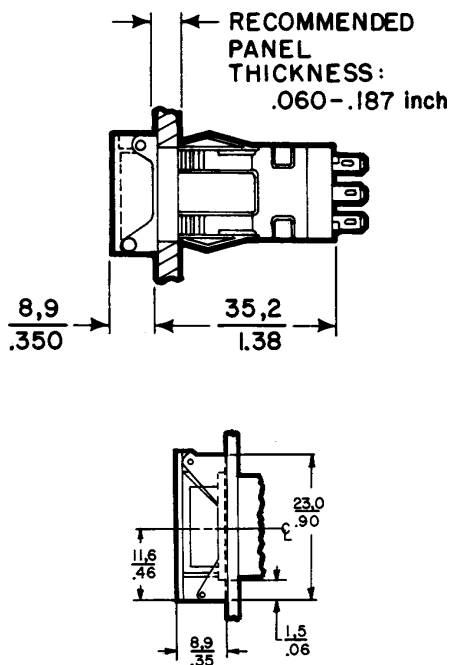
AML75 seals are not designed for use with the AML61 mounting system.



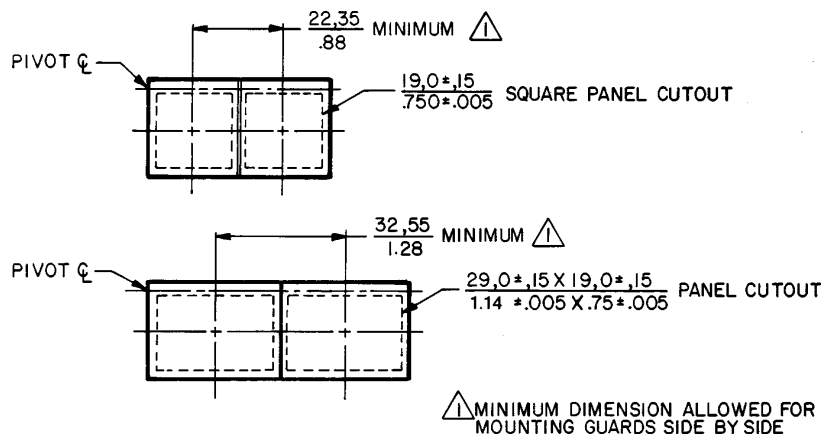
NOTE: Suggested cutout dimensions are based on an .125"/3,18 mm panel thickness. Individual preferences for inpanel fit

may require measurement of assemblies before panels are cut.

AML76 SWITCH GUARD ACCESSORY



PANEL CUTOUTS



AML Series LED Application Information

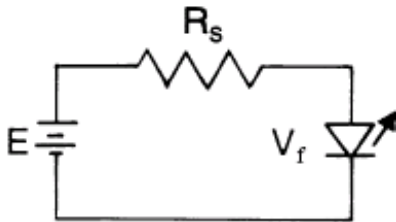
LED APPLICATION INFORMATION

For those devices without internal current limiting resistors, suitable external control of the LED current must be provided. It is recommended that a minimum of 5 VDC open circuit voltage with an appropriate series resistance be used to drive LEDs. This minimizes the effect of temperature (current variation) on forward voltage of the LED. Resistor values can be determined by supply voltage or current for LED:

$$R_S = E - V_f / I_f$$

WHERE: R_S = Series Resistance
 E = Supply Voltage
 V_f = Forward Voltage of LED
 I_f = Circuit Current

If a diode is added in series for reverse polarity protection then:



$$R_S = E - V_f - V_{PD} / I_f$$

WHERE: V_{PD} = Forward Voltage of Protection Diode

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

1-800-537-6945 USA
1-800-737-3360 Canada
1-815-235-6847 International

FAX

1-815-235-6545 USA

INTERNET

www.honeywell.com/sensing
info@micro.honeywell.com

MICRO SWITCH

Sensing and Control

Honeywell Inc.

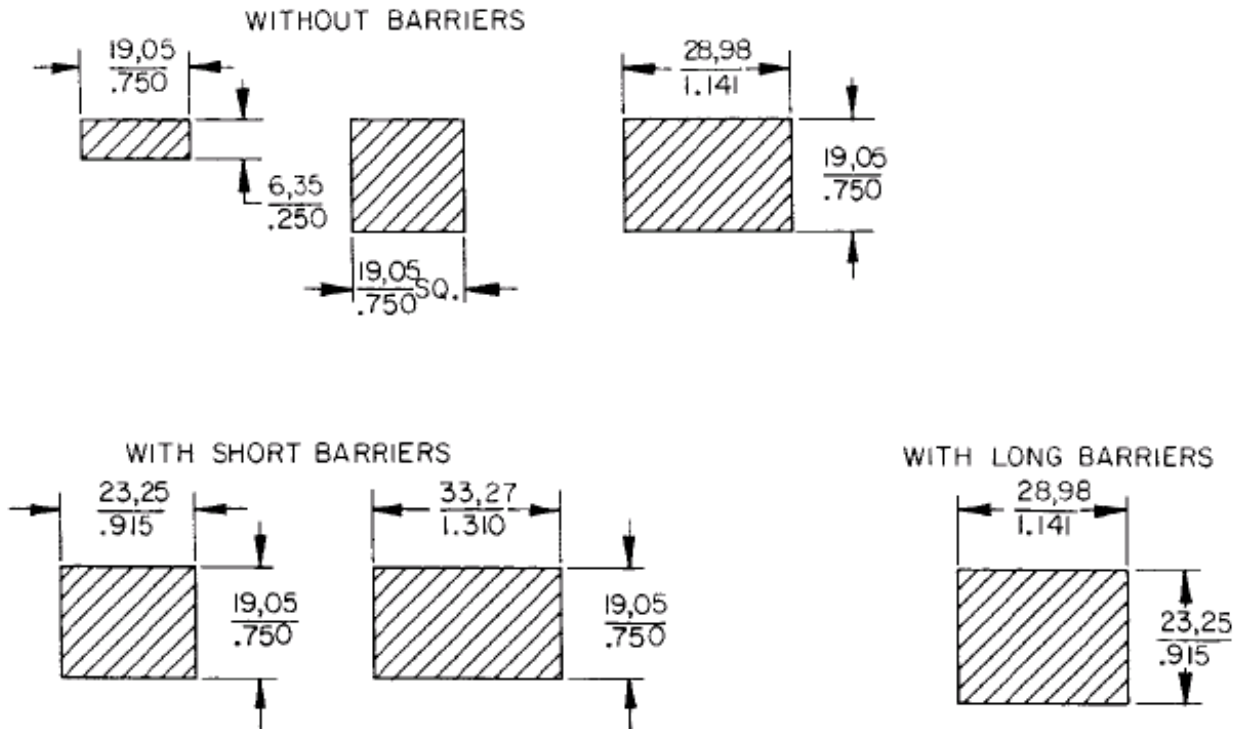
11 West Spring Street

Freeport, Illinois 61032



www.honeywell.com/sensing

AML Series Panel Cutouts



PANEL CUTOUT FOR SINGLE-STATION FRONT-OF-PANEL MOUNTING

Recommended panel thickness: 1,52 - 4,75 mm [0.060 to 0.187 in].

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

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1-800-537-6945 USA
 1-800-737-3360 Canada
 1-815-235-6847 International

FAX

1-815-235-6545 USA

INTERNET

www.honeywell.com/sensing
 info@micro.honeywell.com

MICRO SWITCH

Sensing and Control
 Honeywell Inc.

11 West Spring Street
 Freeport, Illinois 61032



www.honeywell.com/sensing

Manual Switches

Solid State Pushbutton

AML11 Series

INCANDESCENT OR NON-LIGHTED DISPLAY



Buttons ordered separately.

FEATURES

- Hall effect reliability.
- Provides low voltage signals that interface with nearly all DC logic level loads.
- 5 VDC, 6-16 VDC and 4.5-24 VDC supply voltage.
- Full guard bezel option.
- Lamps can be furnished installed or ordered separately.
- UL recognized.
- Lamp circuit independent of switch circuit.

AML11 ORDER GUIDE

AML11 B

Housing Type
Standard Bezel: AML11B Square Non-Lighted AML11C Square 1 Lamp Ckt. AML11E Rect. Non-Lighted AML11F Rect. 1 Lamp Ckt. AML11G Rect. 2 Lamp Ckts.
Full Guard Bezel: AML11H Square Non-Lighted AML11J Square 1 Lamp Ckt. AML11K Rect. Non-Lighted AML11L Rect. 1 Lamp Ckt. AML11M Rect. 2 Lamp Ckts.

Bezel Color
B Black

Incandescent Lamp Type
A No Lamp Installed
B 6 V Lamp*
C 14 V Lamp*
E 28 V Lamp*

Terminal Type
2 .110 × .020 (Solder or Quick-Connect)
3 .025 × .025 (Printed Circuit, or Push-On)

Circuitry Codes		
5 VDC Sinking	AA Momentary Action	AE Alternate Action
6-16 VDC Sinking	BA Momentary Action	BE Alternate Action
5 VDC Scan**	CA Momentary Action	CE Alternate Action
4.5-24 VDC Sinking	DA Momentary Action	DE Alternate Action

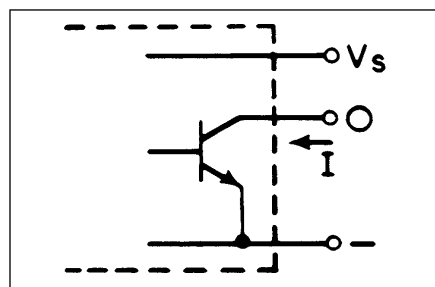
* Lamps will be installed per each lamp circuit specified in the Housing Type.

** See "Scan Switches," next page.

Example: **AML11BBA2AA**

Square pushbutton switch housing, non-lighted; black bezel; .110 × .020 termination; momentary action; current sinking output for use with 5 volt supply.

CURRENT SINKING OUTPUT AML10 SERIES



A permanent magnet plunger moves adjacent to the Hall effect integrated circuit to give a digital, current sinking normally high output.

Manuals

Manual Switches

Solid State Pushbutton

AML12 Series

LED DISPLAY



LED "window" buttons ordered separately.
LEDs are not replaceable.

FEATURES

- Hall effect reliability (Refer to facing page for electrical specifications.)
- Rectangular, high efficiency LED's give flush display area and wide angle indication.
- Available with or without diode protection for the LED's.
- 5 thru 24 VDC devices have an internal resistor to maintain LED current at nominal 20 mA.

Electrical Data	Page 20
Buttons	Page 43, 44
Lamps and LEDs	Page 59
Accessories	Page 57, 58
Mounting Dimensions	Page 60, 62

- LED circuit independent of switch circuit.
- UL recognized.

AML12 ORDER GUIDE

AML12C

Housing Type
Standard Bezel: AML12C Square 1 LED
Full Guard Bezel: AML12J Square 1 LED

Example: **AML12CBB2AA**
Square pushbutton switch housing; black bezel; red LED; .110 x .020 termination; current sinking output for use with 5 volt supply; momentary action.

Bezel Color
B Black

LED Color/ Voltage
Red
B V*
C 5 V
D 10 V
E 15 V
F 24 V
Yellow
H V*
J 5 V
K 10 V
L 15 V
M 24 V
Green
R V*
S 5 V
T 10 V
W 15 V
X 24 V

Terminal Type/ Diode Protection
2 .110 x .020 (Solder or Quick-Connect)
3 .025 x .025 (Printed Circuit or Push-On)
8 .110 x .020 With Diode Protection

Circuitry Codes		
5 VDC Sinking	AA Momentary Action	AE Alternate Action
6-16 VDC Sinking	BA Momentary Action	BE Alternate Action
5 VDC Scan**	CA Momentary Action	CE Alternate Action
4.5-24 VDC Sinking	DA Momentary Action	DE Alternate Action

* See LED application information for devices without current-limiting resistor, page 59.

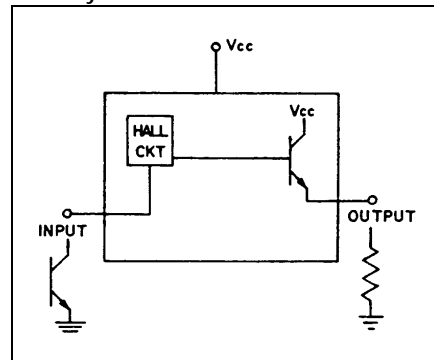
AML11/12 HALL EFFECT SCAN SWITCHES

Scan switches interface directly with a port expander and microcomputer to operate either in a scan matrix or as an individual function switch with a level sourcing signal (emitter follower). Scanning is used to look at each switch in a matrix to see which stations are active. The scan matrix significantly lowers overall power consumption, since each switch requires power only while being strobed.

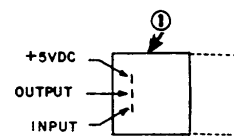
In the scanned mode, the minus supply connection becomes the scanning input connection. When this input is high, the switch is de-energized and does not consume power. When the scan input is low, the switch will draw current as it normally does when energized. If the button is depressed when the scan input is low, the output will be high. The output remains low if the button is not depressed during the scan cycle.

ELECTRICAL DATA

Circuitry



Termination



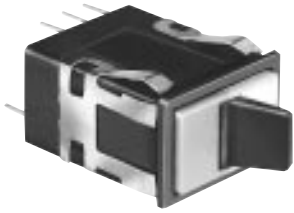
Dotted lines denote rectangular housing.
① The "MICRO SWITCH" identification is shown on this side of the switch housings.

Manual Switches

Solid State Paddle

AML13 Series

INCANDESCENT OR NON-LIGHTED DISPLAY



FEATURES

- Hall effect reliability.
- Provides low voltage signals that interface with nearly all DC logic level loads.
- 5 VDC and 6-16 VDC supply voltage.
- 2 or 3-position operation.
- Toggle type paddle operators permanently installed in rectangular housings.
- Covers for the switch housing may be lighted or unlighted.
- UL recognized.
- Lamps can be furnished installed or ordered separately.
- Lamp circuit independent of switch circuit.

Covers ordered separately.

AML13 ORDER GUIDE

AML13 E	B	A	2	AA	01
Housing Type	Operator/Bezel Color	Incandescent Lamp Type	Terminal Type	Circuitry Code	Operating Action
AML13 E Rectangular Non-Lighted AML13 F Rectangular 1 Lamp Ckt. (A) AML13 G Rectangular 2 Lamp Ckts. (A & B)	B Black/Black <p>① The "MICRO SWITCH" identification is shown on this side of the switch housing.</p>	A No Lamp Installed B 6 V Lamp* C 14 V Lamp* E 28 V Lamp*	2 .110 × .020 (Solder or Quick-Connect) 3 .025 × .025 (Printed Ckt., or Push-On)	One IC (Ckt. A): AA 5 V Sinking BA 6-16 V Sinking DA 4.5-24 VDC Sinking Two IC's (Ckts. A & B): AC 5 V Sinking BC 6-16 V Sinking DC 4.5-24 VDC Sinking	Insert Code Numbers from Operating Action Chart

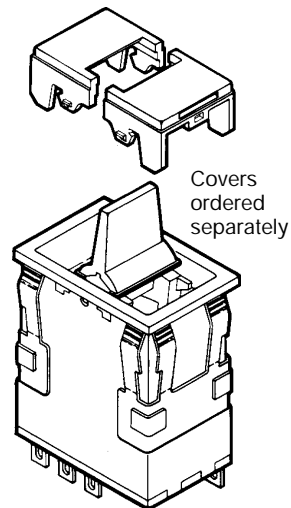
* Lamps will be installed per each lamp circuit specified in the Housing Type.

Example: **AML13EBA2AA01**
Rectangular non-lighted paddle switch housing; black paddle and bezel; .110 × .020 terminals; with one 5 V sinking IC pack; two position operation.

OPERATING ACTION

2 Position:		
Maint.	01 None	Maint.
Mom.	02 None	Maint.
Maint.	03 None	Mom.
3-Position:**		
Maint.	04 Maint.	Maint.
Mom.	05 Maint.	Mom.
Maint.	06 Maint.	Mom.
Mom.	07 Maint.	Maint.

** 3-position switches must have two circuits specified in the listing (circuitry codes "AC" or "BC").



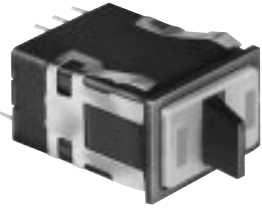
Manuals

Manual Switches

Solid State Paddle

AML15 Series

LED DISPLAY



Covers with LED "window" ordered separately.

LEDs are not replaceable.

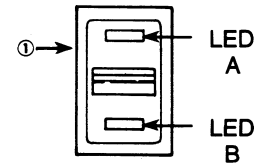
FEATURES

- Hall effect reliability.
- Rectangular, high efficiency LED's give flush display area and wide angle indication.
- Available with or without diode protection for the LED's.
- 5 thru 24 VDC devices have an internal resistor to maintain LED current at nominal 20 mA.
- LED circuit independent of switch circuit.
- UL recognized.

Electrical Data	Page 20
Paddle Covers	Page 48, 49
Lamps	Page 59
Accessories	Page 57, 58
Mounting Dimensions	Page 60, 62

AML15 ORDER GUIDE

AML15 F	B	B	2	AA	01	R	X
Housing Type	Operator Bezel Color	LED Voltage	Terminal Type/ Diode Protection	Circuitry Code	Operating Action	LED Color (LED A)	LED Color (LED B)
AML15 F Rect. 1 LED	B Black/Black	B V*	2 .110 × .020 (Solder or Quick-Connect)	One IC (Ckt. A): AA 5 V Sinking	Insert Code Numbers from Operating Action Chart	R Red	R Red
AML15 G Rect. 2 LED's		C 5 V	3 .025 × .025 (Printed Circuit, or Push-On)	BA 6-16 V Sinking		Y Yellow	Y Yellow
		D 10 V	8 .110 × .020 w/Diode Protection for LED	DA 4.5-24 VDC Sinking		G Green	G Green
		E 15 V		Two IC's (Ckts. A & B): AC 5 V Sinking		X No LED	X No LED
		F 24 V		BC 6-16 V Sinking			
				DC 4.5-24 VDC Sinking			



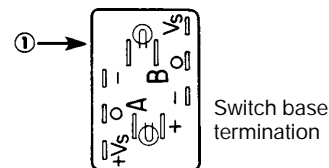
* See LED application information for devices without current-limiting resistor, page 59.

Example: AML15FBB2AA01RX

Rectangular paddle switch housing with one LED, without resistor, black paddle and bezel; .110 × .020 terminals, with one 5 V sinking IC pack; 2-position operation.

CIRCUIT OUTPUT STATES

Ckt. A	Low (operated)	High	High
Ckt. B	High	High	Low (operated)



① The "MICRO SWITCH" identification is on this side of the switch housing.

Manual Switches

Electronic Control Pushbutton

AML21 Series

INCANDESCENT OR NON-LIGHTED DISPLAY



Buttons ordered separately.

FEATURES

- 1, 2, or 4 poles.
- Silver or gold contacts.
- Full guard bezel option.
- Momentary or 2-level alternate action (push-on, push-off).
- UL recognized, CSA certified.
- Lamps can be furnished installed or ordered separately.
- Lamp circuit independent of switch circuit.



AML21 Series: 1 pole and 2-pole only.

AML21 ORDER GUIDE

AML21 B

Housing Type	Bezel Color	Incandescent Lamp Type	Terminal Type	Circuitry Codes (Each pole has double-throw)	
Standard Bezel: AML21B Square Non-Lighted AML21C Square 1 Lamp Ckt. AML21E Rect. Non-Lighted AML21F Rect. 1 Lamp Ckt. AML21G Rect. 2 Lamp Ckts.	B Black	A No Lamp Installed B 6 V Lamp* C 14 V Lamp* E 28 V Lamp*	2 .110 × .020 (Solder or Quick-Connect) 3 .025 × .025 (Printed Ckt. or Push-On)	Silver Contacts	Mom. Action AA 1-Pole AC 2-Pole CC 4-Pole Alt. Action AB 1-Pole AD 2-Pole CD 4-Pole
Full Guard Bezel: AML21H Square Non-Lighted AML21J Square 1 Lamp Ckt. AML21K Rect. Non-Lighted AML21L Rect. 1 Lamp Ckt. AML21M Rect. 2 Lamp Ckts.				Gold Contacts	Mom. Action BA 1-Pole BC 2-Pole DC 4-Pole Alt. Action BB 1-Pole BD 2-Pole DD 4-Pole
				Gold-Plated Silver Contacts	Mom. Action EA 1-Pole EC 2-Pole Alt. Action EB 1-Pole ED 2-Pole

* Lamps will be installed per each lamp circuit specified in the Housing Type.

Manuals

Example: **AML21BBA2AA**

Square pushbutton switch housing non-lighted; black bezel; .110 × .020 termination; momentary action; 1-pole, double-throw; silver contacts.

Manual Switches

Electronic Control Pushbutton

AML22 Series

LED DISPLAY



Buttons with LED "window" ordered separately.
LEDs are not replaceable.

FEATURES

- Identical to AML21 switches, except furnished with high efficiency LED display.
- Rectangular LED's are flush with button surface, providing wide angle indication.
- Optional diode protection for LED's.
- 5 thru 24 VDC LED devices have an internal resistor to maintain current at nominal 20 mA.
- UL recognized, CSA certified.
- LED circuit independent of switch circuit.

Electrical Data	Page 20
Buttons	Page 43, 44
Lamps	Page 59
Accessories	Page 57, 58
Mounting Dimensions	Page 60, 63



AML22 Series: 1 pole and 2-pole only.

AML22 ORDER GUIDE

AML22 C	B	B	2	AA									
Housing Type	Bezel Color	LED Color/Voltage	Terminal Type	Circuitry Codes (Each pole has double-throw)									
<p>Standard Bezel: AML22C Square 1 LED AML22H Square 1 High-Profile LED (For use with AML52-A buttons)</p> <p>Full Guard Bezel: AML22J Square 1 LED</p>	<p>B Black</p>	<p>Red B V* C 5V D 10V E 15V F 24V</p> <p>Yellow H V* J 5V K 10V L 15V M 24V</p> <p>Green R V* S 5V T 10V W 15V X 24V</p>	<p>2 .110 × .020 (Solder or Quick-Connect)</p> <p>3 .025 × .025 (Printed Ckt., or Push-On)</p> <p>8 .110 × .020 With Diode Protection for LED</p>	<table border="1"> <tr> <td rowspan="2">Silver Contacts</td> <td>Mom. Action AA 1-Pole AC 2-Pole CC 4-Pole</td> </tr> <tr> <td>Alt. Action AB 1-Pole AD 2-Pole CD 4-Pole</td> </tr> <tr> <td rowspan="2">Gold Contacts</td> <td>Mom. Action BA 1-Pole BC 2-Pole DC 4-Pole</td> </tr> <tr> <td>Alt. Action BB 1-Pole BD 2-Pole DD 4-Pole</td> </tr> <tr> <td rowspan="2">Gold-Plated Silver Contacts</td> <td>Mom. Action EA 1-Pole EC 2-Pole</td> </tr> <tr> <td>Alt. Action EB 1-Pole ED 2-Pole</td> </tr> </table>	Silver Contacts	Mom. Action AA 1-Pole AC 2-Pole CC 4-Pole	Alt. Action AB 1-Pole AD 2-Pole CD 4-Pole	Gold Contacts	Mom. Action BA 1-Pole BC 2-Pole DC 4-Pole	Alt. Action BB 1-Pole BD 2-Pole DD 4-Pole	Gold-Plated Silver Contacts	Mom. Action EA 1-Pole EC 2-Pole	Alt. Action EB 1-Pole ED 2-Pole
Silver Contacts	Mom. Action AA 1-Pole AC 2-Pole CC 4-Pole												
	Alt. Action AB 1-Pole AD 2-Pole CD 4-Pole												
Gold Contacts	Mom. Action BA 1-Pole BC 2-Pole DC 4-Pole												
	Alt. Action BB 1-Pole BD 2-Pole DD 4-Pole												
Gold-Plated Silver Contacts	Mom. Action EA 1-Pole EC 2-Pole												
	Alt. Action EB 1-Pole ED 2-Pole												

* See LED information for devices without current limiting resistor, page 59.

Example: AML22CBB2AA

Square pushbutton switch housing with one LED, black bezel; red LED (without resistor); .110 × .020 termination; momentary action, 1-pole, double-throw; silver contacts.

CONTACT ARRANGEMENT

1, 2 or 4 poles: Form C

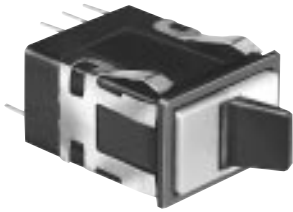


Manual Switches

Electronic Control Paddle

AML23 Series

INCANDESCENT OR NON-LIGHTED DISPLAY



Covers ordered separately.

FEATURES

- Silver or gold contacts.
- 1, 2 or 4 poles.
- Toggle type paddle operators permanently installed in rectangular housings.
- Covers for the switch housing may be lighted or unlighted.
- UL recognized, CSA certified.
- Lamps can be furnished installed or ordered separately.
- Lamp circuit independent of switch circuit.

Electrical Data	Page 20
Paddle Covers	Page 48
Lamps	Page 59
Accessories	Page 57, 58
Mounting Dimensions	Page 60,63

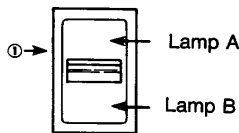


AML23 Series: 1 pole and 2-pole only.

AML23 ORDER GUIDE

AML23 E	B	A	2	AA	01
Housing Type	Operator/Bezel Color	Incandescent Lamp Type	Terminal Type	Circuitry Codes	Operating Action
AML23 E Rectangular Non-Lighted AML23 F Rectangular 1 Lamp Ckt. (A) AML23 G Rectangular 2 Lamp Ckts. (A & B)	B Black/Black	A No Lamp Installed B 6 V Lamp* C 14 V Lamp* E 28 V Lamp*	2 .110 × .020 (Solder or Quick-Connect) 3 .025 × .025 (Printed Ckt., or Push-on)	Insert Code letters as shown in Circuitry Chart	Insert Code numbers from Operating Action Chart

* Lamps will be installed per each lamp circuit specified in the Housing Type.



① The "MICRO SWITCH" identification is shown on this side of the switch housings.

Example: **AML23EBA2AA01**
Rectangular non-lighted paddle switch housing; black paddle and bezel; .110 × .020 terminals; with one circuit ON and one circuit OFF in each extreme operator position (maintained).

Manuals

CIRCUITRY

Silver Contacts	Gold Contacts	2-Position		3-Position			
AA	BA						
AC (Non-illuminated switches only)	BC						
CA	DA						
CC (Non-illuminated switches only)	DC						

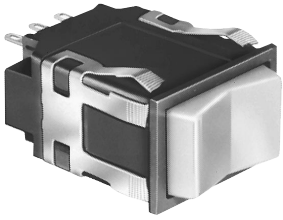
OPERATING ACTION

2-Position:			
Maint.	01 None	Maint.	Maint.
Mom.	02 None	Maint.	Maint.
Maint.	03 None	Mom.	Mom.
3-Position:			
Maint.	04 Maint.	Maint.	Maint.
Mom.	05 Maint.	Mom.	Mom.
Maint.	06 Maint.	Mom.	Mom.
Mom.	07 Maint.	Maint.	Maint.

Manual Switches

Electronic Control Rocker

INCANDESCENT OR NON-LIGHTED DISPLAY



FEATURES

- Silver or gold contacts.
- 2 or 3 position operation.
- UL recognized, CSA certified.
- Lamps can be furnished installed or ordered separately.
- Lamp circuit independent of switch circuit.

Electrical Data	page 19
Rockers	page 51
Lamps	page 58
Accessories	pages 56, 57
Mounting Dimensions	pages 59, 62

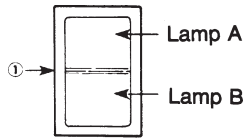


*AML24 Series: 1 pole and 2-pole only.

Rocker operators ordered separately.

AML24 ORDER GUIDE

AML24 E	B	A	2	AA	01
Housing Type	Bezel Color	Incandescent Lamp Type	Terminal Type	Circuitry Codes	Operating Action
AML24 E Rectangular Non-Lighted AML24 F Rectangular 1 Lamp Ckt. (A) AML24 G Rectangular 2 Lamp Ckts.	B Black	A No Lamp Installed B 6 V Lamp* C 14 V Lamp* E 28 V Lamp*	2 .110 × .020 (Solder or Quick-Connect) 3 .025 × .025 (Printed Ckt., or Push-on)	Insert Code letters as shown in Circuitry Chart	Insert Code numbers from Operating Action Chart



① The "MICRO SWITCH" identification is shown on this side of the switch housings.

* Lamps will be installed per each lamp circuit specified in the Housing Type.

Example: **AML24EBA2AA01**
Rectangular non-lighted rocker switch housing; black bezel; .110 × .020 terminals; with one circuit ON and one circuit OFF in each extreme operator position (maintained).

CIRCUITRY

Silver Contacts	Gold Contacts	2-Position		3-Position			
AA	BA						
AC (Non-illuminated switches only)	BC						
CA	DA						
CC (Non-illuminated switches only)	DC						

OPERATING ACTION

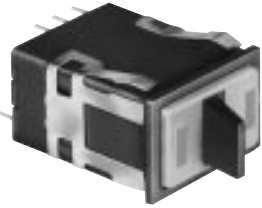
2-Position:		
Maint.	01 None	Maint.
Mom.	02 None	Maint.
Maint.	03 None	Mom.
3-Position:		
Maint.	04 Maint.	Maint.
Mom.	05 Maint.	Mom.
Maint.	06 Maint.	Mom.
Mom.	07 Maint.	Maint.

Manual Switches

Electronic Control Paddle

AML25 Series

LED DISPLAY



Covers with LED "window" ordered separately.

FEATURES

- Identical to AML23, except furnished with one or two rectangular high efficiency LED's which give flush display area and wide angle indication.
- Available with or without diode protection for LED's.
- LED circuit independent of switch circuit.
- 5 thru 24 VDC devices have internal resistor to maintain current at nominal 20 mA.
- UL recognized, CSA certified.



AML25 Series: 1 pole and 2-pole only.

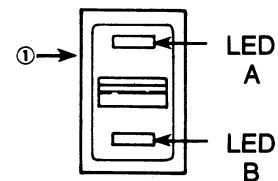
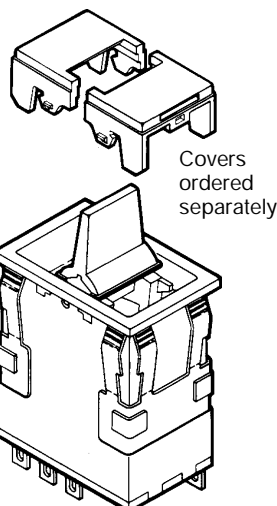
AML25 ORDER GUIDE

AML25 F	B	B	2	AA	01	R	X
Housing Type	Operator/ Bezel Color	LED Voltage	Terminal Type/ Diode Protection	Circuitry Codes	Operating Code	LED Color (LED A)	LED Color (LED B)
AML25 F Rectangular 1 LED AML25 G Rectangular 2 LED's	B Black/Black	B V* C 5 V D 10 V E 15 V F 24 V	2 .110 × .020 (Solder or Q-C) 3 .025 × .025 (Printed Ckt., or Push-On) 8 .110 × .020 w/Diode protection	Insert code letters as shown in Circuitry Chart on p. 29 LED version available only with AA BA CA DA circuitry	Insert code numbers from Operating Action Chart on p. 29	R Red Y Yellow G Green X No LED	R Red Y Yellow G Green X No LED

* See LED application information for devices without current-limiting resistor, page 59.

Example: **AML25FBB2AA01RX**
 Rectangular paddle switch; illuminated with one red LED, this device has a black paddle and bezel, and .110 × .020 terminals; with one circuit ON and one circuit OFF in each extreme operator position (maintained).

† For further information on replacement LED's, call the 800 number.

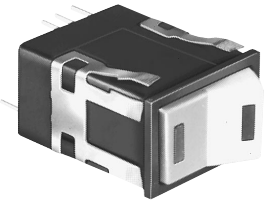


① The "MICRO SWITCH" identification is shown on this side of the switch housings.

Manual Switches

Electronic Control Rocker

LED DISPLAY



Rocker operators ordered separately.
LEDs are not replaceable.

FEATURES

- Identical to AML24, except furnished with one or two rectangular high efficiency LED's which give flush display area and wide angle indication.
- Available with or without diode protection for LED's.
- LED circuit independent of switch circuit.

Electrical Data	page 19
Rockers	page 52
Lamps and LEDs	page 58
Accessories	page 57
Mounting Dimensions	pages 59, 62

- 5 thru 24 VDC LED devices have internal resistor to maintain current at nominal 20 mA.
- UL recognized, CSA certified.



*AML26 Series: 1 pole and 2-pole only.

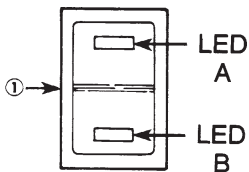
AML26 ORDER GUIDE

AML26 F B B 2 AA 01 R X

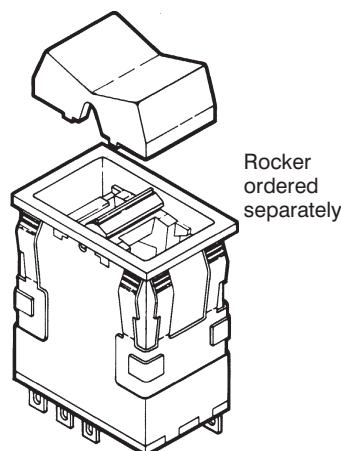
Housing Type	Bezel Color	LED Voltage	Terminal Type/ Diode Protection	Circuitry Codes	Operating Action	LED Color (LED A)	LED Color (LED B)
AML26 F 1 LED	B Black	B V*	2 .110 × .020 (Solder or Quick-Connect)	Insert code letters as shown in Circuitry Chart	Insert code numbers from Operating Action Chart	R Red	R Red
AML26 G 2 LED's		C 5 V	3 .025 × .025 (Printed Ckt., or Push-On)	LED version available only with AA BA CA DA circuitry		Y Yellow	Y Yellow
		D 10 V	8 .110 × .020 w/Diode for LED protection			G Green	G Green
		E 15 V				X No LED	X No LED
		F 24 V					

*See LED application information for devices without current-limiting resistor, page 58.

Example: **AML26FBB2AA01RX**
Rectangular rocker switch; illuminated with one LED, this device has a black bezel, .110 × .020 terminals; with one circuit ON and one circuit OFF in each extreme operator position (maintained).



① The "MICRO SWITCH" identification is shown on this side of the switch housings.



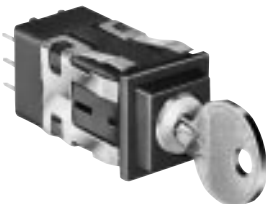
Manuals

Manual Switches

Electronic Control Keylock

AML27 Series

NON-LIGHTED



FEATURES

- Enable control of access to computer peripherals, keyboards, point-of-sale terminals, and security systems which are locked when unattended; and other locations where tampering must be discouraged.
- 2 or 3 positions, maintained (90° throw) and momentary action (60° throw).
- 5-bit key combinations

Electrical Data	Page 19
Mounting Dimensions	Page 60, 63
Accessories	Pages 57-58

- UL recognized, CSA certified.
- Static discharge protection (up to 20 kV when grounded).

AML27 ORDER GUIDE

AML27 A	B	K	2	AA	21	BA		
Housing Type	Bezel Color	Button Color	Terminal Type	Circuitry Codes (Each pole has double-throw)	Operation Action (Key out in center position, except where noted)		Key Combinations	
AML27 A Square housing Non-Lighted	B Black	K Black	2 .110 x .020 (Solder or Quick-Connect) 3 .025 x .025 (Printed Circuit or Push-On)	Silver Contacts: AA 1 pole AC 2 pole Gold Contacts: BA 1 pole BC 2 pole	CCW	Center	CW	(Two Keys Furnished) BA BL BB BM BC BN BD BP BE BQ BF BR BG BS BH BT BJ BV BK BW
					None	21 Maint.	Maint.	
					None	22* Maint.	Maint.	
					None	23 Maint.	Mom.	
					Maint.	24 Maint.	Maint.	
					Mom.	25 Maint.	Mom.	
					Maint.	26** Maint.	Maint.	
					Mom.	27*** Maint.	Maint.	
					Maint.	28*** Maint.	Maint.	
					Maint.	29† Maint.	Maint.	
					Maint.	30† Maint.	Mom.	
					Maint.	31†† Maint.	Mom.	

REPLACEMENT KEYS

One key per listing.

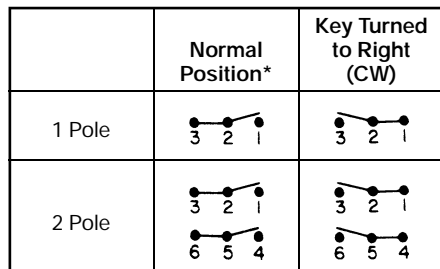
Key Combination	Key Code	Catalog Listing
BA	110	30PA101-AML
BB	109	30PA102-AML
BC	108	30PA103-AML
BD	107	30PA104-AML
BE	106	30PA105-AML
BF	105	30PA106-AML
BG	104	30PA107-AML
BH	103	30PA108-AML
BJ	102	30PA109-AML
BK	101	30PA110-AML
BL	111	30PA111-AML
BM	112	30PA112-AML
BN	113	30PA113-AML
BP	114	30PA114-AML
BQ	115	30PA115-AML
BR	116	30PA116-AML
BS	117	30PA117-AML
BT	118	30PA118-AML
BV	119	30PA119-AML
BW	120	30PA120-AML

Specify different Key Combinations to acquire different keys, i.e.; AML27ABK2AA21BB and AML27ABK2AA21BK have different keys. AML27ABK2AA21BB and AML27ABK3BC25BB have identical interchangeable keys.

Example: **AML27ABK2AC28BB**
Square housing; black bezel and button; .110 x .020 terminals; 2-pole double-throw; silver contacts; 3-position maintained and key code "BB".

CIRCUITRY

2-Position Switches:



* Key out in both positions.

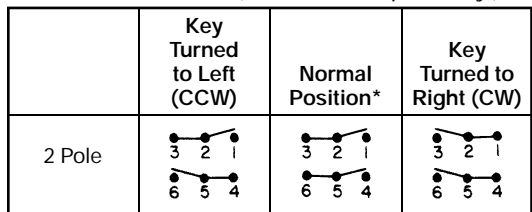
** Key out in all three positions.

*** Key out in center and CW positions.

† Key out in center and CCW positions.

†† Key out in CCW only.

3-Position Switches (Available in 2-pole only.)



* Circuit remains the same with key in or out.

ORDER GUIDE FOR OLD STYLE AML27 REPLACEMENT KEYS

One key per listing.

Key Comb.	Key Code	Catalog Listing	Key Comb.	Key Code	Catalog Listing
AA	601	30PA3-AML	AF	610	30PA12-AML
AB	602	30PA8-AML	AG	612	30PA13-AML
AC	604	30PA9-AML	AH	614	30PA14-AML
AD	607	30PA10-AML	AJ	615	30PA15-AML
AE	608	30PA11-AML	AK	616	30PA16-AML

Manuals

Manual Switches

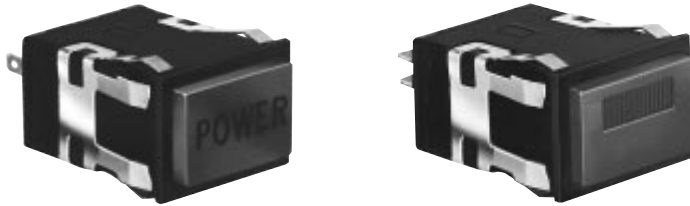
Power Duty Pushbutton

AML31/32 Series

INCANDESCENT, NEON, OR NON-LIGHTED DISPLAY

FEATURES

- UL recognized, CSA certified.
- AML31 lamp circuit independent of switch circuit.



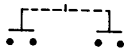
AML31 Series: 2-pole.
AML32 Series: 2-pole.

Buttons ordered separately.

CONTACT ARRANGEMENT

AML51F BUTTONS

2 poles (Form X)



AML31 ORDER GUIDE

AML31 accepts one incandescent lamp which can be furnished installed or ordered separately.

<u>AML31 E</u>	<u>B</u>	<u>A</u>	<u>4</u>	<u>AC</u>
Housing Type	Bezel Color	Incandescent Lamp Type	Terminal Type	Circuitry Codes
Standard Bezel: AML31E Rect. Non-Lighted AML31F Rect. 1 Lamp Ckt. Full Guard Bezel: AML31K Rect. Non-Lighted AML31L Rect. 1 Lamp Ckt.	B Black	A No Lamp Installed B 6 V Lamp* C 14 V Lamp* E 28 V Lamp*	4 .187 × .020 (Solder or Quick-Connect)	2-Pole, Single-Throw Normally-Open, Form X: AD AC Alt. Mom. Action Action

* Lamps will be installed per each lamp circuit specified in the Housing Type.

Example: AML31EBA4AC

Rectangular pushbutton switch housing, non-lighted; black bezel; .187 × .020 terminals; momentary action; 2-pole, single-throw, normally open, Form X.

AML32 ORDER GUIDE

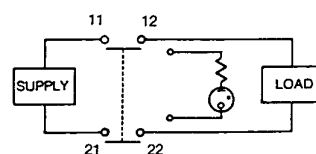
AML32 has neon lamp wired to 125 or 250 VAC resistor.

<u>AML32 F</u>	<u>B</u>	<u>C</u>	<u>7</u>	<u>AC</u>
Housing Type	Bezel Color	Neon Lamp Voltage/Color	Terminal Type Lamp Circuit	Circuitry Codes
Standard Bezel: AML32F Rect. 1 Neon Lamp Full Guard Bezel: AML32L Rect. 1 Neon Lamp	B Black	Red B 125 VAC C 250 VAC Clear K 125 VAC L 250 VAC Green M 125 VAC P 250 VAC	4 .187 × .020 (Solder or Quick-Connect) with isolated lamp circuit 7 .187 × .020 with integral lamp circuit	2-Pole, Single-Throw Normally-Open, Form X: AD AC Alt. Mom. Action Action

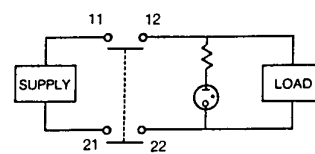
Example: AML32FBC7AC

Rectangular pushbutton switch housing; black bezel; 250 volt, red neon lamp; .187 × .020 terminals with integral lamp circuit; momentary action; 2-pole, single-throw, normally open, Form X.

Isolated neon circuit



Integral neon circuit

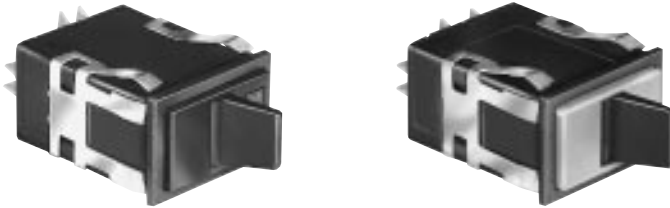


Manual Switches

Power Duty Paddle

AML33/35 Series

INCANDESCENT, NEON, OR NON-LIGHTED DISPLAY



Colored housing covers ordered separately.

CONTACT ARRANGEMENT

1 or 2 poles: Form A



Electrical Data	Page 20
Paddle Covers	Page 48
Lamps	Page 59
Mounting Dimensions	Page 61

FEATURES

- Toggle type paddle operators permanently installed in rectangular housings.
- 2-position maintained action.
- AML33 lamp circuit independent of switch circuit.
- UL recognized, CSA certified.



AML33 Series: 2-pole only.
AML35 Series: 1-pole and 2-pole.

AML33 ORDER GUIDE

AML33 accepts one incandescent lamp which can be furnished installed or ordered separately.

AML33 E	B	A	4	AA	01
Housing Type	Operator/Bezel Color	Incandescent Lamp Type	Terminal Type	Circuitry Codes	Operating Action
AML33 E Rectangular Non-Lighted AML33 F Rectangular 1 Lamp Ckt.	B Black/Black 	A No Lamp Installed B 6 V Lamp* C 14 V Lamp* E 28 V Lamp*	4 .187 × .020 (Solder or Quick-Connect)	Silver Contacts: AA 1-Pole (One Form A Single-throw, Normally-Open) AC 2-Pole (Two Form A)	 01 Maint. ON Maint. OFF

* Lamps will be installed per each lamp circuit specified in the Housing Type.

Manuals

AML35 ORDER GUIDE

AML35 has neon lamp wired to 125 or 250 VAC resistor.

AML35 F	B	B	4	AA	01
Housing Type	Operator/Bezel Color	Neon Lamp Voltage	Terminal Type/ Lamp Circuit †	Circuitry Codes	Operating Action
AML35 F Rectangular 1 Neon Lamp	B Black/Black 	Red B 125 VAC C 250 VAC Green M 125 VAC P 250 VAC	4 .187 × .020 (Solder or Quick-Connect) With Isolated Lamp Circuit 7 .187 × .020 With Integral Lamp Circuit (Available with 2-Pole devices only)	Silver Contacts: AA (One Form A Single-Throw) Available only with isolated lamp circuit, term. type 4. AC 2-Pole (Two Form A)	 01 Maint. ON Maint. OFF

① The "MICRO SWITCH" identification is shown on this side of the switch housing.
† Refer to next page for neon lamp circuit schematics.

Example: **AML35FBB4AA01**

Rectangular paddle switch housing; black paddle and bezel; 125 VAC neon lamp; .187 × .020 terminals with isolated

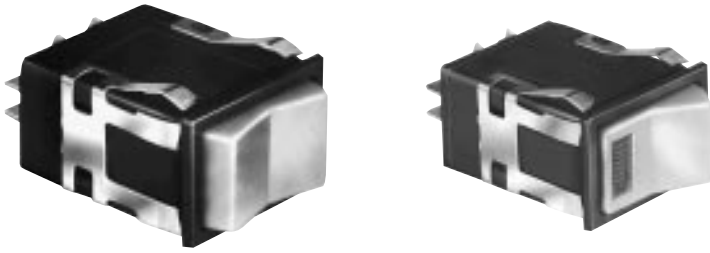
lamp circuit; 1-Pole Form A Single-Throw; with circuit ON in one extreme position and OFF in the other (maintained).

Manual Switches

Power Duty Rocker

AML34/36 Series

INCANDESCENT, NEON, OR NON-LIGHTED DISPLAY



Rocker operators ordered separately.

FEATURES


- Same circuitry, and electrical rating as power duty paddle switches.
- Neon lamp circuitry can be isolated or integral on 2-pole switches; isolated-only on 1-pole switches (see schematics).
- UL recognized, CSA certified.
- AML34 lamp circuit independent of switch circuit.

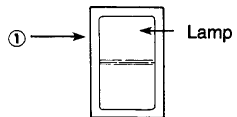


AML34 Series: 2-pole only.
AML36 Series: 1-pole and 2-pole.

AML34 ORDER GUIDE

AML34 accepts one incandescent lamp which can be furnished installed or ordered separately.


AML34 E	B	A	4	AA	01
Housing Type	Bezel Color	Incandescent Lamp Type	Terminal Type	Circuitry Codes	Operating Action
AML34 E Rectangular Non. Illum. AML34 F Rectangular 1 Lamp Ckt.	B Black	A No Lamp Installed B 6 V Lamp* C 14 V Lamp* E 28 V Lamp*	4 .187 × .020 (Solder or Quick-Connect)	Silver Contacts: AA 1-Pole (One Form A Single-Throw) AC 2-Pole (Two Form A)	 01 Maint. ON Maint. OFF

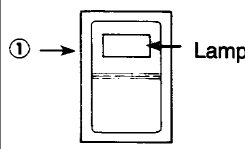


* Lamps will be installed per each lamp circuit specified in the Housing Type.

AML36 ORDER GUIDE

AML36 has neon lamp wired to 125 or 250 VAC resistor.

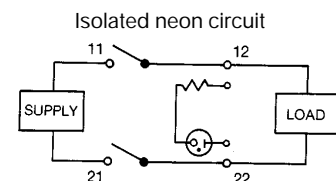
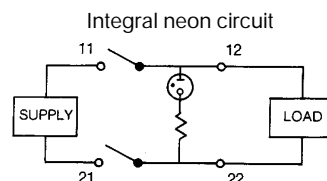
AML36 F	B	B	4	AA	01
Housing Type	Bezel Color	Neon Lamp Voltage	Terminal Type/ Lamp Circuit	Circuitry Codes	Operating Action
AML36 F Rectangular 1 Neon Lamp	B Black	Red 125 VAC C 250 VAC Green 125 VAC M 125 VAC P 250 VAC	4 .187 × .020 (Solder or Quick-Connect) With Isolated Lamp Circuit 7 .187 × .020 (Solder or Quick-Connect) With Integral Lamp Circuit	Silver Contacts: AA (One Form A Single-Throw) Not available with terminal type 7 AC 2-Pole (Two Form A)	 01 Maint. ON Maint. OFF



① The "MICRO SWITCH" identification is shown on this side of the switch housing.

Example: AML36FBB4AA01

Rectangular rocker switch housing; black bezel; 125 VAC neon lamp; .187 × .020 terminals with isolated lamp circuit; 1-Pole Form A single-throw; with circuit ON in one extreme position and OFF in the other.



Manual Switches

Lighted Indicators

AML41/42/43 Series

To order lamps see page 59.

FEATURES

- Pushbutton style indicators match display of lighted switches. Choice of incandescent, LED, or neon illumination.
- Lens style indicators use a special cap-like button which covers the bezel to present a larger display area, without affecting family appearance. Up to 3-lamp split screen capability. Incandescent illumination.



AML41
(Use AML51 push-buttons only.
Page 43.)



AML41
(Use AML51-J/-K/-L lens buttons only.
Page 43.)

AML41 INCANDESCENT DISPLAY INDICATORS ORDER GUIDE

AML41 C		B	A	2
Housing Type		Bezel Color	Incand. Lamp Type	Terminal Type
Pushbutton Style:	Lens Style:			
AML41 C Square 1 lamp ckt.	AML41 J Rectangular 1 lamp ckt.	B Black	A No lamp installed	2 .110 × .020 (Solder or Quick-Connect)
AML41 D Square 2 lamp ckts.	AML41 K Rectangular 2 lamp ckts.		B 6 V Lamp*	3 .025 × .025 (Printed Circuit or Push-On)
AML41 F Rectangular 1 lamp ckt.	AML41 L Rectangular 3 lamp ckts.		C 14 V Lamp*	
AML41 G Rectangular 2 lamp ckts.			E 28 V Lamp*	

* Lamps will be installed per each lamp circuit specified in the Housing Type.

Examples:

AML41CBA2

Square (pushbutton style) indicator housing with one lamp circuit; black bezel; .110 × .020 termination.

AML41JBA2

Rectangular (lens style) indicator housing with one lamp circuit; black bezel; .110 × .020 termination.



AML42C
(Use AML52-C/-A pushbuttons only.
Page 44.)



AML42S

AML42 LED DISPLAY INDICATORS ORDER GUIDE

LEDs are not replaceable.

AML42 S	B	C	2
Housing Type	Bezel Color	LED Color/Voltage	Terminal Type/ Diode Protection
AML42 C Square 1 LED	B Black	Red B 5 V* C 10 V D 15 V E 24 V	2 .110 × .020 (Solder or Q.C.)
AML42 S Compact 1 LED	Yellow H V* J 5 V K 10 V L 15 V M 24 V	Green R V* S 5 V T 10 V W 15 V X 24 V	3 .025 × .025 (Printed Circuit or Push-On)
			8 .110 × .020 w/diode to protect LED
			9 .025 × .025 w/diode to protect LED

Example: **AML42SBC2**

Compact indicator with black bezel; 5 volt red LED; .110 × .020 termination.

* See LED application data, page 59, for these devices without current-limiting resistor.

Manuals

AML43 neon display indicators are identical to AML32 power switches, except button is furnished assembled (locked in depressed position) and there is no provision for switching. Button is nonremovable. Other button colors are available.

AML43FBB40R

Rectangular device with black bezel; 125 volt red neon lamp .187 × .020 termination.

NOTE: Add **L** to neon indicator catalog listing if legend is desired and submit Legend Sheet FO-63504.

AML43 NEON DISPLAY INDICATORS ORDER GUIDE

AML43 F	B	B	4	OR
Housing Type**	Bezel Color	Neon Lamp Color/Voltage	Terminal Type	Button Color
AML43F Rect.	B Black	Red B 125 V C 250 V	4 .187 × .020 (solder or Q.C.)	OR Red OY Yellow OG Green OW White OK Black
		Clear K 125 V L 250 V		
		Green M 125 V P 250 V		

Maual Switches

Solid State LED Annunciators

AML45/59 Series

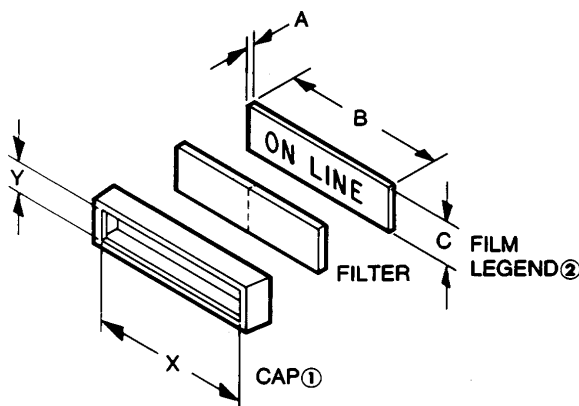
AML59 CAP ASSEMBLIES

The cap assembly consists of: black cap, color filter(s), and optional film legend; furnished unassembled. It snaps onto housing, flush with the housing bezel.

Filters, assembled with their matte finish facing the LED's, efficiently diffuse the illumination. They are color-tinted to complement the red, yellow, and green LED's.

NOTE: Cap assembly should not be subjected to the temperature and chemical atmosphere associated with wave soldering. These parts should be installed after soldering and cleanup.

Catalog listings for AML59 cap assemblies are derived from the ordering guide below. The ordering guide for AML45 LED housings is on page 39.



CUSTOM LEGENDS

A 2:1 drawing in black ink is required for satisfactory reproduction of custom film legends. As an alternative, you may submit an office copy of a page from a typographic supplier catalog such as Chartpak, Letraset, and Zipatone. MICRO SWITCH can also furnish graphic legends from the "Henry Dreyfus Symbol Source Book." (Custom legends require a one-time start-up charge.)

- ① Viewing area inside cap:
X = 1.04 min.; Y = .272 min.
- ② Customers ordering film legends from commercial photographic or typesetting sources should specify that the film be precision cut, per the following dimensions, to insure proper retention and alignment on the face of the annunciator: A = .007 max.; B = 1.1 ± .010; C = .300 ± .003.

STANDARD LEGENDS

AML59 Legend Sheet (see page 42) provides ordering information for negative and positive standard film legends in the type style (14-point Helvetica condensed bold) shown below. Use separate legend sheet for each AML59 catalog listing and attach it (them) to your purchase order.

ABCDEFGHIJKLMN OPQRST
UVWXYZ &?!():',.-/#% 1/2
\$0123456789

Approx. .165"

AML59 ORDER GUIDE

Cap Style		Cap Color	Legend Type	Filter Color		
AML59-R		K	10	Full Screen	Split Screen	
AML59-R Full Screen		K Black	10 No Legend	R Red	R Red	R Red
AML59-S Split Screen			20 Negative Film Legend	Y Yellow	Y Yellow	Y Yellow
			21 Positive Film Legend	G Green	G Green	G Green

Manuals

Examples:
AML59-RK10R
 Full screen style, black cap, no legend, and red filter.

AML59-SK20RY
 Split screen style, black cap, negative film legend, red and yellow color filters.

Manual Switches

Legend Sheet

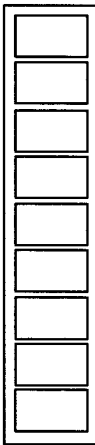
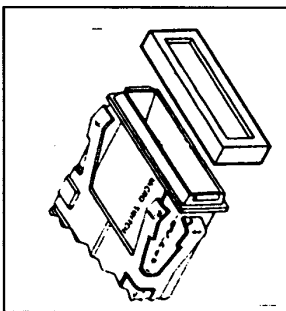
AML59 Series

Honeywell

AML59 Legend Sheet

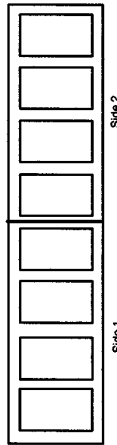
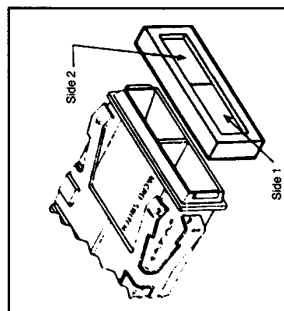
Account NO _____

Use this form to describe film legends to be used with AML59 Series Cover Assemblies



Style "R" (Full Screen)

Special Direction _____



Style "S" (Split Screen)

Special Direction _____

Catalog Listing AML59 -	Quantity Ordered
P.O. No.	S. O. No
Schedule No.	Customer Part No.
	Line No
	Customer Dwg. No.

Customer: _____
 Address: _____ (city) _____ (state)

INSTRUCTIONS:

1. Please use black ink to fill in shaded areas.
2. Fill in appropriate catalog listing. - One listing per sheet.
3. Fill in quantity ordered and your order no.
4. Indicate legends desired - do not exceed 9 characters for style "R" or 4 characters on either side of style "S".
5. This completed form must accompany your purchase order

NOTES:

- Legends must be designed to properly assemble to housings, which are to be installed with the MICRO SWITCH logo "up".
- All legends will be centered unless special directions are given.
- Standard legends are 14 pt. helvetica, condensed - Bold. A thru Z and numerals 0 thru 9 are standard.
- Legend Type:
 - Type "20" **NEGATIVE**
 - Type "21" **POSITIVE**

NEGATIVE POSITIVE










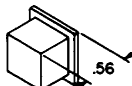

Manual Switches

Buttons/Lens for Switches and Indicators

AML51 Series

AML51 PUSHBUTTON ORDER GUIDE

For Incandescent or non-lighted display switches and pushbutton style indicators.

AML51-C	10	R	—
For AML11, 21, 31 switches and AML41 indicators: Pushbutton Style	Display Legend/Type	Full Color or 1st Color Split	2nd Color Split
 AML51-C  AML51-F  AML51-G  AML51-A  AML51-H  AML51-N*  AML51-B*  AML51-E*  AML51-M*  AML51-R*	Transmitted Color 10 No legend 20 With legend on cap. Transmitted Color (Clear cap and color insert) 11 No legend 21 With legend on insert Dead Front (Smoky gray cap and color insert) 30 No legend 40 With legend on insert Projected Color (White cap and color insert) 50 No legend 60 With legend on cap	R Red Y Yellow G Green B Blue W White K*** Black L*** Gray A** Amber	R Red Y Yellow G Green B Blue W White K*** Black L*** Gray A** Amber
For AML41D indicators only:  AML51-D			

* Available with transmitted color (10 or 20) only.

Example: **AML51-C10R**

Square full color button; with transmitted color, no legend; red.

** Available with transmitted color and dead front only.




*** Black and gray not recommended for lighted display.

* AML51-N buttons not available with Display/Legend Types 10 and 20.

Note: Dimensions include the .060 in bezel.

AML51 LENS ORDER GUIDE

For incandescent display AML41J, K, and L lens style indicators only.

AML51-J	10	R		
Lens style	Display/Legend Type	Full Color or 1st Color Split	2nd Color Split	3rd Color Split
 AML51-J  AML51-K  AML51-L	Transmitted Color 10 No legend 20 With legend Transmitted Color (Clear cap and color insert) 11 No legend 21 With legend Dead Front (Smoky gray cap and color insert) 30 No legend 40 With legend Projected Color (White cap and color insert) 50 No legend 60 With legend	R Red Y Yellow G Green B Blue W White A** Amber	R Red Y Yellow G Green B Blue W White A** Amber	R Red Y Yellow G Green B Blue W White A** Amber

** Not available with projected color.

AML51 lens buttons provide added display area by snapping onto and covering the bezel of AML41J, K, and L indicators. They do not fit other indicators or switches.

Example: **AML51-J10R**

Rectangular lens type button; full color; transmitted color, no legend; red.

HOW TO ORDER BUTTON LEGENDS

When specifying legended buttons, submit a legend order sheet to cover each listing. To insure proper legend orientation, AML housings (when viewed from the panel front) should have the "MICRO SWITCH" identification facing UP on square devices and UP or to the LEFT on rectangular.

Button legend order sheets are shown on the following pages. Reproduce them on your office copier.

Legend Sheet	Form No.
AML51 Pushbuttons	FO-63394
AML51 Lens buttons	FO-63395
AML52 Pushbuttons	FO-63504
AML53 Paddle switch covers	FO-63567
AML55 Paddle switch covers	FO-63565
AML54 Rockers	FO-63566
AML56 Rockers	FO-63564

Manuals

Manual Switches

AML51/52 Series

Buttons for Switches and Indicators


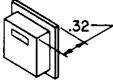
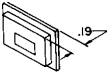
AML52 BUTTON ORDER GUIDE

For AML12, AML22 (w/o light pipe), AML32, AML42 LED display.

AML52-N

10

R

Button Type
For LED Devices AML52-C 
AML52-A* 
For AML32 Neon Devices AML52-N 

Display/Legend Type
Transmitted Color 10 No Legend 20 With Legend

Button Color
R Red
Y Yellow
G Green
B Blue
W White
K Black
A Amber
L Gray

Examples:

AML52-N10R

Rectangular full screen; for use on neon power switch with transmitted color, no legend; red button.

AML52-C10K

Square full screen; for use with LED device; transmitted color, no legend; black button.

Manual Switches

Pushbutton Legend Sheet

AML52 Series

Honeywell

AML 52/57 Pushbutton Legend Sheet for L.E.D. & Neon Buttons

Account No _____

Catalog Listing AML52 -		Customer Dwg. No.	
Customer P.O. No.	Line Number	Schedule No.	
MICRO SWITCH Sales Order			

Customer: _____
Address: _____
(city) _____ (state) _____

Instructions

1. Fill in appropriate catalog listing - one listing/sheet.
2. Check proper figure #: Type size, type color.
3. Fill in quantity required.
4. Indicate legends desired — Do not exceed maximums shown in legend order guide.

Note

1. For Proper Legend Orientation, AML housings (when viewed from front of panel) should have "MICRO SWITCH" logo oriented "UP" on square devices and "UP" or to the "LEFT" on rectangular devices.
2. Please use black ink in filling out this form to help us process your order.

LEGEND ORDER GUIDE														
Button: Type Orientation	Figure NO	Max Lines				Max Characters				5/16	7/64	9/64	13/64	5/16
		5/64	7/64	9/64	13/64	5/16	7/64	9/64	13/64					
☐	1	3	2	1	1	1	1	1	1	7	5	5	3	1
☐	2	3	2	1	1	1	1	1	1	7	5	5	3	1
☐	3	1	1	0	0	0	0	0	0	12	10	0	0	0
☐	4	1	1	0	0	0	0	0	0	12	10	0	0	0
☐	5	3	2	1	1	1	1	1	1	7	5	4	3	1
☐	6	3	2	1	1	1	1	1	1	7	5	4	3	1

Standard Legend Placement

1. Transmitted Color — Legend on outer shell (Button)
2. Figures 3 and 4 not applicable for AML57 listings

Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.		A3		Modified Gothic	
.	:	!	?	'	"
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					1/3
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					* &
					>
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SPECIAL LEGENDS

NOTE: Use this area to show special Legend Locations or Configurations NOT shown above. NON-STANDARD legends will involve additional charges and increased delivery time.

Fig. "A"	Fig. "B"
----------	----------

LEGEND ORDER CHART

Customer Part NO	Fig NO	Type Size		Ink Color		Button Qty	Legend Description					
		5/64	7/64	9/64	13/64		5/16	1st Line	2nd Line	3rd Line		

FO-63504-C

Sheet Prepared By: _____ (Signature)
_____ (Date)

Manuals

Manual Switches

Pushbutton Legend Sheet

AML51 Series

Honeywell

AML Pushbutton Legend Sheet

Account NO. 126 - 284

LEGEND ORDER GUIDE

Button: Type Orientation	Figure NO	Max Lines/Area			Max Characters/Line		
		5/64	7/64	9/64	13/64	5/16	5/16
1 A*B AREA	1	4	3	2	5	3	1
1 P.R AREA	2	4	3	2	5	3	1
1 C AREA	3	4	3	2	5	3	1
1 D AREA	3	1	1	1	7	5	3
1 E,H* AREA	4	4	3	2	11	9	8
1 E,H* AREA	5	6	4	3	7	5	3
1 F AREA	6	4	3	2	11	9	8
1 F AREA	7	6	4	3	7	5	3
1 G,N AREA	8	1	1	1	11	9	8
1 M AREA	9	5	4	3	8	6	6

Definitions of Markings

- Thru holes to snap into indicator housings
- Internal reliefs to snap over switch plunger tabs

Standard Legend Placement

- Use special legends sec. for other placements
- 1. Transmitted Color - Legend on outer shell (Button)
- 2. Dead Front - Legend on Insert
- 3. Projected Color - Legend on outer shell (Button)
- 4. Transmitted color with clear cap legend on insert

LEGEND ORDER CHART

Customer Part No	Fig No	Type Size			Ink Color	But- ton Qty
		5/64	7/64	9/64		
				Black	1	
				White	2	
					1	
					2	
					1	
					2	
					1	
					2	
					1	
					2	

Catalog Listing
AML51 -
Customer P.O. No. _____ Customer Dwg. No. _____
MICRO SWITCH Sales Order _____ Line Number _____ Schedule No. _____

Customer: _____
Address: _____ (city) _____ (state) _____

Instructions

- Fill in appropriate catalog listing - one listing/sheet.
- Check proper figure #, Type size, Type color.
- Fill in quantity required.
- Indicate legends desired - Do not exceed maximums shown in legend order guide.

Note

- For Proper Legend Orientation, AML housings (when viewed from front of panel) should have "MICRO SWITCH" logo oriented "UP" on square devices and "UP" or to the "LEFT" on rectangular devices.
- Please use black ink in filling out this form to help us process your order.
- INSERT ONLY ON STYLE A & H BUTTON

SPECIAL LEGENDS
NOTE: Use this area to show special Legend Locations or Configurations NOT shown to the left. NON-STANDARD legends will involve additional charges and increased delivery time.

A3
Modified Gothic
numerals (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.

.	:	;	!	?	'	"	/	()	*	&
\$	#	%	o	+	-	±	+	x	=	≠	<
→	↑	↓	←	CR	1/4H	2/3	4	1/3	2/3	@	∞

Fig. "A" _____ Fig. "B" _____

Sheet prepared by: _____

(Signature)

(Date)

FO-83384J

Manual Switches

Lens Legend Sheet

AML51 Series



AML Lens Legend Sheet

Account No _____

LEGEND ORDER GUIDE

Button: Type Orientation	Figure No	Max Lines				Max Characters									
		5/64	7/64	9/64	13/64	5/16	7/64	9/64	13/64	5/16					
AREA 1 J	1	4	4	3	3	2	2	1	1	14 13	10 10	9	6	3	1
		4	4	3	3	2	2	1	1						
AREA 1 2 K	2	4	4	3	3	2	2	1	1	6	5	5	3	1	
		4	4	3	3	2	2	1	1						
AREA 1 2 3 L	3	4	4	3	3	2	2	1	1	4	3	3	2	1	
		4	4	3	3	2	2	1	1						
AREA 1 J	4	4	4	3	3	2	2	1	1	9	8	7	6	3	
		4	4	3	3	2	2	1	1						
AREA 1 2 K	5	3	3	2	2	1	1	1	1	8	7	6	6	3	
		3	3	2	2	1	1	1	1						
AREA 1 2 3 L	6	2	2	1	1	1	1	0	0	8	7	6	6	4	
		2	2	1	1	1	1	0	0						

Standard Legend Placement

1. Transmitted Color — Legend on outer shell (Button)
2. Dead Front - Legend on insert
3. Projected Color - Legend on outer shell (Button)

LEGEND ORDER CHART

Customer Part No	Fig No	Type Size		Ink Color		But ton Qty	Legend Description							
		5/64	7/64	9/64	13/64		5/16	Black	White	Sequencer: Left-to-Right or Top-to-Bottom				
							1st Line	2nd Line	3rd Line	4th Line				

FO-6386-D

Sheet Prepared By: _____

(Signature)

(Date)



Catalog Listing
AML51 —

Customer P.O. No. _____ Customer Dwg. No. _____

MICRO SWITCH Sales Order _____ Line Number _____ Schedule No. _____

Customer: _____ (city) _____ (state) _____

Address: _____ (state) _____

Instructions

1. Fill in appropriate catalog listing - one listing/sheet.
2. Check proper figure #, Type size, type color.
3. Fill in quantity required.
4. Indicate legends desired — Do not exceed maximums shown in legend order guide.

Note

1. For Proper Legend Orientation, AML housings (when viewed from front of panel) should have "MICRO SWITCH" logo oriented "Up" on square devices and "Up" or to the "LEFT" on rectangular devices.
2. Please use black ink in filling out this form to help us process your order.

Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.	A3	Modified Gothic
· , ; ! ? ' _ " / () * &		
\$ € # % 0 + - ± ÷ × = ≠ > <		
→ ↑ ← CR 1/41/23/41/3 2/3 @ ∞		

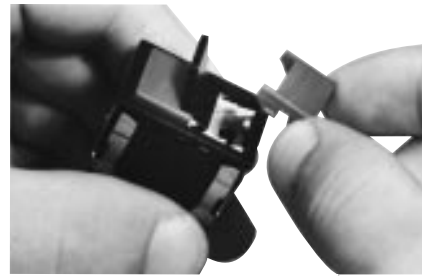
SPECIAL LEGENDS
NOTE: Use this area to show special Legend Locations or Configurations NOT shown above. NON-STANDARD legends will involve additional charges and increased delivery time.

Fig. "A"	Fig. "B"

Manual Switches

AML53/55 Series

Covers for Paddle Switches



Colored covers simply snap into the top of paddle switch housings.

COLOR DISPLAY OPTIONS

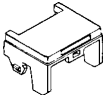
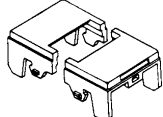
Transmitted color — Color is displayed whether lamp is On or Off. Choice of 1-piece covers (types 10 or 20) or covers with clear cap and colored translucent insert (types 11 or 12).

Projected color — Translucent white cover with transparent colored insert (types 50 or 60). White cover appears colored when illuminated.

Dead front hidden color/hidden legend — Cover appears black with lamp Off. Legend and color appear when illuminated (types 30 or 40).

AML53 PADDLE SWITCH COVER ORDER GUIDE

For AML13, AML23, and AML33 incandescent or non-lighted display.

AML53-T	10	R	G
Paddle Switch Cover Type  AML53-E 1/2 Cover  AML53-T Two-Piece Cover	Display/Legend Type Transmitted Color 10 No legend 20 With legend on cap Transmitted Color (Clear cap and color insert) 11 No legend 21 With legend on insert Dead Front (Smoky gray cap and color insert) 30 No legend 40 With legend on insert Projected Color (White cap and color insert) 50 No legend 60 With legend on cap	Cover Color	
		1/2 cover, or one side of two-piece cover	Other side of two-piece cover (see note)
		R Red Y Yellow G Green B Blue W White K* Black L* Gray A** Amber	R Red Y Yellow G Green B Blue W White K* Black L* Gray A** Amber

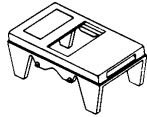
Note: Only one color code letter is necessary when ordering 1/2 covers.

Example: **AML53-T10RG**
Two-piece cover; with transmitted color, no legend; red and green.

* Not for lighted display.
** Not available with projected color.

AML55 PADDLE SWITCH COVER ORDER GUIDE

For AML35 neon display.

AML55-N	10	R	Y
Paddle Switch Cover Type  AML55-N Full Neon Cover, with colored lens	Display/Legend Type Transmitted Color 10 No Legend 20 With Legend	Lens Color T Clear R Red	Cover Color R Red Y Yellow G Green B Blue W White K Black L Gray A Amber

AML55-N covers have a colored lenticular lens window which extends over the neon lamp.

Example: **AML55-N10RY**
Full neon paddle switch cover; with transmitted color, no legend; red lens and yellow cover.

Manual Switches

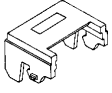
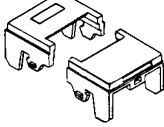
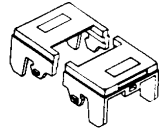
Covers for Paddle Switches

AML55 Series

AML55 PADDLE SWITCH COVER ORDER GUIDE

For AML15 and AML25 LED display.

See notes below

AML55-T	10	Y	R
Paddle Switch Cover Type AML55-E  1/2 Cover (For one LED)*	Display/Legend Type Transmitted Color 10 No Legend 20 With Legend	Cover Color – See notes below	
AML55-T  Two-Piece Cover (For one LED)		1/2-cover, or LED side of two-piece covers*	Other side of two piece covers
AML55-H  Two-Piece Cover (For two LED's)		R Red Y Yellow G Green B Blue W White K Black L Gray	R Red Y Yellow G Green B Blue W White K Black L Gray

HOW TO ORDER LEGENDS FOR PADDLE SWITCH COVERS

When specifying legended paddle switch covers, submit a legend order sheet to cover each catalog listing. These forms identify the maximum number of lines per area and the maximum characters per line, based on the type size you request.

To insure proper legend orientation, paddle switch housings (when viewed from the panel front) should have the "MICRO SWITCH" identification facing UP or to the LEFT.

Legend order sheets for covers are shown on the following pages. Reproduce them on your office copier or request a pad of them from the 800 number.:

Legend Sheet	Form No.
AML53 Covers	FO-63567
AML55 Covers	FO-63565

AML55-E, -T, and -H covers have an open window which allows LED's to be flush with the cover surface.

* Notes:

- ¹ Only one color code letter is necessary for AML55-E 1/2 covers.
- ² To order a 1/2-cover without the LED "window," specify an AML53-E listing from the previous page.

Example: **AML55-T10YR**

Two-piece cover; with LED window in one side, transmitted color, no legend; yellow (LED side) and red (non-LED side).





Manual Switches

Paddle Operator Legend Sheet

AML Paddle Operator (Cover) Legend Sheet

Account NO 126 - 284

LEGEND ORDER GUIDE

Button: Type Orientation	Figure No	Max Lines/Area				Max Characters/Line								
		5/64	7/64	9/64	13/64	5/16	5/64	7/64	9/64	13/64	5/16			
AREA 1	1	2	2	2	1	1	1	1	0	7	5	5	3	1
AREA 1	2	2	2	2	1	1	1	1	0	7	5	5	3	1
AREA 2	3	2	2	2	1	1	1	1	0	7	5	5	3	1

Catalog Listing
AML53 -

Customer P.O. No. _____ Customer Dwg. No. _____

MICRO SWITCH Sales Order _____ Line Number _____ Schedule No. _____

Customer: _____

Address: _____ (state) _____

Instructions

1. Fill in appropriate catalog listing - one listing/sheet.
2. Check proper figure #. Type size, Type color.
3. Fill in quantity required.
4. Indicate legends desired — Do not exceed maximums shown in legend order guide.

Note

1. For Proper Legend Orientation, AML housings (when viewed from front of panel) should have "MICRO SWITCH" logo oriented "UP" on square devices and "UP" or to the "LEFT" on rectangular devices.
2. Please use black ink in filling out this form to help us process your order.

- Standard Legend Placement - 1. Transmitted Color—Legend on outer shell (Button)
 Use Special Legends Section 2. Dead Front—Legend on insert
 for other placements. 3. Projected Color - Legend on outer shell (Button)
 4. Transmitted color with color with clear cap legend on insert.
 5. All legends will be centered within the legendable areas.

LEGEND ORDER CHART

Customer Part No	Fig No	Type Size 5/64	7/64	9/64	13/64	5/16	Ink Color		Area 1		Area 2	
							Black	White	1st Line	2nd Line	1st Line	2nd Line

Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.

A3
Modified Gothic

STANDARD SYMBOLS AVAILABLE

.	:	;	!	?	'	—	"	/	()	*	&
\$	#	%	o	+	-	±	+	x	=	≠	>	<
→	↑	↓	←	CR	1/4	1/2	3/4	1/3	2/3	∞		

SPECIAL LEGENDS

NOTE: Use this area to show special Legend Locations or Configurations NOT shown above. NON-STANDARD legends will involve additional charges and increased delivery time.

Fig. "A"	Fig. "B"
----------	----------

FO-6567-E _____ (Signature) _____ (Date)

Manual Switches

Paddle Legend Sheet

AML55 Series

Honeywell

AML Paddle (Cover) Legend Sheet For LED and Neon Style

Account NO 126-284

Catalog Listing **AML55** –

Customer P.O. No.	Customer Dwg. No.	Schedule No.
MICRO SWITCH Sales Order		Line Number

Customer: _____

Address: _____

(city) _____ (state) _____

Instructions

1. Fill in appropriate catalog listing - one listing/sheet.
2. Check proper figure #, Type size, Type color.
3. Fill in quantity required.
4. Indicate legends desired — Do not exceed maximums shown in legend order guide.

Note

1. For Proper Legend Orientation, AML housings (when viewed from front of panel) should have "MICRO SWITCH" logo oriented "UP" on square devices and "UP" or "the" "LEFT" on rectangular devices.
2. Please use black ink in filling out this form to help us process your order.

Legend Order Guide											
Cover Type Orientation	Figure No	Max Lines/Area			Max Characters/Line			Side 1	Side 2	Side 3	Side 4
		5/64	7/64	9/64	13/64	5/16	5/64				
	1	1	1	1	0	0	7	5	5	0	0
	2	1	1	1	0	0	7	5	5	0	0
Side 1 Side 2	3	1	1	1	0	0	7	5	5	0	0
Side 2	4	2	2	2	1	1	7	5	5	3	1
Side 1 Side 2	5	1	2	2	0	1	7	5	5	0	1

Standard Legend Placement — Use Special Legends Section for other placements.

1. All Legends will be centered within the legendable areas

LEGEND ORDER CHART

Customer Part No	Fig No	Type Size	Legend Color		But ton Qty	Legend Description					
			Black	White		Sequence: Left-to-Right or Top-to-Bottom	1st Line	2nd Line	3rd Line		
	5/64	7/64	9/64	13/64	5/16						

FO-68665-B

(Signature)

(Date)

SPECIAL LEGENDS

NOTE: Use this area to show special Legend Locations or Configurations NOT shown below. NON-STANDARD legends will involve additional charges and increased delivery time.

Fig. "A"

Fig. "B"

Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.		A3		Modified Gothic	
STANDARD SYMBOLS AVAILABLE					
·	;	!	?	'	"
\$	¢	#	%	+	-
→	↑	↓	←	↔	↕
				1/4	1/3
				2/3	∞
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				()
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				=	>
				<	

Manuals

Manual Switches

Rocker Switch Operators

AML54/56 Series

COLOR DISPLAY OPTIONS



Rocker operators are assembled to the switches by simply snapping them into recesses in the switch operator sockets.



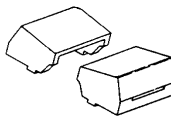
Transmitted color — Color is displayed whether lamp is On or Off. Choice of 1-piece rockers (types 10 or 20) or rockers with clear cap and colored translucent insert (types 11 or 12).

Dead front hidden color/hidden legend — Rocker appears black with lamp Off. Legend and color appear when illuminated (types 30 or 40).

Projected color — Translucent white rocker with transparent colored insert (types 50 or 60). White rocker appears colored when illuminated.

AML54 ROCKER OPERATOR ORDER GUIDE

For AML14, AML24, AML34 incandescent or non-lighted display.

<u>AML54-F</u>	<u>10</u>	<u>R</u>	
Rocker Operator Type	Display/Legend Type	Rocker Color – See Note Below	
AML54-F	Transmitted Color	Full rocker, 1/2 rocker, or one side of two-piece rockers	Other side of two-piece rockers
 Full Rocker	10 No legend 20 With legend on cap	R Red Y Yellow G Green B Blue W White K* Black L* Gray A** Amber	R Red Y Yellow G Green B Blue W White K* Black L* Gray A** Amber
 1/2 Rocker	Transmitted Color (Clear cap and color insert) † 11 No legend 21 With legend on insert		
 Two-Piece Rocker	Dead Front † (Smoky gray cap and color insert) 30 No legend 40 With legend on insert		
	Projected Color † (White cap and color insert) 50 No legend 60 With legend on cap		


NOTE: AML54-F10 and AML54-F20 are one-piece, one-color full rockers. Thus only one color code letter is necessary when ordering. Include a two letter code for all other AML54-E (and AML54-T) catalog listings.

* Not for lighted display.
 ** Not available with projected color or dead front.
 † Not available for use with AML34 power switches.

Example: **AML54-F10R**
 Full rocker; with transmitted color, no legend; red.

AML56 ROCKER OPERATOR ORDER GUIDE

For AML36 neon display.

<u>AML56-N</u>	<u>10</u>	<u>R</u>	<u>Y</u>
Rocker Operator Type	Display/Legend Type	Lens Color	Rocker Color
AML56-N  Full Rocker with Colored Lens	Transmitted Color 10 No Legend 20 With Legend	T Clear R Red Y Yellow	R Red Y Yellow G Green B Blue W White K Black

AML56-N rockers have a colored lenticular lens window which extends over the neon lamp.

Example: **AML56-N10RY**
 Full rocker; with transmitted color, no legend; yellow rocker and red lens.


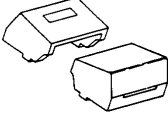
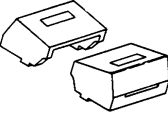
Manual Switches

Rocker Switch Operators

AML56 Series

AML56 ORDER GUIDE

For AML16 and AML26 LED display.

AML56-T	10	R	B
Rocker Operator Type	Display/Legend Type	Rocker Color – See Notes Below	
AML56-E	Transmitted Color 10 No Legend 20 With Legend	1/2-rocker or LED side of two-piece rockers	Other side of two piece rockers
 1/2-Rocker* (For one LED)		R Red Y Yellow G Green B Blue W White K Black L Gray	R Red Y Yellow G Green B Blue W White K Black L Gray
AML56-T  Two-Piece Rocker (For one LED)			
AML56-H  Two-Piece Rocker (For two LED's)			

Example: **AML56-T10RB**
 Two-piece rocker; with LED window in one side, transmitted color, no legend; red (LED side) and blue (non-LED side).

- * Notes:
- Only one color code letter is necessary for AML56-E 1/2-rockers. AML56-E, -T, and -H rockers have an open window which allows LEDs to be flush with the rocker surface.
 - To order a 1/2-rocker without the LED "window," specify an AML54-E listing from the previous page.

HOW TO ORDER ROCKER LEGENDS

When specifying legended rockers, submit a legend order sheet to cover each catalog listing. These forms identify the maximum number of lines per area and the maximum characters per line, based on the type size you request. To insure proper legend orientation, rocker switch housings (when viewed from the panel front) should have the "MICRO SWITCH" identification facing UP or to the LEFT.

Rocker legend order sheets are shown on the following pages. Reproduce them on your office copier.

Legend Sheet	Form No.
AML54 Rockers	FO-63566
AML56 Rockers	FO-63564

Manuals

Manual Switches

Rocker Legend Sheet

AML54 Series

Honeywell

AML Rocker Legend Sheet

Account NO 126-284

Legend Order Guide																	
Button Type Orientation	Figure No	Max Lines/Area			Max Characters/Line			5/16	9/64	5/16							
		5/64	7/64	9/64	13/64	5/16	7/64				9/64	13/64	5/16				
AREA 1 E	1	2	2	2	1	1	1	1	0	7	5	4	5	3	2	1	0
AREA 1 E	2	2	2	2	2	1	1	1	0	7	5	4	5	3	2	1	0
AREA 2 F	3	2	2	2	2	1	1	1	0	7	5	4	5	3	2	1	0
AREA 1 T	4	2	2	2	2	1	1	1	0	7	5	4	5	3	2	1	0

Standard Legend Placement - 1. Transmitted Color—Legend on outer shell (Button)
 *2. Dead Front—Legend on insert
 Use Special Legends Section for other placements.
 *3. Projected Color - Legend on outer shell (Button)
 *4. Transmitted color with clear cap legend on insert.
 *NOT AVAILABLE WITH AML 34 SERIES
 5. All legends will be centered within the legendable areas.

Customer Part No	Fig No	Type Size		Ink Color		But- ton Qty	Area 1 Sequence: Left-to-Right or Top-to-Bottom		Area 2
		5/64	7/64	9/64	13/64		5/16	1st Line	

FO-63586-E _____ (Signature) _____ (Date)

Catalog Listing **AML54 -** Customer Dwg. No. _____
 Customer P.O. No. _____
 MICRO SWITCH Sales Order _____ Line Number _____ Schedule No. _____

Customer: _____
 Address: _____ (city) _____ (state) _____

Instructions

1. Fill in appropriate catalog listing - one listing/sheet.
2. Check proper figure #, Type size, Type color.
3. Fill in quantity required.
4. Indicate legends desired — Do not exceed maximums shown in legend order guide.

Note

1. For Proper Legend Orientation, AML housings (when viewed from front of panel) should have "MICRO SWITCH" logo oriented "UP" on square devices and "UP" or to the "LEFT" on rectangular devices.
2. Please use black ink in filling out this form to help us process your order.

SPECIAL LEGENDS

NOTE: Use this area to show special Legend Locations or Configurations NOT shown below. NON-STANDARD legends will involve additional charges and increased delivery time.

Fig. "A" _____ Fig. "B" _____

A3 Modified Gothic

Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.

STANDARD SYMBOLS AVAILABLE											
.	,	:	;	!	?	'	—	"	/	*	&
\$	¢	#	%	o	+	-	±	+	x	=	≠
→	↑	↓	↖	↗	↘	↙	↚	↛	↜	↝	↞

Manual Switches

Rocker Legend Sheet

AML56 Series

Honeywell

AML Rocker Legend Sheet

Account NO 126-284

Legend Order Guide											
Button Type Orientation	Figure No	Max Lines/Area			Max Characters/Line			5/16	13/64	5/16	
		5/64	7/64	9/64	5/64	7/64	9/64				
AREA 1	E	1	1	1	0	0	7	5	5	3	0
AREA 1	E	2	1	1	1	0	7	5	5	3	0
AREA 1	H	3	1	1	1	0	7	5	5	3	0
AREA 2	N	4	2	2	2	1	7	5	5	3	1
AREA 2	T	5	1	2	2	1	7	5	5	3	0

Standard Legend Placement - 1. All legends will be centered within the legible areas.
Use Special Legends Section for other placements.

Catalog Listing
AML56 -

Customer P.O. No. _____ Customer Dwg. No. _____

MICRO SWITCH Sales Order _____ Line Number _____ Schedule No. _____

Customer: _____

Address: _____ (city) _____ (state) _____

Instructions

1. Fill in appropriate catalog listing - one listing/sheet.
2. Check proper figure #, Type size, Type color.
3. Fill in quantity required.
4. Indicate legends desired - Do not exceed maximums shown in legend order guide.

Note

1. For Proper Legend Orientation, AML housings (when viewed from front of panel) should have "MICRO SWITCH" logo oriented "Up" on square devices and "Up" or to the "LEFT" on rectangular devices.
2. Please use black ink in filling out this form to help us process your order.

SPECIAL LEGENDS

NOTE: Use this area to show special Legend Locations or Configurations NOT shown below. NON-STANDARD legends will involve additional charges and increased delivery time.

Fig. "A" _____ Fig. "B" _____

Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.		A3		Modified Gothic	
STANDARD SYMBOLS AVAILABLE					
•	;	!	?	'	"
\$	¢	%	o	+	-
→	↖	↗	↘	↙	↚
←	↖	↗	↘	↙	↚
∞	∞	∞	∞	∞	∞

Customer Part No	Fig No	Type Size		Ink Color		But- ton Qty	Area 1		Area 2	
		5/64	7/64	9/64	13/64		5/16	Black		White
							1st Line	2nd Line	1st Line	2nd Line

FO-63664-D _____ (Signature) _____ (Date)

Manuals

Manual Switches Mounting Hardware

AML61 Series

FOR STRIP AND MATRIX MOUNT ASSEMBLIES

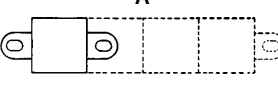
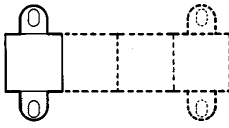
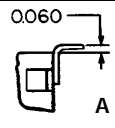
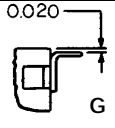
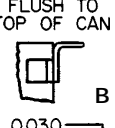
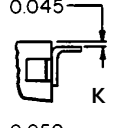
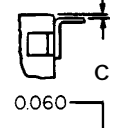
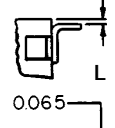
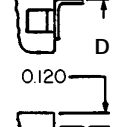
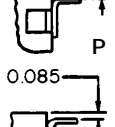
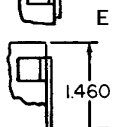
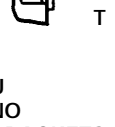

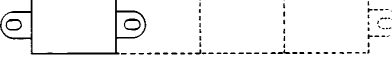
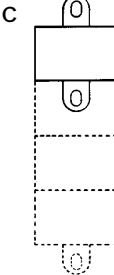
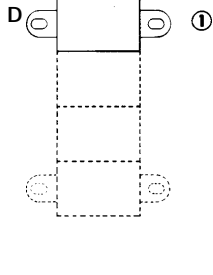


FEATURES

- Enables subpanel mounting of devices in factory assembled metal cans which are welded together in strips or matrices. Assures accurate alignment and enables pre-wiring.
- L-shaped mounting brackets conform to various panel thicknesses, using spacers.
- Simplifies panel fabrication, since only one large cutout is required.
- Facilitates printed circuit board mounting. Operating force is transmitted to mounting hardware, rather than P.C. board.
- For custom matrices contact the MICRO SWITCH Application Center.
- Mounting dimensions page 65.

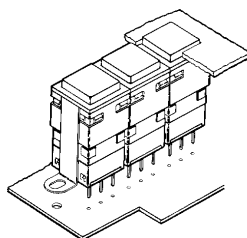
AML61 MOUNTING HARDWARE ORDER GUIDE

(For standard strip mount assemblies)

AML61 B	A	5	A
Type	Mounting Bracket Orientation	Number of Cans	Mounting Bracket Location
<p>Square cans:</p> <p>AML61 B (Plain finish)</p> <p>AML61 J (Black finish)</p>	<p>A</p>  <p>E</p> 	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9*</p> <p>10*</p> <p>11*</p> <p>12*</p> <p>*A, C, D & E orientation only.</p>	<p>A</p>  <p>G</p>  <p>BRACKET FLUSH TO TOP OF CAN</p> <p>B</p>  <p>K</p>  <p>C</p>  <p>L</p>  <p>D</p>  <p>P</p>  <p>E</p>  <p>T</p>  <p>F</p>  <p>U NO BRACKETS</p>
<p>Rect. cans:</p> <p>AML61 E (Plain finish)</p> <p>AML61 K (Black finish)</p>	<p>B</p>  <p>C</p>  <p>D</p>  <p>①</p>		

① To order one rectangular can with mounting brackets on short sides, specify AML61EB1____ or AML61KB1____.

Example: **AML61EC5A**
Five rectangular cans, plain finish (un-painted), long sides abutting; type **A** mounting brackets on long sides, located flush with switch or indicator bezel. (Type **T** bracket brings top of annunciator bezel flush with top of .160 in./4,1 mm panel.)



This strip has Type F brackets for P.C. board mounting.

NON-STANDARD ASSEMBLIES

Use the order form on the following page to specify non-standard AML61 strip or matrix assemblies. You may reproduce it on your office copier, or order pads from the 800 number. Request FO-63558.

Manual Switches

Barriers/Panel Seal Accessories

AML71/75 Series

AML71 BARRIERS

When mounting an individual unit, an end barrier is attached to each side of the housing. The center barrier is used in a slot mount array.

FEATURES

- Barriers separate individually mounted switches and indicators — help prevent inadvertent actuation of two pushbutton switches with a single push.
- Front of panel mounting simplifies installation.

AML71 BARRIER ORDER GUIDE (See notes)

Barriers shown in order guide are black.

Barrier Length	Type	Catalog Listing
Short (For use with square devices and short side of rectangular devices.)	Center	AML71SCB
	End	AML71SEB
Long (For use with long side of rectangular devices.)	Center	AML71LCB
	End	AML71LEB

Notes:

Not for use with AML61 mounting hardware or any full guard bezel products.
Not for use with AML41J, K, or L lens type indicators; or AML45 annunciators.

FEATURES

- AML75 panel seals fit pushbutton switches and indicators.
- Provides protection from contamination from accidental beverage spills, dust, and dirt.
- Easy to install, without tools
- No effect on display color, light intensity, or legend quality.
- Replace seal or change lamps without removing switch from panel.
- For .19-inch standard height square or rectangular pushbuttons.
- Mounting dimensions page 66.

The design complements AML's functional appearance, creating a pleasing framed effect around the button. It consists of a matte black plastic base which press-fits between the panel and switch bezel, and a transparent flexible seal which snaps into the base. PK 8521, shipped with each order, provides installation instructions.

Button colors and legends can be viewed without distortion whether lighted or unlighted. Seals can be conveniently replaced or removed for relamping, without removing the switch from panel.

Operating temperature range is 32° to 131°F (0° to 55°C).

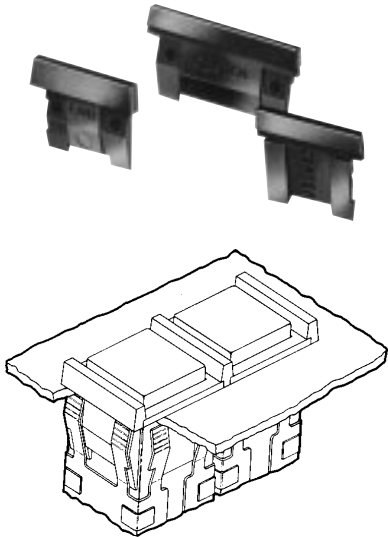
AML75 PANEL SEAL ORDER GUIDE

Description	For Use With:		
	Square .19" high pushbuttons	Rectangular .19" high pushbuttons	Rockers
Base & Seal	AML75ABC	AML75BBC	AML75RBC
Base Only	AML75ABN	AML75BBN	—
Seal Only	AML75ANC	AML75BNC	—

Notes:

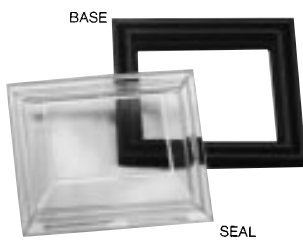
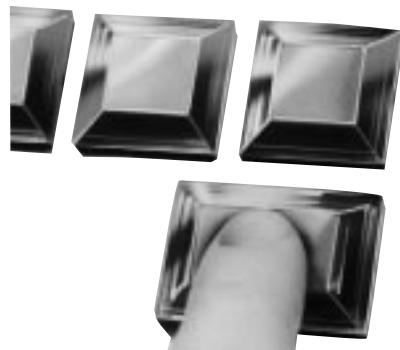
Multiple units should not be mounted in a single slot, since this would create an unsealed space between each unit. AML75 seals are not for use with barriers, full

guard bezels, AML61 mounting hardware, AML45 annunciators, or AML41J, K, or L lens type indicators.



Drawing shows two switches, slot mounted. From left to right: one center barrier, a second switch, plus another end barrier to complete the arrangement.

AML75 PANEL SEAL



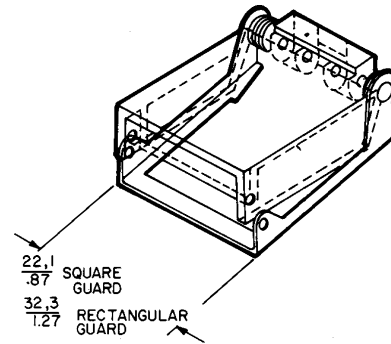
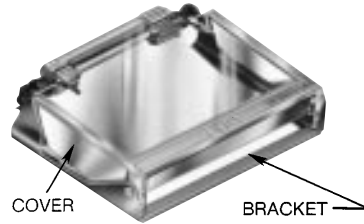
MATERIAL
Base: Polypropylene
Cap: Polyvinyl Chloride

Manuals

Manual Switches

Switch Guard/Panel Plugs, Dummy Housings

AML76/78 Series



FEATURES

- Button cannot be operated when switch guard cover is closed, preventing accidental operation
- Wire lock-down feature further prevents unintentional actuation of the switch.
- Lamps can be replaced with the switch guard attached, without special tools, saving maintenance time
- Can be used with alternate or momentary action square or rectangular .19 inch standard height AML buttons
- Shock resistant construction, for long, maintenance-free life

AML76 switch guard protects square and rectangular .19-inch standard height pushbuttons from inadvertent actuation. It is for use with standard bezel type switches only.

See page 66 for mounting dimensions.

The switch guard cover is clear, polycarbonate thermoplastic through which the button is easily visible. The word "lift" is molded onto the top front edge of the guard. The bracket is bright-finished stainless steel.

The switch guard may be assembled to the AML pushbutton before the switch is installed in a panel. Or, the guard can be assembled to a pushbutton already mounted in a panel, providing the wiring is sufficiently slack to raise the switch bezel above the panel; and if there is sufficient clearance with adjacent units. PK 8522 contains installation instructions and is shipped with each order.

AML switch guards may be mounted in horizontal or vertical matrices. A wire lock-down feature, using .020-inch diameter locking wire, may be used as an additional protection.

SWITCH GUARD ORDER GUIDE

Guard Type*	Catalog Listing
Square	AML76C10T01P
Rectangular	AML76F10T01P

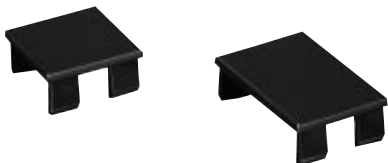
* The word "LIFT" is molded into the cover. If other languages are desired contact the 800 number.
 Note: Switch guard is not designed for use with AML61 mounting hardware, AML71 barriers, or full guard bezel switches.

CONNECTOR BLOCK



This connector block can be used with square 1 and 2 pole AML21 switches with .110 x .020 terminals to enable plug-in wiring.

AML78 PANEL PLUGS



Plastic panel plugs (shown above) enable the user to provide for future needs by punching extra panel holes. Finished in matte black, they are the same height as the standard AML bezel when snapped in place from the panel front.

Panel plugs are only for use in individual holes or with AML61 mounting hardware in multi-station strips. (Use dummy housings in strip cutouts without AML61 mounting hardware.)

PANEL PLUG ORDER GUIDE

Plug Type	Catalog Listing
Square	AML78CB
Rectangular	AML78FB

AML78 DUMMY HOUSINGS

Dummy housings can be used to provide for expansion needs in strip cutouts without AML61 mounting hardware. They have mounting clips, but there is no provision for switching or illumination.

DUMMY HOUSING ORDER GUIDE

Dummy Housing Type*	Catalog Listing
Square (Pushbutton style)	AML78C100
Rectangular (Pushbutton style)	AML78F100
Rectangular (Lens indicator style)	AML78J100

* Order AML51 Buttons/lenses for use with dummy housings.

Manual Switches

Lamps, Soldering Recommendations, Receptacles

AML91 Series

AML91 LAMP ORDER GUIDE

Lamp Type	Industry Lamp No.	Voltage	Catalog Listing
Incandescent T-1-3/4 wedge base	86	6.3	AML91LA86
	73	14.0	AML91LA73
	85	28.0	AML91LA85

LAMP DATA

The following data was compiled from manufacturer's specifications, for reference only.

INCANDESCENT LAMPS

Industry Lamp No.	Volts	Amps	Watts	MSCP	Life A/C Volts
86	6.3	.200	1.25	.49	20,000 hours
	5.5	.185	1.12	.246	106,200 hours
	5.0	.177	.89	.185	290,000 hours
73	14.0	.080	1.12	.30	15,000 hours
	12.0	.077	1.00	.23	36,450 hours
85	28.0	.04	1.12	.30	7,000 hours
	24.0	.037	.89	.177	41,860 hours

Neon Lamps

25,000 hours (half life)

INTEGRAL LEDs

LEDs Furnished Permanently Installed in These Products	V _f	I _f	V _{PD}	Peak Inverse Voltage	
				w/o Diode Protection	w/Diode Protection
AML12, 15, 16, 22, 25, 26, 42	2.4 V	20 mA	.7 V	5 V	34 V
AML45	2.4 V	20 mA	.7 V	4 V	33 V

100,000 hours (half life).

AML92 SERIES LEDs



For use with these AML switches and indicators equipped with lamp sockets:

Pushbutton switches: AML11 (Square Only)*, AML21 (rectangular and square), and AML31.

Paddle switches: AML31/23/33

Rocker switches: AML14/24/34

Indicators: AML41

* Rectangular solid state with one or two lamp circuits cannot be used with LED catalog listings ending in "L".

AML92 ORDER GUIDE

LED Color	Quad Chip	Six Chip
Red	AML92ERY	AML92ERL
Green	AML92EGY	AML92EGL
Yellow	AML92EYY	AML92EYL
White	—	AML92EWL*

* For use with white or yellow buttons.

OPERATING CHARACTERISTICS

Type	V _f Fwd. Voltage (typ.)				I _f Fwd. Current	V _R Rev. Voltage
	Yellow	Green	Red	White		
Quad Chip	8.6	8.6	7.8	—	15 mA	16 V
Six Chip	4 V	4 V	4 V	4 V	50 mA	5.6 V

TEMPERATURE RANGE

(Quad Chip or Six Chip)

Operating: -20 to 60°C (-4 to 140°F)

Storage: -30 to 100°C (-22 to 212°F)

For application help: call 1-800-537-6945.

SOLDERING RECOMMENDATIONS

All terminals are solder plated. Proper soldering and cleaning procedures must be followed to maintain the reliability of AML products during installation. An instruction sheet which outlines these procedures is included with AML shipments. You may also obtain a copy from your MICRO SWITCH Sales Office. Request PK 8518.

As a general guide, the following information may be used:

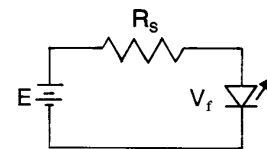
Use a 280°C (538°F) solder iron tip, up to 6 seconds duration, with a 60-40 rosin core solder. This allows the terminal to heat quickly on the exterior of the housing only, and greatly reduces the chance of flux migrating inside the housing.

LED APPLICATION INFORMATION

For those devices without internal current limiting resistors, suitable external control of the LED current must be provided. It is recommended that a minimum of 5 VDC open circuit voltage with an appropriate series resistance be used to drive LED devices. This minimizes the effect of temperature (current variation) on forward voltage of the LED.

Resistor values can be determined by supply voltage or current for LED:

$$R_s = \frac{E - V_f}{I_f}$$



WHERE: R_s = Series Resistance

E = Supply Voltage

V_f = Forward Voltage of LED

I_f = Circuit Current

If a diode is added in series for reverse polarity protection then:

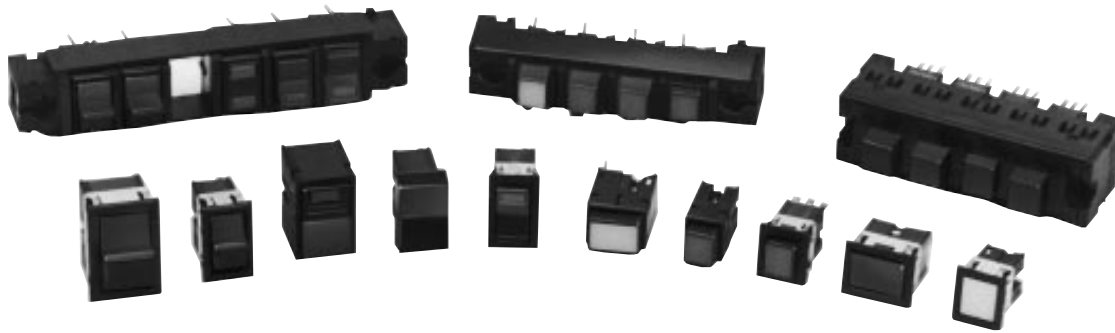
$$R_s = \frac{E - V_f - V_{PD}}{I_f}$$

WHERE: V_{PD} Forward Voltage of Protection Diode

Manual Switches

Miniature Manual Line

MML Series



FEATURES

- Breadth of line offers complete selection of pushbuttons (including encoding options), rockers, paddles and indicators to accommodate different functions and promote operator efficiency.
- Printed wiring board (PWB) or panel mounted switches, plus multi-unit strip mounting, and single level termination for cost-effective installation.
- Tactile feedback imparts a definite feel of switching action.
- Coordinated appearance enhances panel harmony.
- Illumination by long-life LED's and incandescent lamps—for lighted display versatility.
- Solid state, electronic control and power duty switching—for electrical versatility.
- Temperature range: -18° to 65°C (0° to 149°F).

DESIGN FREEDOM

Rocker and paddle switches have been added to the MICRO SWITCH MML Miniature Manual Line. They complement AML pushbuttons and indicators, providing you flexibility and design freedom to answer all your miniature manual control requirements. You can choose the actuator option that matches the switch function and natural habit pattern reflex of the operator. You no longer need to compromise quality, appearance, or human factors considerations, because of size constraints.

The MML pushbutton and indicator offering has also been expanded to include new square forms which are small enough to fit in the tightest places.

MOUNTING FLEXIBILITY

Printed wiring board (PWB) mounted switches can be arranged in individual panel openings, multi-unit strips or matrices, in a common panel cutout. Optional support brackets provide added rigidity for stand-alone PWB mounted devices. Units with bezels and mounting clips can be snap-in mounted from the panel front.

Single level PWB or solder/quick-connect termination throughout makes wiring faster, easier, and more economical. Housings are designed to accommodate washing, before and after wave soldering, to help prevent contamination during printed wiring board installation.

LIGHTED DISPLAY OPTIONS

Pushbuttons and indicators can be full-face illuminated by LED's or incandescent lamps for high visibility of colors and legends. Inherently rugged, long-life LED's reduce service and maintenance costs. Also, their low drive and inrush current (30 mA or less) reduces costs of drive circuitry.

Rockers can be furnished with colored lenses for illumination by LED's or incandescent lamps.

CONTROL VERSATILITY

Solid state pushbutton switches with Hall effect integrated circuits interface directly with microprocessors and other logic level devices. Time-proven for billions of cycles, Hall effect IC's provide the ultimate in reliability.

Electronic control pushbutton, rocker, and paddle switches, with gold or silver contacts, handle up to 1 amp; power duty switches, up to 6 amps.

Manual Switches

Miniature Manual Line

MML Series

MML ENHANCES PANEL HARMONY

The attractive clean line design of the total MML offering is coordinated to work in harmony and enhance the visual qualities of your product. MML will help make a good first impression with your customers by blending with other panel components. And also work hard over the long run to maintain operator satisfaction.

HOW TO ORDER

To specify MML catalog listings, refer to the order guides. They are based on a modular cataloging system which gives you the flexibility to choose the combination of feature options that best answers the requirements of your application.

ORDER GUIDES

Solid State Switches

MML11 Pushbutton Switches 70

Electronic Control Switches

MML21 Pushbutton Switches 72

MML23 Paddle Switches 74

MML24 Rocker Switches 74

Power Duty Switches

MML31 Pushbutton Switches 76

Indicators

MML41 Indicators/LED or Incandescent Display 78

MML46 Indicators/LED or Incandescent Display 78

MML44 Indicators/LED Display 80

Lenses and Buttons

MML51 Lenses/Incandescent or Non-lighted Display 82

MML52 Lenses/LED or Neon Display 82

Mounting Hardware

MML61 Strip Mounting Frames 85

MML72/73 Bezels and Mounting Clips 86

MML74 PWB Mount Support Brackets 86

LED's, Lamps, Receptacles

MML92/93 LED's/Receptacles 87/90

MML91/93 Incandescent Lamps/Receptacles 89/90



MML medical application. Intranavenous fluid flow controller automatically dispenses fluids for medications, therapy, and nutrition.



MML communications application. Mobile radio control keeps businesses in touch with employees on the road.

Manual Switches

Miniature Manual Line

MML Series

MML CHARACTERISTICS

	MML 10 Series	MML 20 Series	MML 30 Series	MML 40 Series
Mechanical Lifetime*				N/A
Pushbuttons–Momentary	1,000,000	250,000	100,000	---
Pushbuttons–Alternate	100,000	100,000	100,000	---
Rockers	100,000	250,000	100,000	---
Paddles	100,000	250,000	100,000	---
Electrical Lifetime***				N/A
Pushbuttons–Momentary	1,000,000	25,000	25,000	---
Pushbuttons–Alternate	100,000	25,000	25,000	---
Rockers	100,000	25,000	25,000	---
Paddles	100,000	25,000	25,000	---
Agency Ratings				
UL	File E53576	File E12252	File E12252	File E58932
CSA	File L R4442	File LR4442	File LR4442	File LR4442

* 95% Survival
 ** Lifetime at Full Rated Load


MML ELECTRICAL DATA

MML10 SERIES

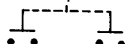
Electrical Characteristics	Integrated Circuit Function	5-24 VDC Sinking	
	Supply Current (Max.)	7 mA (Released) 8 mA (Operated no load)	
	Output Voltage (Operated)	0.3 Volt (Sinking 10 mA)	
	Output Leakage Current Max. (Released)	5.0 μ A	
	Switching Time Max.		
	Rise 10% to 90%	1.5 μ sec (Sinking 10 mA)	
	Fall 90% to 10%	0.5 μ sec (Sinking 10 mA)	
	Rated Output Current	10 mA Sinking	
	Absolute Maximum Ratings	Supply Voltage (V _s)	-28 to +28 VDC
		Voltage Externally Applied to Output	-0.5 Volt min. +28 Volts max. (Off condition)
Loads to Output		20 mA (Sinking)	
Storage Temperature		-40° to +85°C (-40° to +185°F)	
Operating Temperature		-18° to +65°C (0° to +149°F) and supply voltage of 4.5 to 5.5 VDC	

As with all solid state components, performance can be expected to deteriorate as rating limits are approached; however, they will not be damaged unless the limits are exceeded.

MML20 SERIES

Electrical Rating (silver contacts)	Standard buttons
	Up to 1 amp, 125 VAC
Electrical Rating Gold Contacts	1 piece plunger/lens cap buttons:
	Black—Up to 1 amp, 125 VAC
	All others—Up to 0.5 amp, 125 VAC
Electrical Rating Gold Contacts	All button styles:
	Up to 0.25 amp, 30 VDC UL rating—0.10 amp, 30 VDC
	One pole Form C
	

MML30 SERIES

MML31:	
Electrical Rating	6A @ 125 VAC, 250 VAC; 2A @ 30 VDC;
	Silver Contacts 1A @ 125 VDC "L"; 1/10 hp @ 125 VAC
Contact Arrangement	1 or 2 poles Form X
	

Manuals

Manual Switches

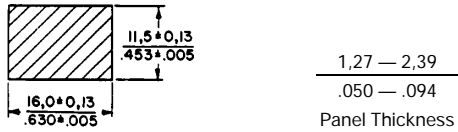
Miniature Manual Line

MML Series

MOUNTING DIMENSIONS (For reference only)

PANEL CUTOUTS FOR PUSHBUTTON SWITCHES AND INDICATORS/RECTANGULAR TYPE

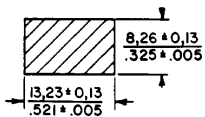
INDIVIDUAL SNAP-IN PANEL MOUNT



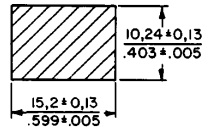
PANEL PUNCH FOR MML SERIES

A panel punch is manufactured by Greenlee-Textron Tool Co., Rockford, IL (815-926-3011).

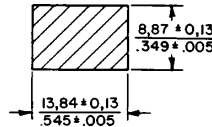
INDIVIDUAL PRINTED WIRING BOARD (PWB) MOUNT



Pushbutton Plunger Thru Panel



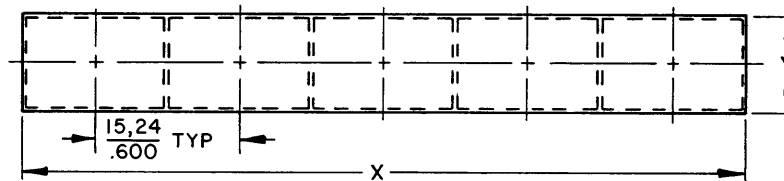
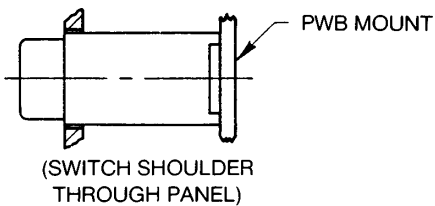
Housing Thru Panel



Indicator Lens Thru Panel

MULTI-UNIT PRINTED WIRING BOARD (PWB) MOUNT

Horizontal Mount



Establish tooling holes on X coordinate and use these holes to establish relationship between PWB and Panel

$$\text{Terminals } \frac{0.20}{.008} \times \frac{0.76}{.030}$$

Recommended hole size in PWB $\frac{1.17}{.046}$

$$N = \text{Number of switches}$$

$$X = N-1 \times \frac{15.24}{.600} + \frac{15.11}{.595}$$

$$Y = \frac{10.16}{.400}$$

Example: N = 5 Switches

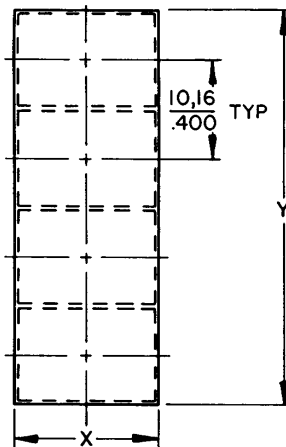
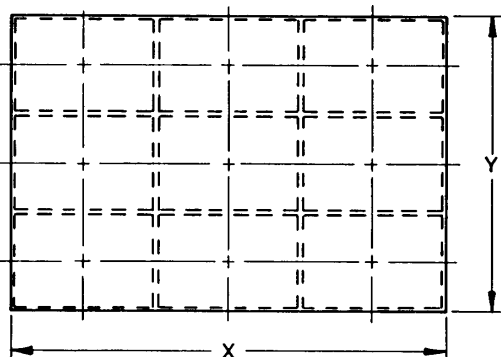
$$X = 5-1 \times \frac{15.24}{.600} + \frac{15.11}{.595}$$

$$X = \frac{76.07}{2.995}$$

Switches must be fixtured to insure proper panel cutout alignment

Matrix Mount

Vertical Mount



$$N = \text{Number of Switches}$$

$$N_x = \text{Number of Rows}$$

$$N_y = \text{Number of Columns}$$

$$N = N_x-1 \times \frac{15.24}{.600} + \frac{15.11}{.595}$$

$$Y = N_y \times \frac{10.16}{.400}$$

$$N = \text{Number of Switches}$$

$$Y = N \times \frac{10.16}{.400}$$

$$X = \frac{15.11}{.595}$$

Example: N = 4

$$Y = 4 \times \frac{10.16}{.400}$$

$$Y = \frac{40.64}{1.600}$$

Manuals

Manual Switches

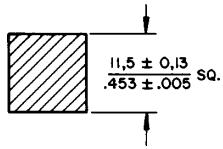
Miniature Manual Line

MML Series

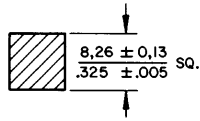
MOUNTING DIMENSIONS (For reference only)

PANEL CUTOUTS FOR PUSHBUTTON SWITCHES AND INDICATORS/SQUARE TYPE

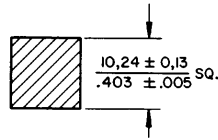
Individual Snap-in Panel Mount



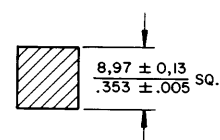
Individual Printed Wiring Board PWB Mount



Pushbutton Plunger Thru Panel



Housing Thru Panel

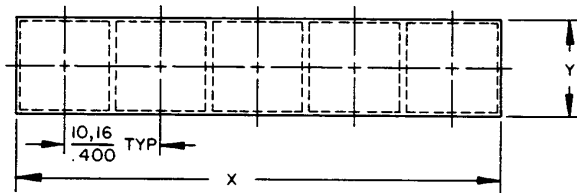
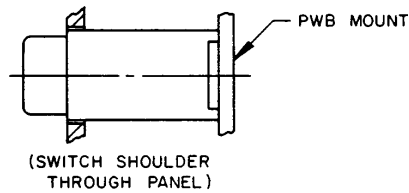


Indicator Lens Thru Panel

See page 91 for panel punch manufacturer.

MULTI-UNIT PRINTED WIRING BOARD (PWB) MOUNT

Horizontal Mounting



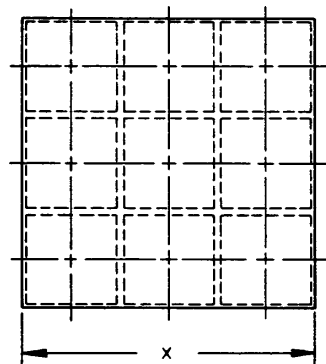
Establish tooling holes on X coordinate and use these holes to establish relationship between PWB and Panel

$$\text{Terminals } \frac{0.20}{.008} \times \frac{0.76}{.030}$$

Recommended hole size in PWB $\frac{1.17}{.046}$

Switches must be fixtured to insure proper panel cutout alignment

Matrix Mounting



N = Number of Switches
 N_x = Number of Rows
 N_y = Number of Columns

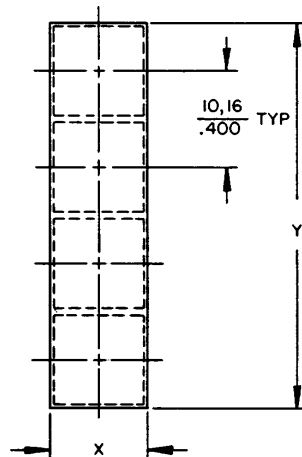
$$\text{Formula: } X = N_x \times \frac{10.16}{.400}$$

$$Y = N_y \times \frac{10.16}{.400}$$

Formula:
N = Number of switches
 $X = N \times \frac{10.16}{.400}$
 $Y = \frac{10.16}{.400}$

Example: N = 5 Switches
 $X = 5 \times \frac{10.16}{.400}$
 $X = \frac{50.80}{2.00}$

Vertical Mounting



N = Number of Switches
Formula: $Y = N \times \frac{10.16}{.400}$

$$X = \frac{10.16}{.400}$$

Example: N = 4
 $Y = 4 \times \frac{10.16}{.400}$
 $Y = \frac{40.64}{1.600}$

Manual Switches

Miniature Manual Line

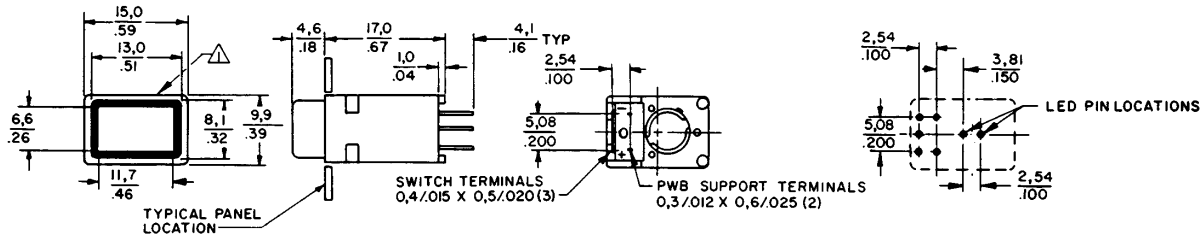
MML Series

MOUNTING DIMENSIONS (For reference only)

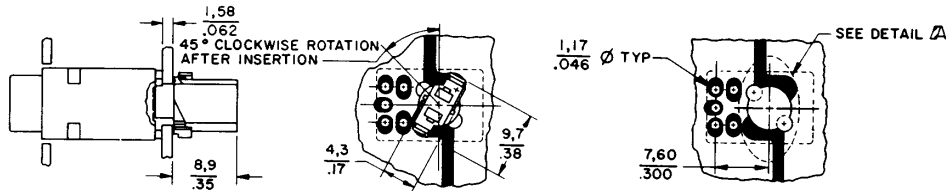
PRINTED WIRING BOARD MOUNT PUSHBUTTON SWITCHES/RECTANGULAR TYPE

MML11 Switches

PWB Pin Locations

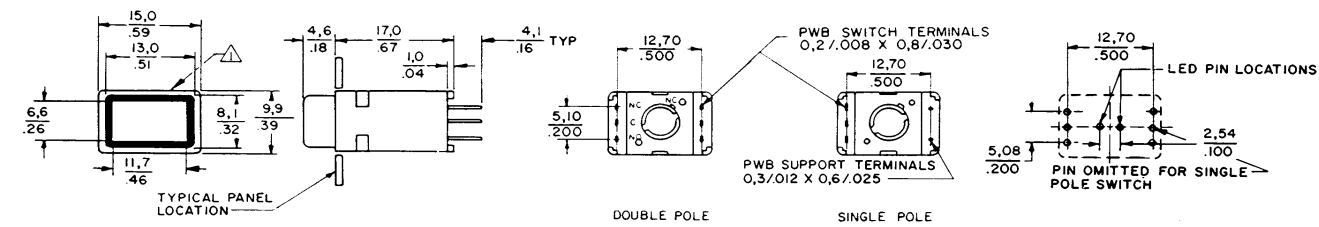


PWB Receptacle Installed (LED or Incandescent Lamp)

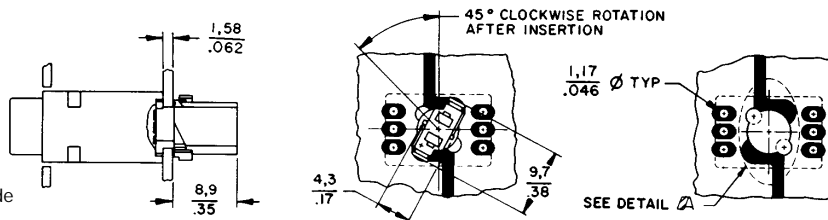


MML21 Switches

PWB Pin Locations



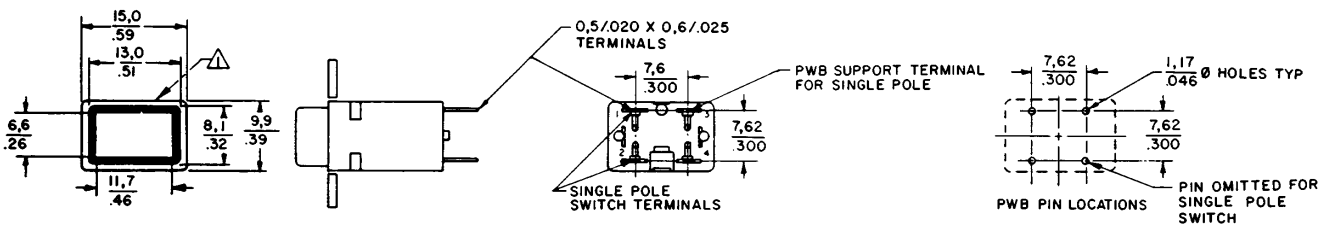
PWB Receptacle Installed (LED or Incandescent Lamp)



Notes:

Δ Micro Switch Identification This Side
2 - Linear measure mm/IN. or $\frac{\text{mm}}{\text{IN.}}$

MML31 Switches



Manuals

Manual Switches

Miniature Manual Line

MML Series

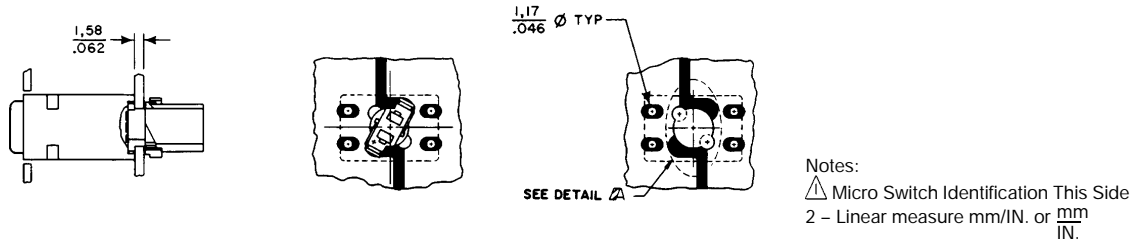
MOUNTING DIMENSIONS (For reference only)

PRINTED WIRING BOARD MOUNT INDICATORS/RECTANGULAR TYPE

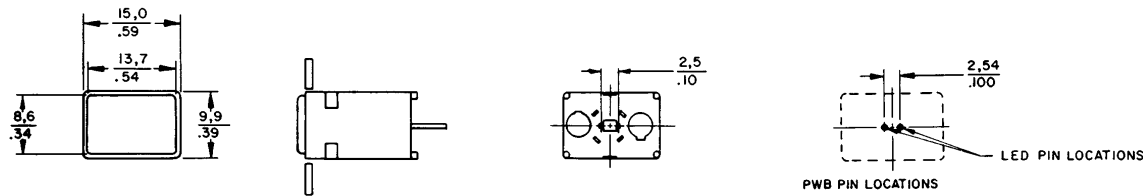
MML41 Indicators



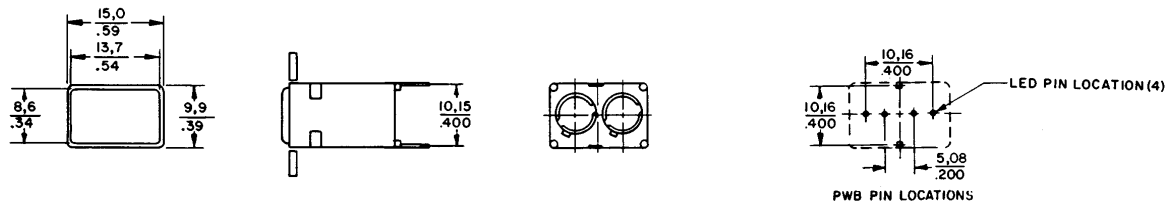
PWB Receptacle Installed (LED or Incandescent Lamp)



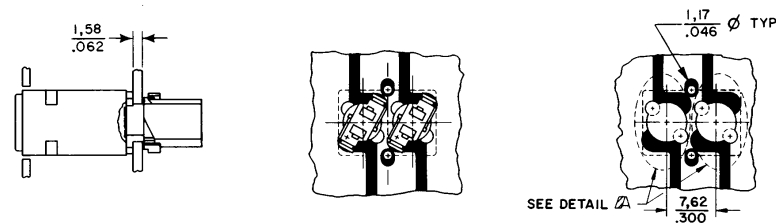
MML44 Indicators



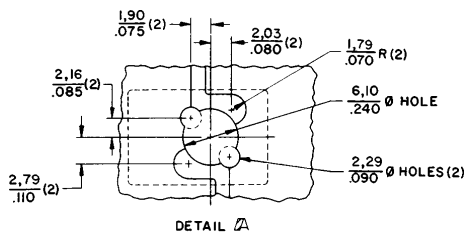
MML46 Indicators



PWB Receptacle Installed (LED or Incandescent Lamp)



PWB Pad Location For Receptacle (LED or Incandescent Lamp)



Manual Switches

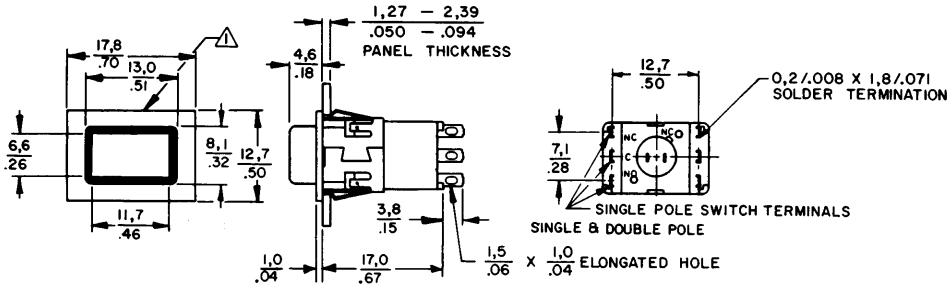
Miniature Manual Line

MML Series

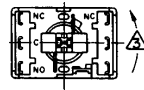
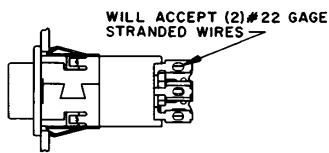
MOUNTING DIMENSIONS (For reference only)

PANEL MOUNT PUSHBUTTON SWITCHES/RECTANGULAR TYPE

MML21 Switches



Solder Receptacle Installed (LED or Incandescent Lamp)



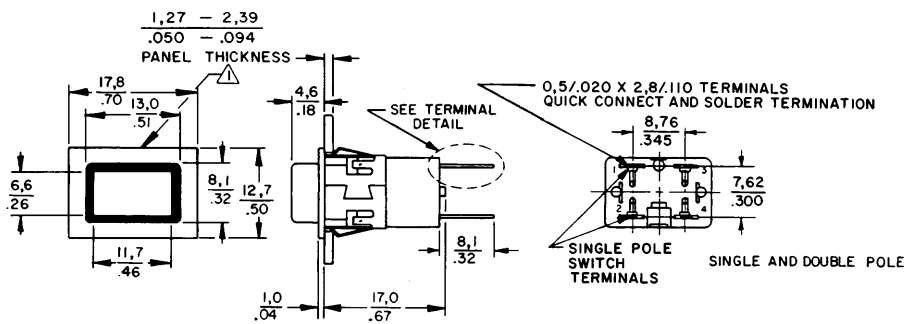
Notes:

△ Micro Switch Identification This Side

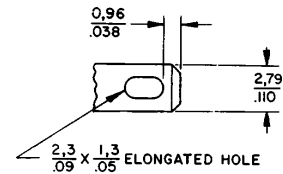
2 - Linear measure mm/IN. or $\frac{mm}{IN}$

△ Rotate 45° counter clockwise for removal from switch or indicator

MML31 Switches



Terminal Detail



Manuals

Manual Switches

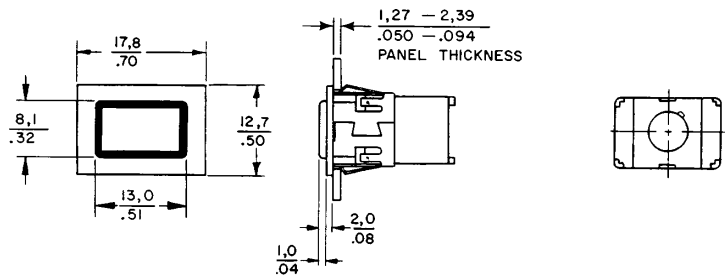
Miniature Manual Line

MML Series

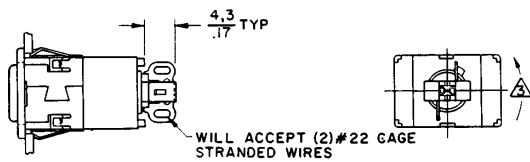
MOUNTING DIMENSIONS (For reference only)

PANEL MOUNT INDICATORS/RECTANGULAR TYPE

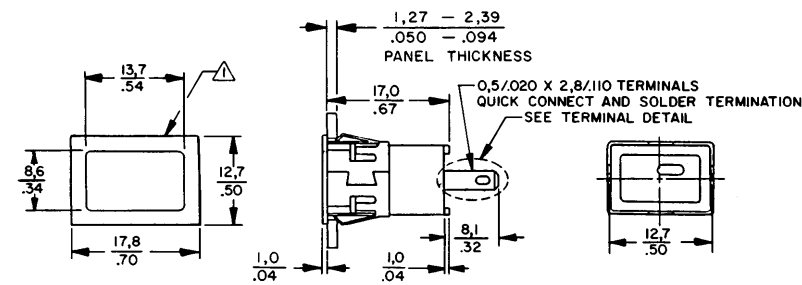
MML41 Indicators



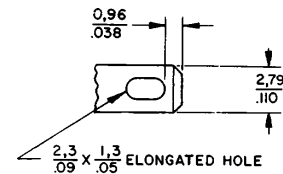
Solder Receptacle Installed (LED or Incandescent Lamp)



MML43 Indicators



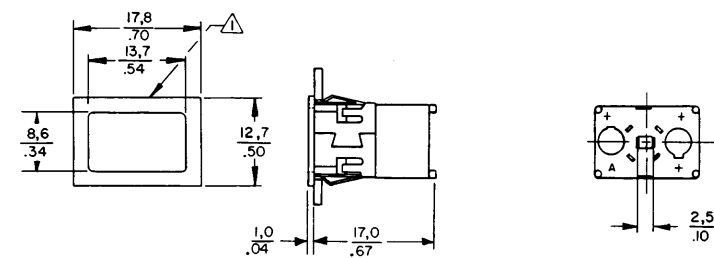
Terminal Detail



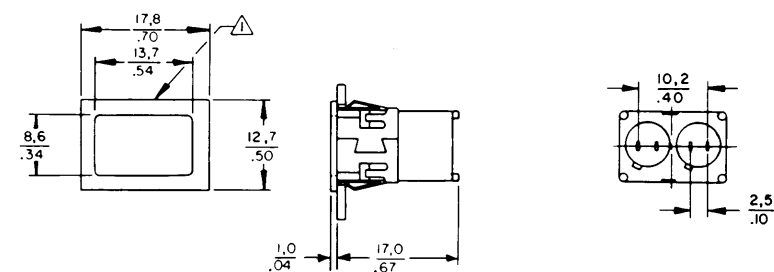
Notes:

- △ Micro Switch Identification This Side
- 2 - Linear measure mm/IN. or $\frac{\text{mm}}{\text{IN.}}$

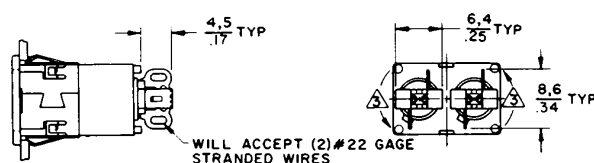
MML44 Indicators



MML46 Indicators



Solder Receptacle Installed (LED or Incandescent Lamp)



Manual Switches

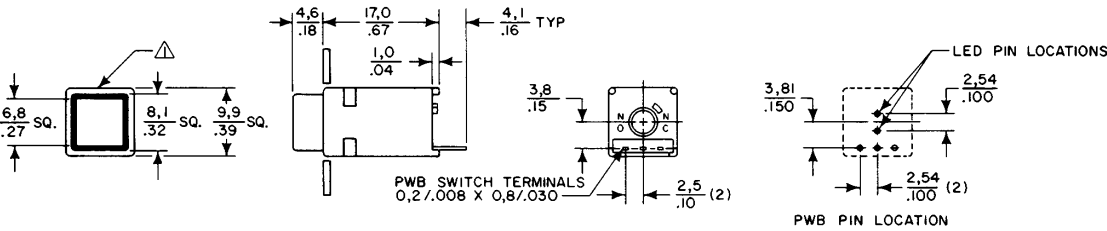
Miniature Manual Line

MML Series

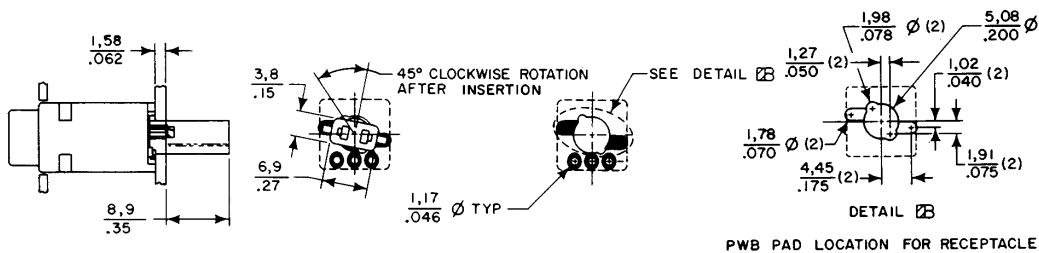
MOUNTING DIMENSIONS (For reference only)

PRINTED WIRING BOARD MOUNT PUSHBUTTON SWITCHES AND INDICATORS/SQUARE TYPE

MML21 Switches

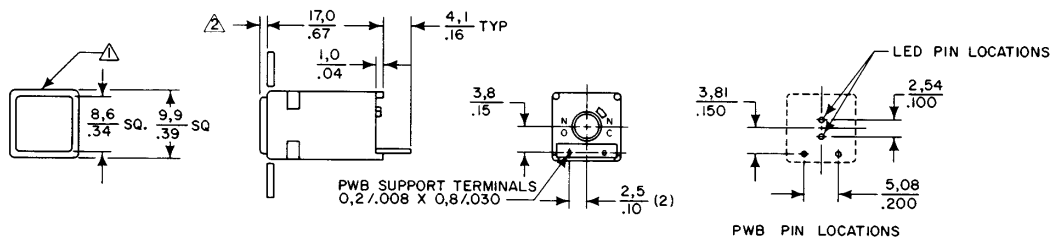


PWB Receptacle Installed (LED or Incandescent Lamp)

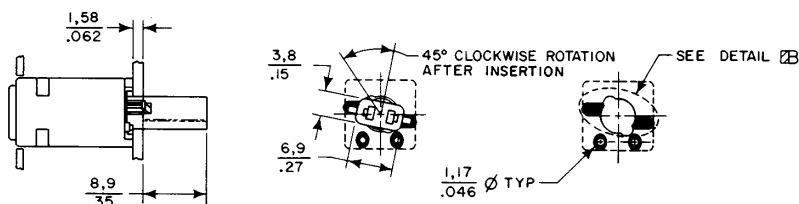


PWB PAD LOCATION FOR RECEPTACLE

MML46 Indicators



PWB Receptacle Installed (LED or Incandescent Lamp)



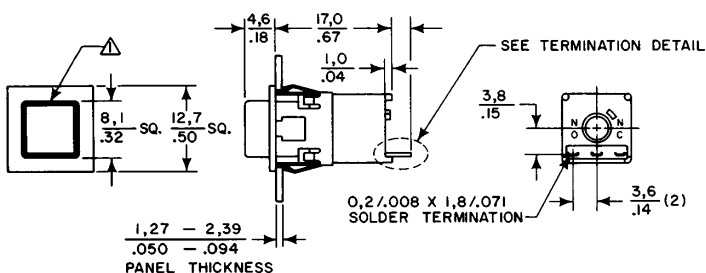
NOTES

- △ MICRO SWITCH IDENTIFICATION THIS SIDE
- △ MML41: 2.0/.08
- △ MML46: 1.0/.04
- 3-LINEAR MEASURE mm/IN OR mm/IN

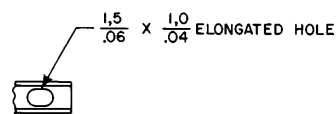
Manuals

PANEL MOUNT PUSHBUTTON SWITCHES/SQUARE TYPE

MML21 Switches



Termination Detail



NOTE:
To install LED or lamp, use MML93L receptacle shown on page 90.

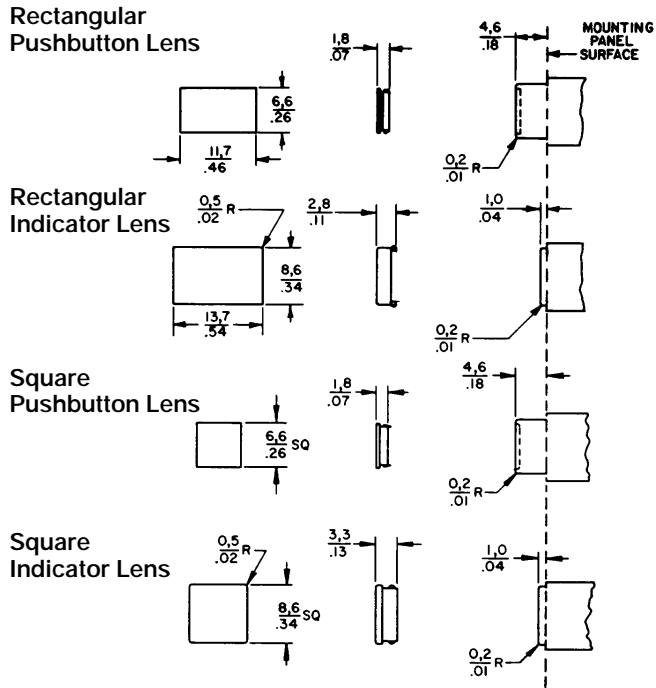
Manual Switches

Miniature Manual Line

MML Series

MOUNTING DIMENSIONS (For reference only)

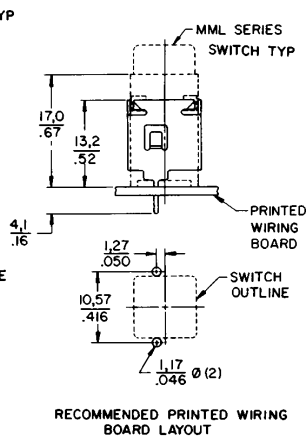
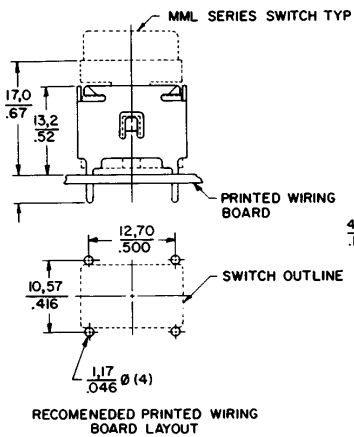
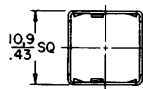
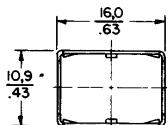
LENSES



PWB SUPPORT BRACKETS

Rectangular

Square



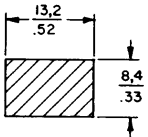
Manual Switches

Miniature Manual Line

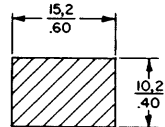
MML Series

MOUNTING DIMENSIONS (For reference only)

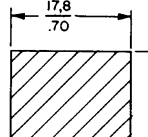
PANEL CUTOUTS FOR PWB MOUNT PADDLE AND ROCKER SWITCHES



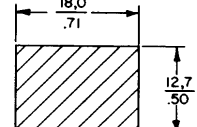
Actuator Thru Panel



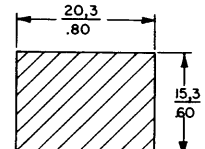
Housing Thru Panel



Umbrella Rocker Thru Panel



2-Pole MML33, 34 Actuator Thru Panel

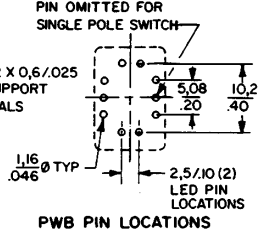
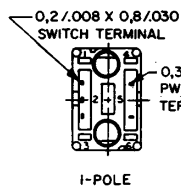
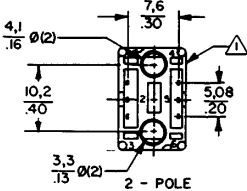
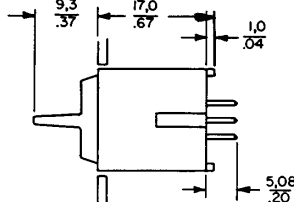
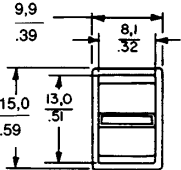


2-Pole MML33, 34 Housing Thru Panel

See page 91 for panel punch manufacturer.

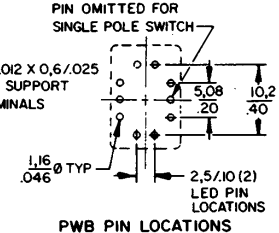
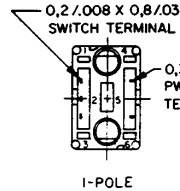
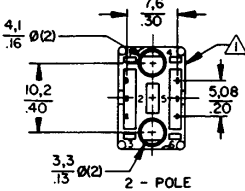
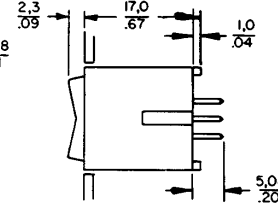
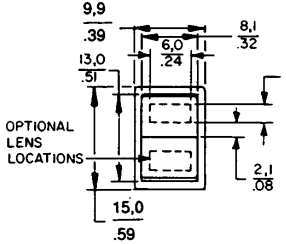
PRINTED WIRING BOARD MOUNT PADDLE AND ROCKER SWITCHES

MML23 Paddle Switches

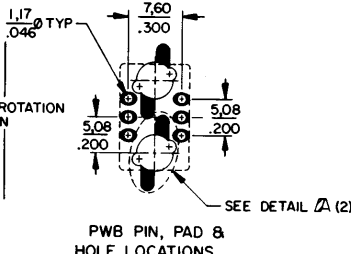
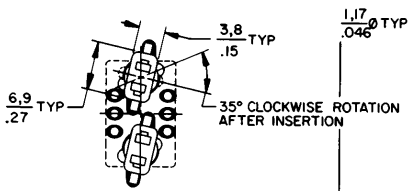
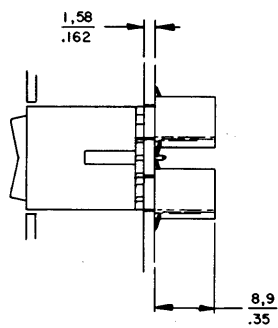


See MML24 drawing below for PWB receptacle dimensions

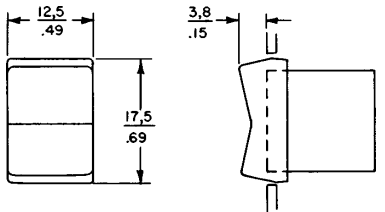
MML24 Rocker Switches



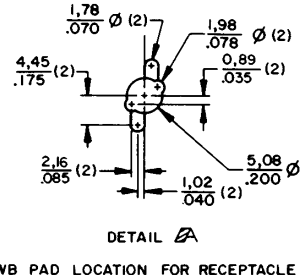
With PWB Receptacle Installed (LED or Incandescent Lamp)



MML24 Rocker (Umbrella Type) Switches



Notes:
 △ Micro Switch Identification This Side
 2 - Linear measure mm/IN. or mm/IN.



PWB PAD LOCATION FOR RECEPTACLE

Manuals

Manual Switches

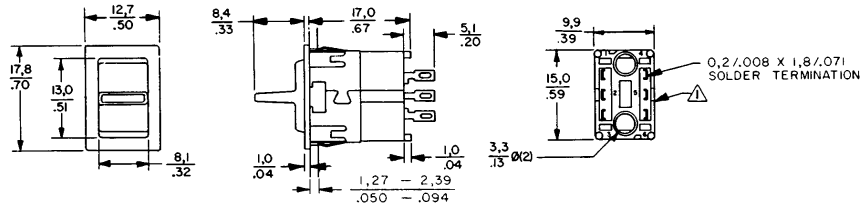
Miniature Manual Line

MML Series

MOUNTING DIMENSIONS (For reference only)

PANEL MOUNT PADDLE AND ROCKER SWITCHES

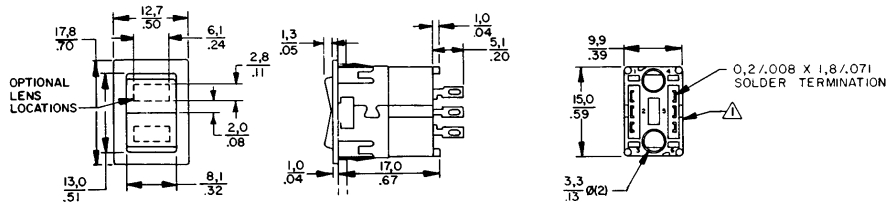
MML23 Paddle Switches



Notes:

△ Micro Switch Identification This Side
 2 - Linear measure mm/IN. or $\frac{\text{mm}}{\text{IN.}}$

MML24 Rocker Switches



NOTE:

To install LED or lamp, use MML93R receptacle shown on page 89.

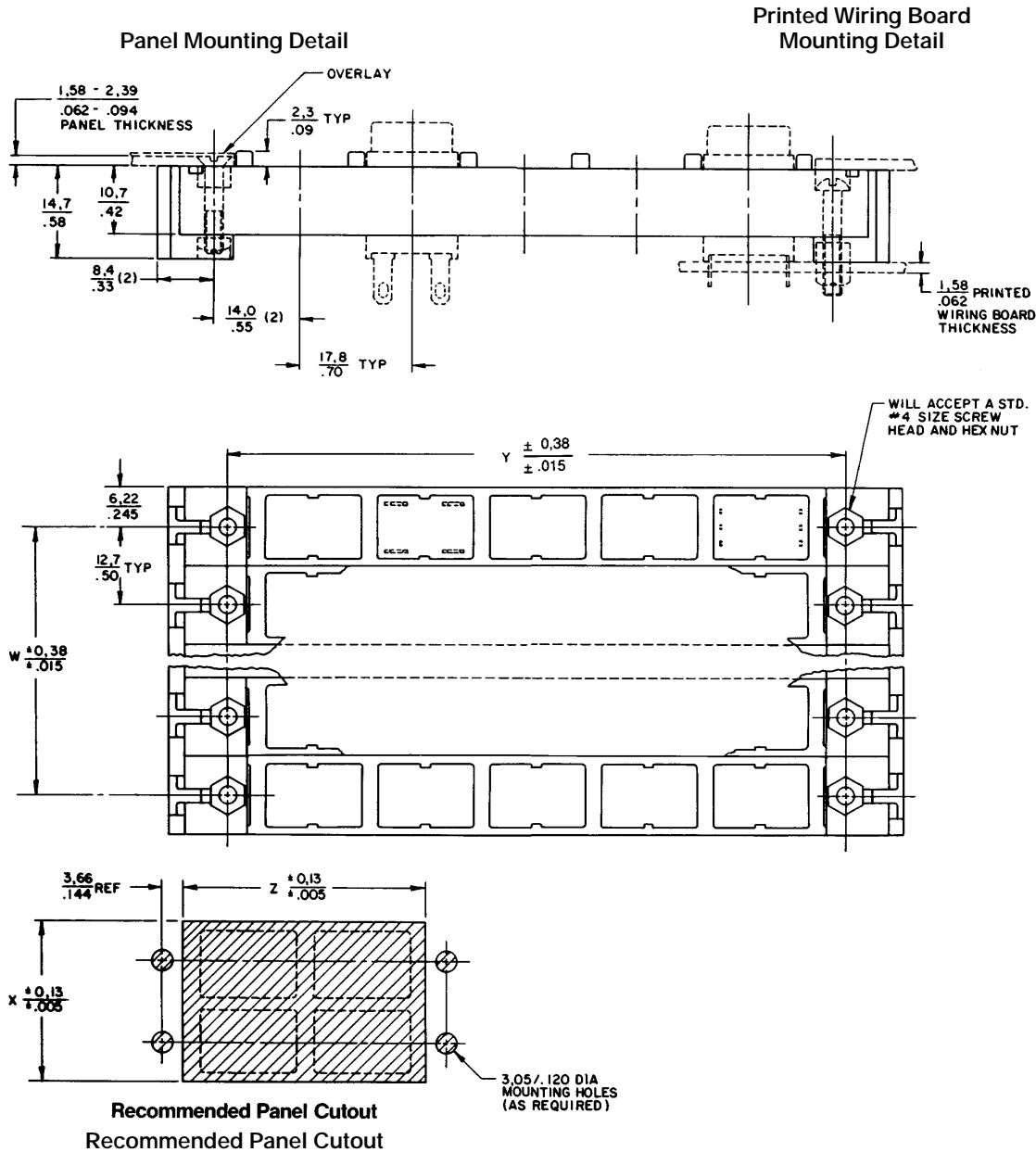
Manual Switches

Miniature Manual Line

MML Series

MOUNTING DIMENSIONS (For reference only)

HORIZONTAL MATRIX MOUNT/RECTANGULAR TYPE



Manuals

10	127,00/5.000	124,56/4.904	10	188,14/7.407	180,64/7.112
9	114,30/4.500	111,86/4.404	9	170,36/6.707	162,86/6.412
8	101,60/4.000	99,16/3.904	8	152,58/6.007	145,08/5.712
7	88,90/3.500	86,46/3.404	7	134,80/5.307	127,30/5.012
6	76,20/3.000	73,76/2.904	6	117,02/4.607	109,52/4.312
5	63,50/2.500	61,06/2.404	5	99,24/3.907	91,74/3.612
4	50,80/2.000	48,36/1.904	4	81,46/3.207	73,96/2.912
3	38,10/1.500	35,66/1.404	3	63,68/2.507	56,18/2.212
2	25,40/1.000	22,96/ .904	2	45,90/1.807	38.40/1.512
1	12,45/ 0.49	10,26/0.404	N/A	N/A	N/A
NO. OF STRIPS	W	X	NO. OF STATIONS	Y	Z

Notes:
1 - Linear measure mm/IN. or $\frac{mm}{IN.}$

Manual Switches

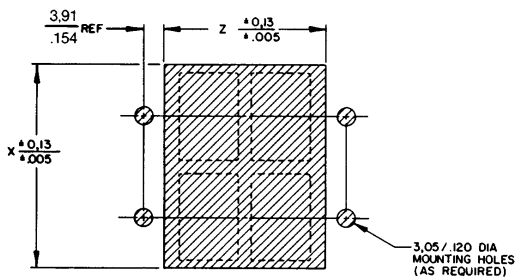
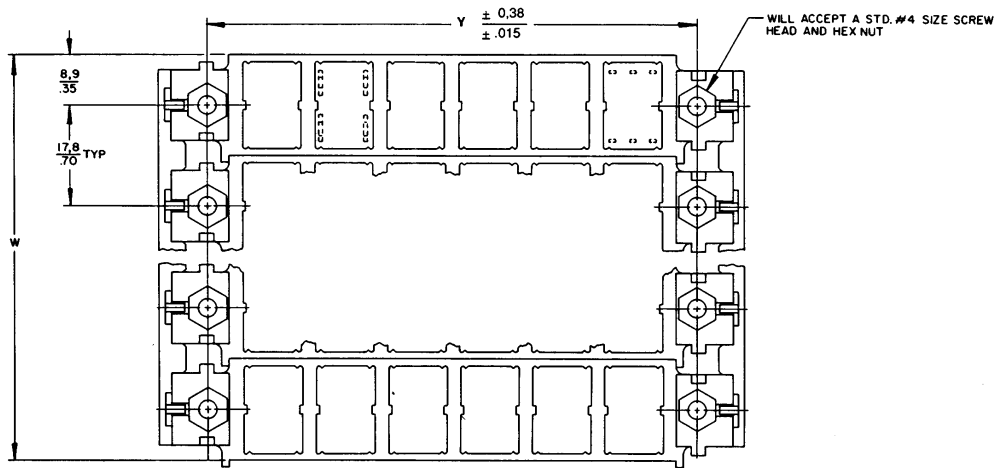
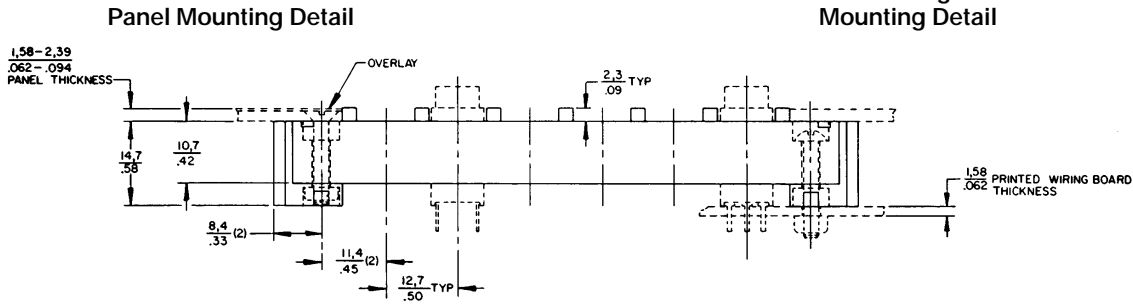
Miniature Manual Line

MML Series

MOUNTING DIMENSIONS (For reference only)

VERTICAL MATRIX MOUNT/RECTANGULAR TYPE

Printed Wiring Board
Mounting Detail



Recommended Panel Cutout

RECOMMENDED DIMENSIONS					
10	177,80/7.000	175,26/6.900	10	137,34/5.407	129,69/5.106
9	160,02/6.300	157,48/6.200	9	124,64/4.907	116,99/4.606
8	142,24/5.600	139,70/5.500	8	111,94/4.407	104,29/4.106
7	124,46/4.900	121,92/4.800	7	99,24/3.907	91,59/3.606
6	106,68/4.200	104,14/4.100	6	86,54/3.407	78,80/3.106
5	88,90/3.500	86,36/3.400	5	73,84/2.907	66,19/2.606
4	71,12/2.800	68,58/2.700	4	61,14/2.407	53,49/2.106
3	53,34/2.100	50,80/2.000	3	48,44/1.907	40,79/1.606
2	35,56/1.400	33,02/1.300	2	35,74/1.407	28,09/1.106
1	17,78/ .700	15,24/ .600	1	23,04/ .907	15,39/ .606
NO. OF STRIPS	W	X	NO. OF STATIONS	Y	Z

Notes:
1 - Linear measure mm/IN. or $\frac{mm}{IN.}$

Manual Switches

Miniature Manual Line

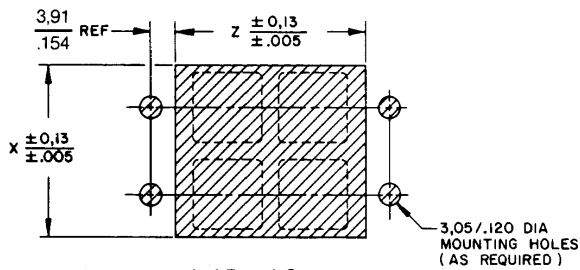
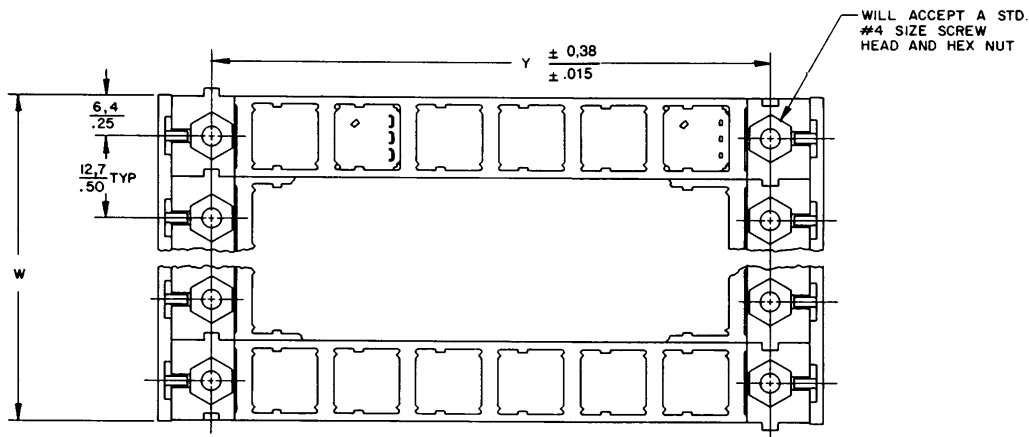
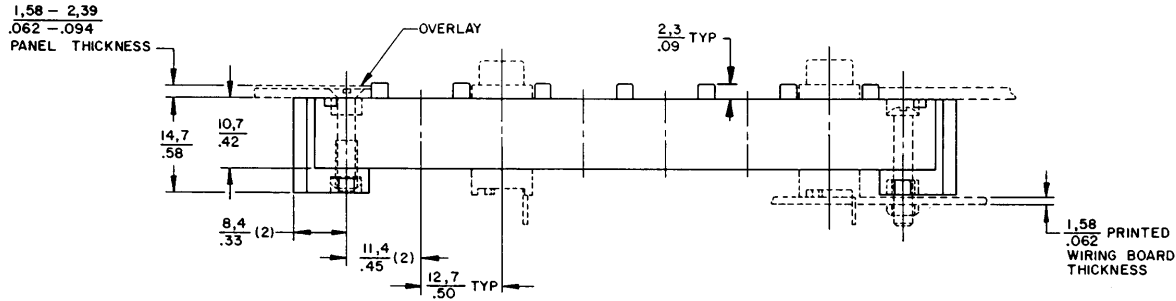
MML Series

MOUNTING DIMENSIONS (For reference only)

MATRIX MOUNT/SQUARE TYPE

Panel Mounting Detail

Printed Wiring Board Mounting Detail



Recommended Panel Cutout

Manuals

RECOMMENDED DIMENSIONS

10	127,00/5.000	124,56/4.904	10	137,16/5.400	129,84/5.112
9	114,30/4.500	111,86/4.404	9	124,46/4.900	117,14/4.612
8	101,60/4.000	99,16/3.904	8	111,76/4.400	104,44/4.112
7	88,90/3.500	86,46/3.404	7	99,06/3.900	91,74/3.612
6	76,20/3.000	73,76/2.904	6	86,36/3.400	79,04/3.112
5	63,50/2.500	61,06/2.404	5	73,66/2.900	66,34/2.612
4	50,80/2.000	48,36/1.904	4	60,96/2.400	53,64/2.112
3	38,10/1.500	35,66/1.404	3	48,26/1.900	40,94/1.612
2	25,40/1.000	22,96/.904	2	35,56/1.400	28,24/1.112
1	12,70/.500	10,26/.404	1	22,86/.900	15,54/.612
NO. OF STRIPS	W	X	NO. OF STATIONS	Y	Z

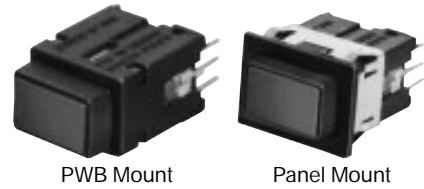
Notes:
1 - Linear measure mm/IN. or mm/IN.

Manual Switches

Solid State Pushbutton

MML11 Series

LED, INCANDESCENT, OR NON-LIGHTED DISPLAY



FEATURES

- Hall effect reliability
- Provides low voltage signals that interface with nearly all DC logic
- Accepts one LED or incandescent lamp
- Printed wiring board or snap-in panel mounting
- UL recognized, CSA certified
- Bezels and mounting clips, LEDs and legended lenses can be furnished installed or ordered separately

Example: MML11KA3AAK

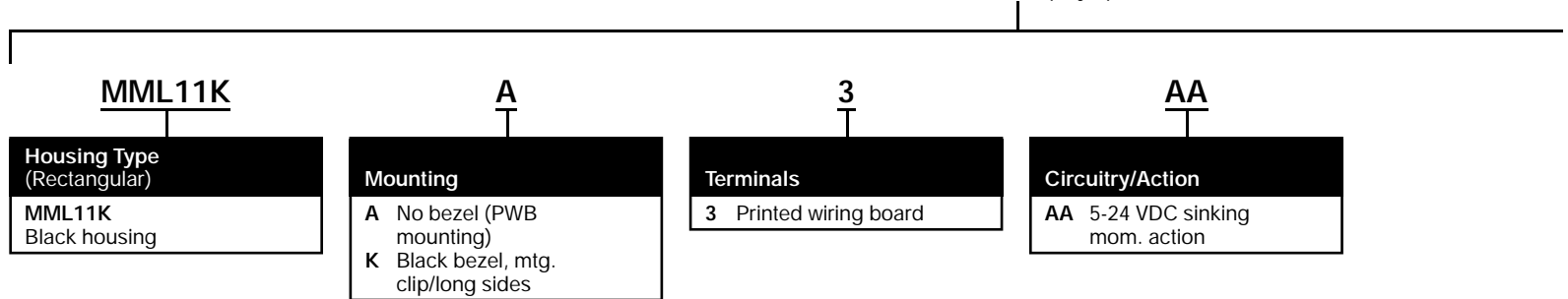
Solid state pushbutton housing (black), no bezel; PWB terminals; momentary action; 5 VDC, current sinking output, black plunger.

Example: MML11KK3AAKRSDR

As above, except furnished with black bezel; mounting clips (long sides); red LED, and red lens installed.

MML11 ORDER GUIDE

Catalog listing codes for switch, less assembled display options



Manual Switches

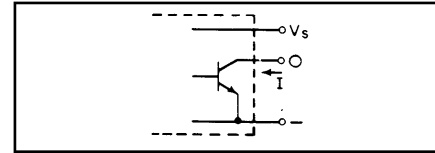
Solid State Pushbutton Switches

MML11 Series

Electrical Data	Page 69
Strip and matrix mounting	Page 85
Mounting dimensions	Page 93
PWB pin locations	Page 93
LED/receptacle	Page 87/88
Lamp/LED	Page 89/90

Current Sinking Output

A permanent magnet plunger moves adjacent to the Hall effect integrated circuit to give a digital, current sinking (normally high and normally low) output.



Order display options assembled to switch by adding codes below

K

Plunger

K Black

RS

LED (Stanley Type)

XX No LED
RS Red*
YS Yellow*
GS Green*

* Permanently installed.

DR

Lens

For LED display:
DR Red
DY Yellow
DG Green

For incandescent or non-lighted display:

LR Red
LY Yellow
LG Green
LW White
LK Black

Leave this space blank,
if legend not desired

Legend

20 With Legend

Use Legend Order Sheet FO-74024 to cover each catalog listing (see page 83).

Manuals

CUSTOMER INSTALLATION:

LED

1. Order LED and receptacle, page 87.
2. Installation instructions, page 88.

Incandescent Lamp

1. Order lamp/PWB receptacle or lamp/solder receptacle, page 89.
2. Installation instructions, page 90.

Manual Switches

Electronic Control Pushbutton

MML21 Series

LED, INCANDESCENT, OR NON-LIGHTED DISPLAY



PWB Mount
(Standard plunger)



Panel Mount
(Standard plunger)



PWB Mount
(One-piece plunger)

FEATURES

- Silver or gold contacts
- Choice of rectangular or square housings
- Accepts one LED or incandescent lamp
- Printed wiring board or snap-in panel mounting
- Bezels and mounting clips, LEDs and legended lenses can be furnished installed or ordered separately
- UL recognized, CSA certified

Example: MML21KK3AAK

Electronic control pushbutton switch with standard plunger; rectangular housing (black); bezel (black); mounting clips on long sides, PWB terminals; 1-pole, momentary action, silver contacts, black plunger.

Example: MML21KK3AAKRSDR

As above, except furnished with red LED and red lens installed.

MML21KK3AAHRSXX20 as above, legended.

Catalog listing codes for switch, less assembled display options

MML21 STANDARD PLUNGER SWITCHES ORDER GUIDE

MML21K		K		3		AA	
Housing Type		Mounting		Terminals		Circuitry/Action (Each pole is double throw)	
		Rectangular	Square			Rectangular	Square
MML21K Rectangular Black Housing MML21H Square Black Housing		A No bezel (PWB mounting) K Black bezel, mtg. clip/long sides	A No bezel (PWB mounting) R Black bezel & mtg. clip	3 Printed Wiring Board 2 Solder		Silver Contacts: AA 1 pole, mom. action AB 1 pole, alt. action AC 2 pole, mom. action AD 2 pole, alt. action Gold Contacts: BA 1 pole, mom. action BB 1 pole, alt. action BC 2 pole, mom. action BD 2 pole, alt. action	Silver contacts: AA 1-pole, mom. action AB 1-pole, alt. action Gold contacts BA 1-pole, mom. action BB 1-pole, alt. action

MML21 ONE PIECE LENS/PLUNGER SWITCHES ORDER GUIDE

Catalog listing codes for switch, less assembled display options

MML21H		K		3		AA	
Housing Type		Mounting		Terminals		Circuitry/Action (Each pole is double throw)	
		Rectangular	Square			Rectangular	Square
MML21K Rectangular Black Housing MML21H Square Black Housing		A No bezel (PWB mounting) K Black bezel, mtg. clip/long sides	A No bezel (PWB Mounting) R Black bezel & mtg. clip	3 Printed Wiring Board 2 Solder		Silver Contacts: AA 1 pole, mom. action AB 1 pole, alt. action AC 2 pole, mom. action AD 2 pole, alt. action Gold Contacts: BA 1 pole, mom. action BB 1 pole, alt. action BC 2 pole, mom. action BD 2 pole, alt. action	Silver contacts: AA 1-pole, mom. action AB 1-pole, alt. action Gold contacts BA 1-pole, mom. action BB 1-pole, alt. action

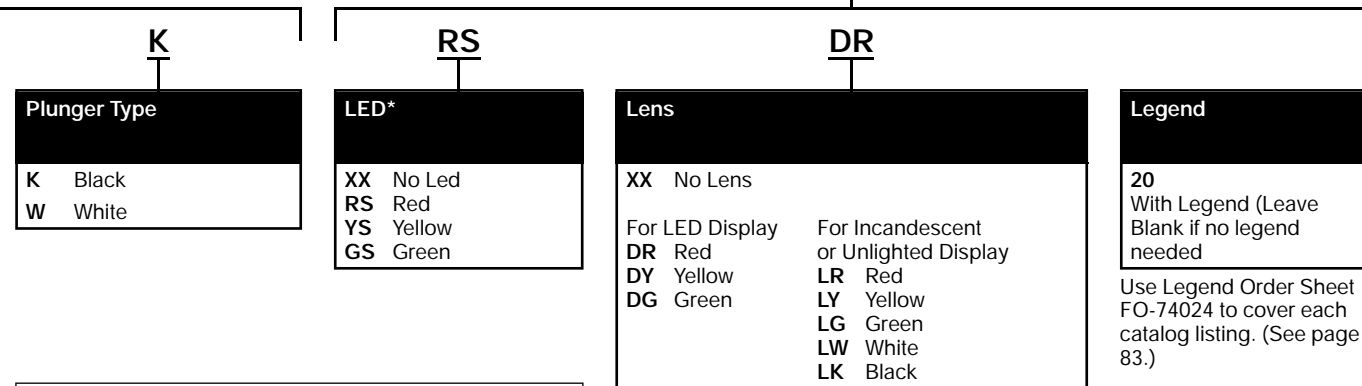
Manual Switches

Electronic Control Pushbutton Switches

MML21 Series

Electrical Data	Page 69
Bezels	Page 86
Strip and matrix mounting	Page 85
PWB pin locations	Page 93

Order display options assembled to switch by adding codes below



CUSTOMER INSTALLATION:

LED

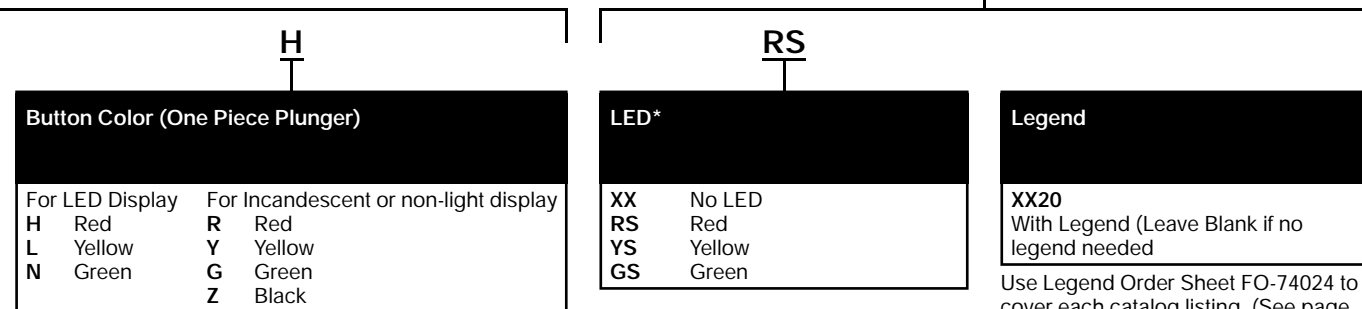
1. Order LED and receptacle, page 87.
2. Installation instructions, page 88.

Incandescent Lamp

1. Order lamp/PWB receptacle or lamp/solder receptacle, page 89.
2. Installation instructions, page 90.

Manuals

Order display options assembled to switch by adding codes below



***Notes:**

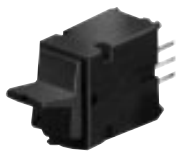
1. When an LED is specified in a **rectangular** MML21 listing, MICRO SWITCH will permanently install it in the housing.
2. MICRO SWITCH does **not** permanently install an LED in a **square** MML21 listing. To install an LED in a square housing, order a MML93L or MML93G receptacle and a MML92 LED (see pages 88 and 90).

Manual Switches

Electronic Control Paddle

MML23/24 Series

NON-LIGHTED DISPLAY



PWB Mount



Panel Mount

FEATURES

- Printed circuit board or snap-in panel mounting
- Bezels and mounting clips can be furnished installed or ordered separately
- UL recognized, CSA certified

Example: MML23KA3AA01K

Electronic control paddle switch with black housing; printed wiring board mounting; printed wiring board terminals; 1 pole, silver contacts; 2-position, maintained action; one circuit ON in each position; black paddle.

MML23 ORDER GUIDE

MML23K

A

3

AA

Housing Type
MML23K Black housing

Mounting
A No bezel (PWB mounting) K Black bezel, mtg. clip/long sides

Terminals
3 Printed wiring board 2 Solder

Circuitry
Insert code letters from Circuitry Chart

Electronic Control Rocker Switches MML24

LED, INCANDESCENT, OR NON-LIGHTED DISPLAY



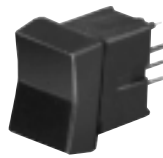
PWB Mount



Panel Mount



PWB Mount
(Lighted rocker)



PWB Mount
(Umbrella rocker)

FEATURES

- Accepts one or two LEDs or incandescent lamps which are ordered separately
- Printed wiring board mounting or snap-in panel mounting
- Bezels and mounting clips can be furnished installed or ordered separately
- UL recognized, CSA certified

MML24 ORDER GUIDE (Catalog listing for switch, less assembled display options)

MML24K

A

3

AA

Housing Type
MML24K Black housing

Mounting
A No bezel (PWB mounting) K Black bezel, mtg. clip/long sides

Terminals
3 Printed wiring board 2 Solder

Circuitry
Insert code letters from Circuitry Chart

Manual Switches

Electronic Control Paddle

MML23/24 Series

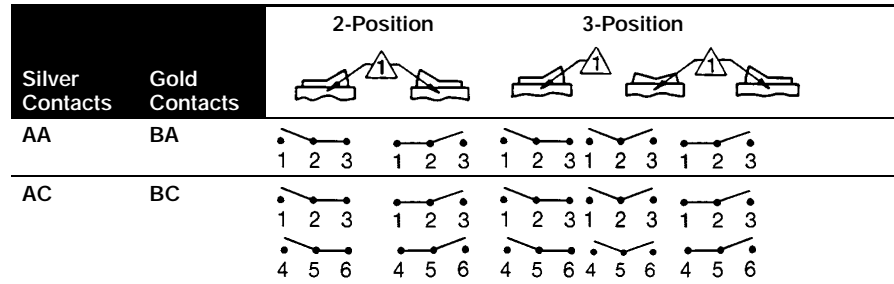
Electrical Data	Page 69
Bezels	Page 86
Strip and matrix mounting	Page 85
Mounting dimensions	Page 99/100
PWB pin locations	Page 99
Rockers and paddles are permanently installed.	

01	K
Action Insert code numbers from Operating Action Chart	Paddle K Black

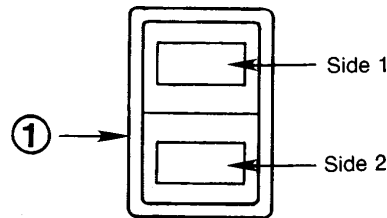
Example: MML24KA3AA01HDRXX
Electronic control rocker switch with black housing, printed wiring board terminals; 1 pole, silver contacts; 2-position, maintained action; one circuit ON in each position; black rocker, red lens for LED display in Side 1 and no lens in Side 2.

Note: Umbrella rockers are available with PWB terminals only.

CIRCUITRY



The "MICRO SWITCH" identification is shown on this side of the switch housings.



OPERATING ACTION

2-Position	01	Maint.	None	Maint.
	02	Mom.	None	Maint.
	03	Maint.	None	Mom.
3-Position	04	Maint.	Maint.	Maint.
	05	Mom.	Maint.	Mom.
	07	Mom.	Maint.	Maint.

Order display options assembled to switch by adding codes below.

01	H
Action Insert code numbers from Operating Action Chart	Rocker K Black rocker, non-lighted H Black rocker, one lens* F White rocker, one lens* <small>* Lighted switches with solder terminals require MML93R receptacle to install lamps or LEDs. See Page 90.</small>

DRXX		Leave blank, if legend not desired
Lens		Legend
Side 1	Side 2	20 With legend Use legend order sheet FO-74193 to cover each catalog listing (see page 84).
XX None	XX None	
LED display:	LED display:	
DR Red	LR Red	
DY Yellow	LY Yellow	
DG Green	LG Green	
	LW White	

CUSTOMER INSTALLATION:

LED

- Order LED and receptacle, page 87.
- Installation instructions, page 88.

Incandescent Lamp

- Order lamp/PWB receptacle or lamp/solder receptacle, page 89.
- Installation instructions, page 90.

Manuals

Manual Switches

Power Duty Pushbutton

MML31 Series

NON-LIGHTED DISPLAY



PWB Mount



Panel Mount

FEATURES

- Printed circuit board or snap-in panel mounting
- Bezels and mounting clips, and legended lenses can be furnished installed or ordered separately
- UL recognized, CSA certified.

Example: MML31KK2AAK

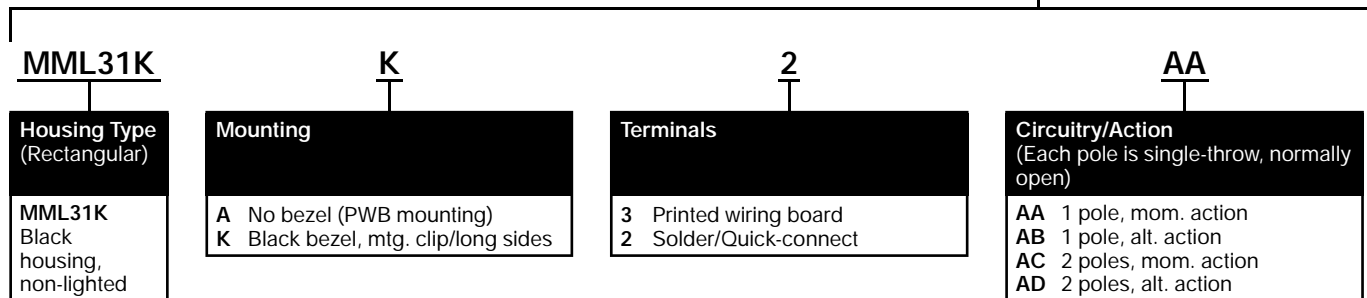
Power duty pushbutton switch housing (black); bezel (black) and mounting clips; solder terminals; 1 pole, momentary action; black plunger.

Example: MML31KK2AAKLR

As above, except furnished with red lens.

MML31 ORDER GUIDE

Catalog listing codes for switch, less assembled display options



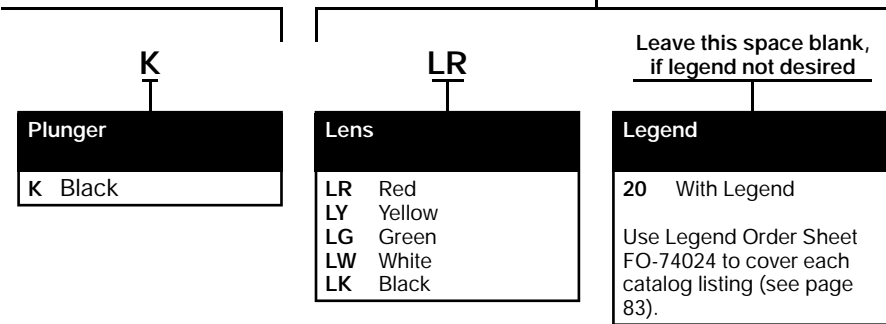
Manual Switches

Power Duty Pushbutton

MML31 Series

Electrical data	Page 69
Bezels	Page 86
Strip and matrix mounting	Page 85
Mounting dimensions	Page 99/100
PWB pin locations	Page 99

Order display options assembled to switch by adding codes below



Manual Switches

Indicators/Pushbutton Style

MML41/46 Series

LED OR INCANDESCENT DISPLAY



PWB Mount



Panel Mount

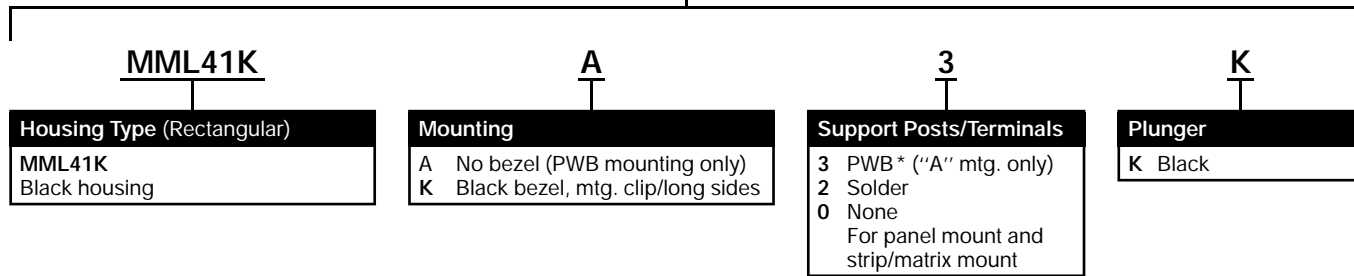
FEATURES

- Accepts one LED or incandescent lamp

MML41 indicators resemble a pushbutton switch with the button in the “down” position.

MML41 ORDER GUIDE

Catalog listing codes for indicator, less assembled display options



Indicators/Flush Mount

MML46

LED OR INCANDESCENT DISPLAY



PWB Mount



Panel Mount



PWB Mount



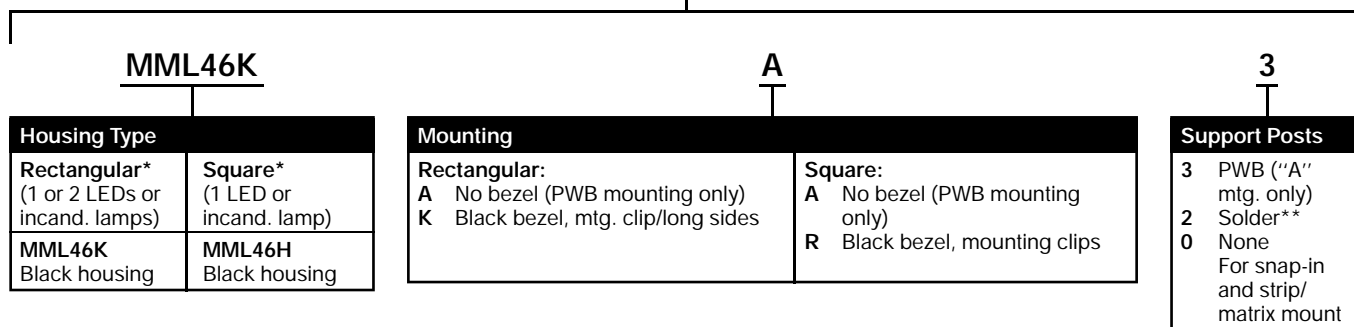
Panel Mount

FEATURES

- Accepts one or two LEDs or incandescent lamps
- Bezels and mounting clips, LEDs and legended lenses can be furnished installed or ordered separately

MML46 ORDER GUIDE

Catalog listing codes for indicator, less assembled display options



** Rectangular housings only.

* Notes:

1. When an LED is specified in a **rectangular** MML46 listing, MICRO SWITCH will permanently install it in the housing.
2. MICRO SWITCH does **not** permanently install an LED in a **square** MML46 listing. To install an LED in a square housing, order a MML93L or MML93G receptacle and a MML92 LED (see pages 88 and 90).

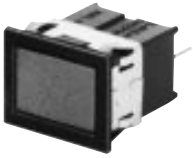
Manual Switches Indicators

MML44 Series

LED DISPLAY



PWB Mount



Panel Mount

FEATURES

- Accepts **one LED only**
- Bezels and mounting clips, and legended lenses can be furnished installed or ordered separately

Example: MML44KAA

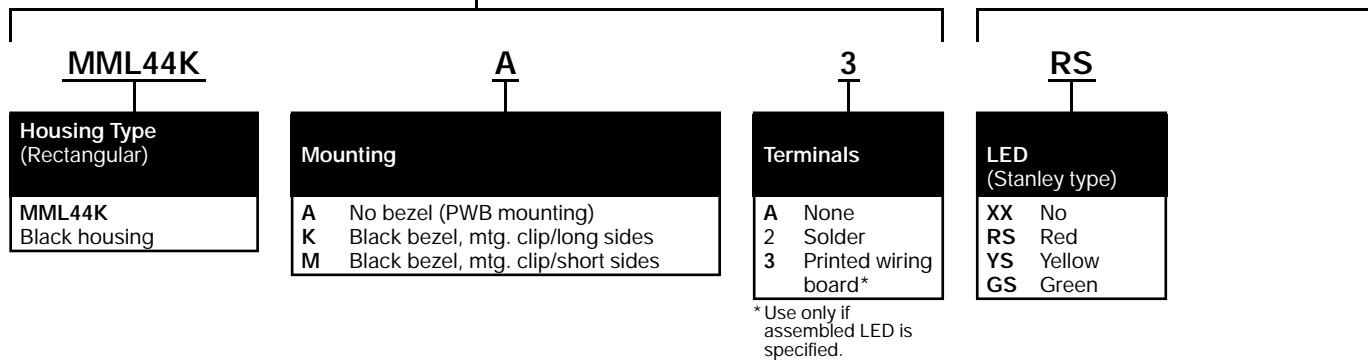
Indicator housing (black) which will accommodate one LED, no bezel

Example: MML44KA3RSDR

As above, except furnished with red LED (PWB terminals) and lens installed.

MML44 ORDER GUIDE

Catalog listing codes for indicator, less assembled display options



Manual Switches

MML44 Series

Bezels	Page 86
LEDs	Page 88
Lenses	Page 82
Strip mounting	Page 85
Mounting dimensions	Page 92/94
PWB pin locations	Page 93/93

Order display options assembled to indicator by adding codes below

DR

Leave this space blank if legend not desired

Lens	
DR	Red
DY	Yellow
DG	Green
DC	Clear

Legend	
20	With legend
Use Legend Order Sheet FO-74024 to cover each catalog listing.	

CUSTOMER INSTALLATION:
LED
 1. Order LED and receptacle, page 87.
 2. Installation instructions, page 88.

Manuals

Manual Switches

Button Lenses/Incandescent or Non-lighted Display

MML51 Series

MML51 ORDER GUIDE

For standard plunger MML pushbuttons.

MML51E

Lens Type
Rectangular Lenses: MML51E Switch lens* MML51G Indicator lens

* Use MML51E with MML41 rectangular pushbutton style indicators.

20

Display/Legend Type
Transmitted Color: 10 No legend 20 With legend

R

Color
R Red
Y Yellow
G Green
W White
K Black (Opaque)

Example: MML51E20R

Incandescent or non-lighted display switch lens; red transmitted color, with legend.

LEGENGING

Use the MML Legend Order Sheets on pages 83 and 84 to specify legending.

Button Lenses/LED or Neon Display

MML52

MML52 ORDER GUIDE

For standard plunger MML pushbuttons.

MML52G

Lens Type
Rectangular Lenses: MML52E Switch lens, LED display MML52G* Indicator lens LED display

* Use MML52E with MML41 rectangular pushbutton style indicators.

10

Display/Legend Type
Transmitted Color: 10 No legend 20 With legend

Y

Color/Illumination
LED Display:
R Red
Y Yellow
G Green
C Clear

Example: MML52G10Y

LED display indicator lens; yellow transmitted color, no legend.

HOW TO INSTALL LENSES

Keytabs on two sides of the lenses mate with matching button slots.

Rectangular lenses have tabs on the long sides. Seat a long side before snapping in place.

HOW TO INSTALL LENSES



1. Seat lens.



2. Snap in place.

Manual Switches Strip Mounting Frames

MML61 Series



MML61 ORDER GUIDE

MML61K

5

Orientation/Color

For Rectangular* Housings:

MML61K
Horizontal strip, black
MML61G
Vertical strip, black

For Square Housings

MML61J
Black

* * .4" x .6" housings only.

No. of Stations

- 1 One
- 2 Two
- 3 Three
- 4 Four
- 5 Five
- 6 Six
- 7 Seven
- 8 Eight
- 9 Nine
- 10 Ten

Note: Switches and indicators are ordered as separate items.

FEATURES

- Provides back of panel or printed wiring board mounting in a multi-unit strip of switches/indicators.
- Devices can be pre-wired prior to installation.
- Holes at each end of frame will accept No. 4 screws.

Example: MML61K5

Black 5-station strip mounting frame, horizontal orientation.

Refer to pages 101, 102 and 103 for mounting dimensions.

Manual Switches Bezels/Mounting Clips

MML72 Series



MML72 ORDER GUIDE (Incl. bezel & mounting clips)

MML72EE

Type
For Rectangular* Housings: MML72EE* Switch: Mtg. clips on long sides

* Use this type with MML41 rectangular pushbutton style indicators.

K

Color
K Black

Example: MML72EEK
Black switch bezel, mounting clips on long sides.

1. Slip mounting clip over top of switch/indicator housing.



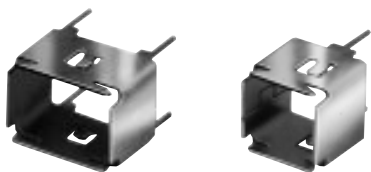
2. Snap bezel onto mounting clip.

Recommended panel thickness for panel mounted units is .050 to .094 in. (1,27 to 2,39 mm).

TO ORDER MOUNTING CLIPS SEPARATELY

For Rectangular Housings: MML73EA (long sides) MML73EB (short sides)
For Square Housings: MML73BA

PWB Mount Support Bracket MML74 Series



These metal frames with PWB support terminals provide added rigidity for stand-alone PWB mounted switches and indicators. They are not for use with MML57 buttons.

See page 98 for mounting dimensions.

MML74 ORDER GUIDE

Catalog Listing	For Use With:
MML74E	Rectangular .4" x .6" housings
MML74B	Square housings

Manual Switches

Incandescent Lamp Assemblies

MML91/93 Series

MML91 LAMP/PWB RECEPTACLE ORDER GUIDE

Lamp Type	Use To Illuminate	Voltage	Catalog Listing Incl. Lamp & PWB Receptacle	Industry Lamp No.
T-1 ① (unbased)	Rectangular button lens	5	MML91C	715
		10	MML91BC	7218
		14	MML91CC	8111
		28	MML91DC	6838
T-1 ② (bi-pin)	Square button lens and MML24 rocker lens	5	MML91E	7715
		10	MML91BE	8095
		14	MML91CE	8098
		28	MML91DE	7839

Notes:

① To order PWB receptacle separately, specify **MML93H**.

② To order PWB receptacle separately, specify **MML93G**.

MML91 LAMP/SOLDER RECEPTACLE ORDER GUIDE

Lamp Type	Use To Illuminate	Voltage	Catalog Listing Incl. Lamp & Solder Receptacle	Industry Lamp No.
T-1 ③ (bi-pin)	Rectangular button lens	5	MML91D	7715
		10	MML91BD	8095
		14	MML91CD	8098
		28	MML91DD	7839

Lamp Type	Use To Illuminate	Voltage	Catalog Listing ④		Industry Lamp No.
			Solder Receptacle	T-1 (Unbased) Lamp Only	
T-1 (unbased)	Square button lens	5	MML93L	MML91A	715
		10	MML93L	MML91BA	7218
		14	MML93L	MML91CA	8111
		28	MML93L	MML91DA	6838
T-1 (unbased)	MML24 rocker lens	5	MML93R	MML91A	715
		10	MML93R	MML91BA	7218
		14	MML93R	MML91CA	8111
		28	MML93R	MML91DA	6838

Notes:

③ To order solder receptacles separately, specify **MML93J**.

④ Order solder receptacles and T-1 lamp listings for complete assembly.

Manuals

Manual Switches

LED/Incandescent Lamp Receptacles

MML93 Series

User installed. Certain MML switches and indicators will accept incandescent lamps, where specified in the order guides.

These lamps are ordered separately and installed by the user, per the procedures described below.

LAMP INSTALLATION

1. With Printed Wiring Board Receptacle for MML93G and MML93H only.

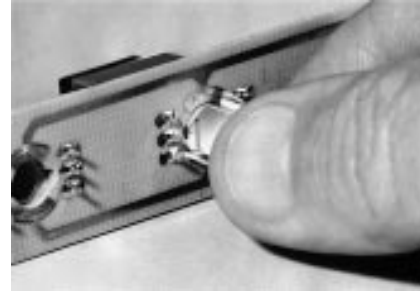
Use PWB receptacles to permit lamps to be added or replaced from behind the printed wiring board, without soldering.



1. Insert the PWB receptacle/incandescent lamp assembly through a hole in the printed wiring board.

These receptacles are for use with rectangular pushbuttons, square pushbuttons and MML24 rocker lens only.

Printed wiring boards are not supplied.



2. A 1/8-turn applied clockwise to the receptacle locks it in the printed wiring board and establishes the electrical connection.

2. With Solder Terminal Receptacle for MML93J bi-pin only

This receptacle attaches directly to the rear of panel-mounted units. It enables lamps to be added or replaced without rewiring.



1. Insert solder terminal receptacle into hole in base of panel mount unit.

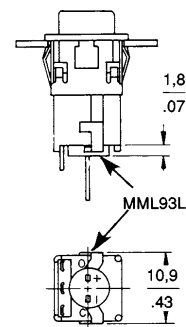
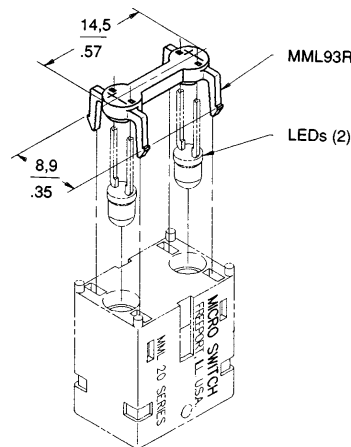
This receptacle is for use with all rectangular pushbuttons and MML41 or MML46 rectangular indicators only.



2. A 1/8-turn clockwise applied to the receptacle locks it in the base.

3. With Solder Terminal Receptacles for MML93L/93R Unbased Only or T-1 LED.

Use the receptacles shown at right to install T-1 LEDs or T-1 unbased lamps in panel-mounted MML21 square pushbutton switches and MML24 rocker switches.



Procedure:

1. Assemble LEDs or lamps to receptacles (leads first).
2. Snap receptacle into slots in housing base.
3. Solder directly to leads.

Manual Switches

MML92 Series

LEDs

Factory installed. Certain MML switches and indicators can be furnished with LEDs **permanently** factory installed, where specified in the order guides.

User installed. LEDs can also be ordered separately and installed in these products by the user, per the procedures described below.

LED INSTALLATION

1. With Printed Wiring Board Receptacle. (MML93K)

PWB receptacle enables T-1 $\frac{3}{4}$ or T-1 LEDs to be added or replaced from behind the printed wiring board, without soldering. LEDs and receptacles are ordered separately. See page 87.

Printed wiring boards are not supplied.



1. Insert the LED/PWB receptacle assembly through a hole in the printed wiring board.



2. A $\frac{1}{8}$ -turn applied clockwise to the receptacle locks it in the printed wiring board and establishes the electrical connection.

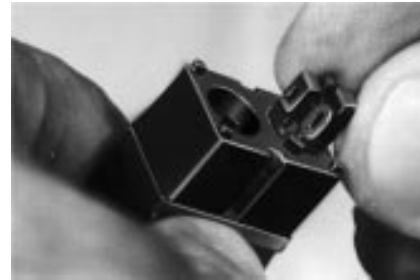
2. With Solder Terminal Receptacle. (MML93J)

This receptacle attaches directly to the rear of panel-mounted units. It enables incandescent lamps to be added or replaced without rewiring. LEDs and receptacles are ordered separately.

This receptacle is for use with all rectangular pushbuttons and MML41 or MML46 rectangular indicators only.



1. Insert solder terminal receptacle into hole in base of panel mount unit.

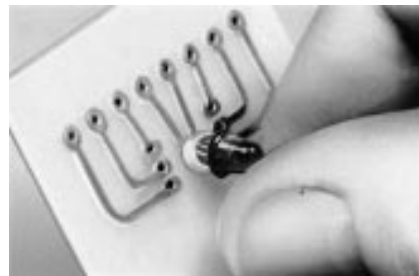


2. A $\frac{1}{8}$ -turn clockwise applied to the receptacle locks it in the base.

3. By Soldering To Printed Wiring Board.

In this procedure, the housing is mounted on the printed wiring board after the T-1 $\frac{3}{4}$ LED has been seated.

This procedure can be used with any MML having PWB terminals.



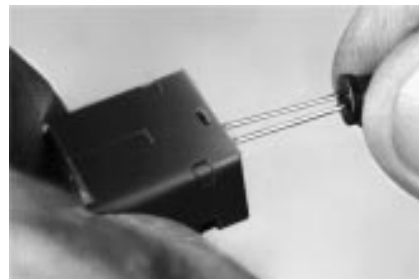
1. Assemble stand-off spacer to LED terminals and seat on printed wiring board.



2. Seat housing on printed wiring board, with LED projecting into hole at the base of the housing.

4. By Soldering to Printed Wiring Board or Leadwire (MML44 indicators only).

T-1 $\frac{3}{4}$ LEDs are added to MML44 indicators via a procedure which is unique to this product. The LED is inserted from the top of the housing with the leadwires protruding through the housing base.



1. Assemble LED to MML44 indicator, with the LED terminals protruding through assembly slot in the middle of housing base.



2. Use pencil eraser to snap LED securely in place.

Manual Switches

MML92/93 Series

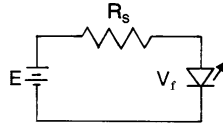
LEDs

LED APPLICATION INFORMATION

To insure stable conditions, suitable external control of the LED current must be provided. It is recommended that a minimum of 5 VDC open circuit voltage with an appropriate series resistance be used to drive LED devices. This minimizes current variation and its effect on temperature and forward voltage of the LED.

Resistor values can be determined by supply voltage or current for LED:

$$R_s = \frac{E - V_f}{I_f}$$



WHERE: R_s = Series Resistance
 E = Supply Voltage
 V_f = Forward Voltage of LED
 I_f = Circuit Current

Maximum drive current is 30 mA. Reverse voltage breakdown of the LED's is 4 volts (min.).

MML92 ORDER GUIDE

LEDs should be the same color as the lenses they illuminate. They are packed 10 per listing, including stand-off spacers for use when solder terminating to a printed wiring board, per procedure 3 on page 88.

LED Type	Use To Illuminate	Catalog Listing	LED Color	Forward Characteristics Typ. @ 20mA	Max.	LED Manufacturers' Part Numbers
T-1¼	Rectangular button lens	MML92ERS MML92EGS MML92EYS	Red Green Yellow	1.7 V 2.1 V 2.1 V	Stanley: 2.0 V 2.5 V 2.5 V	ESBR5633 ESBG5633 ESAY5633
		MML92ERH MML92EGH MML92EYH	Red Green Yellow	2.2 V 2.3 V 2.2 V	Hewlett Packard: 3.0 V 3.0 V 3.0 V	HLMP-3366 HLMP-3568 HLMP-3466
T-1	Square button lens, MML24 rocker lens rectangular button lens	MML92HRS MML92HGS MML92HYS	Red Green Yellow	1.7 V 2.1 V 2.2 V	Stanley: 2.0 V 2.5 V 2.5 V	ESBR3901 ESPY3901 ESAY3901
		MML92HRH MML92HGH MML92HYH	Red Green Yellow	2.2 V* 2.3 V* 2.2 V	Hewlett Packard: 3.0 V 3.0 V 3.0 V	HLMP-1340 HLMP-1540 HLMP-1440

Long lead: Anode (+). Short lead: Cathode (-).
 * @ 25 mA.

Manuals

MML93 LED PWB RECEPTACLE ORDER GUIDE

LED Type	Use to Illuminate	Catalog Listing
T-1¼	Rectangular button lens or umbrella button lens	MML93K
T-1	Square button lens or MML24 rocker lens	MML93G

MML93 LED SOLDER TERMINAL ORDER GUIDE

LED Type	Use to Illuminate	Catalog Listing
T-1	Square button	MML93L
T-1	MML24 rocker lens	MML93R
T-1	Rectangular button	MML93J

Manual Switches

Incandescent Lamp Assemblies

MML91/93 Series

MML91 LAMP/PWB RECEPTACLE ORDER GUIDE

Lamp Type	Use To Illuminate	Voltage	Catalog Listing Incl. Lamp & PWB Receptacle	Industry Lamp No.
T-1 ① (unbased)	Rectangular button lens	5	MML91C	715
		10	MML91BC	7218
		14	MML91CC	8111
		28	MML91DC	6838
T-1 ② (bi-pin)	Square button lens and MML24 rocker lens	5	MML91E	7715
		10	MML91BE	8095
		14	MML91CE	8098
		28	MML91DE	7839

Notes:

① To order PWB receptacle separately, specify **MML93H**.

② To order PWB receptacle separately, specify **MML93G**.

MML91 LAMP/SOLDER RECEPTACLE ORDER GUIDE

Lamp Type	Use To Illuminate	Voltage	Catalog Listing Incl. Lamp & Solder Receptacle	Industry Lamp No.
T-1 ③ (bi-pin)	Rectangular button lens	5	MML91D	7715
		10	MML91BD	8095
		14	MML91CD	8098
		28	MML91DD	7839

Lamp Type	Use To Illuminate	Voltage	Catalog Listing ④		Industry Lamp No.
			Solder Receptacle	T-1 (Unbased) Lamp Only	
T-1 (unbased)	Square button lens	5	MML93L	MML91A	715
		10	MML93L	MML91BA	7218
		14	MML93L	MML91CA	8111
		28	MML93L	MML91DA	6838
T-1 (unbased)	MML24 rocker lens	5	MML93R	MML91A	715
		10	MML93R	MML91BA	7218
		14	MML93R	MML91CA	8111
		28	MML93R	MML91DA	6838

Notes:

③ To order solder receptacles separately, specify **MML93J**.

④ Order solder receptacles and T-1 lamp listings for complete assembly.

Manuals

Manual Switches

LED/Incandescent Lamp Receptacles

MML93 Series

User installed. Certain MML switches and indicators will accept incandescent lamps, where specified in the order guides.

These lamps are ordered separately and installed by the user, per the procedures described below.

LAMP INSTALLATION

1. With Printed Wiring Board Receptacle for MML93G and MML93H only.

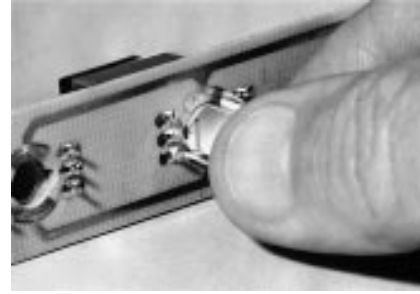
Use PWB receptacles to permit lamps to be added or replaced from behind the printed wiring board, without soldering.



1. Insert the PWB receptacle/incandescent lamp assembly through a hole in the printed wiring board.

These receptacles are for use with rectangular pushbuttons, square pushbuttons and MML24 rocker lens only.

Printed wiring boards are not supplied.



2. A 1/8-turn applied clockwise to the receptacle locks it in the printed wiring board and establishes the electrical connection.

2. With Solder Terminal Receptacle for MML93J bi-pin only

This receptacle attaches directly to the rear of panel-mounted units. It enables lamps to be added or replaced without rewiring.



1. Insert solder terminal receptacle into hole in base of panel mount unit.

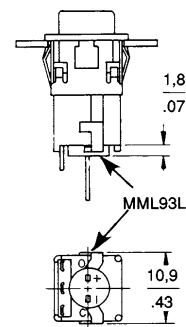
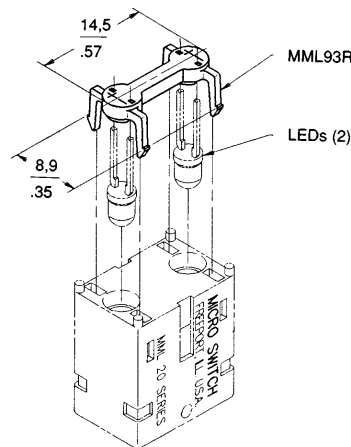
This receptacle is for use with all rectangular pushbuttons and MML41 or MML46 rectangular indicators only.



2. A 1/8-turn clockwise applied to the receptacle locks it in the base.

3. With Solder Terminal Receptacles for MML93L/93R Unbased Only or T-1 LED.

Use the receptacles shown at right to install T-1 LEDs or T-1 unbased lamps in panel-mounted MML21 square pushbutton switches and MML24 rocker switches.



Procedure:

1. Assemble LEDs or lamps to receptacles (leads first).
2. Snap receptacle into slots in housing base.
3. Solder directly to leads.

Manual Switches

Pushbutton Switches

PB Series

FEATURES

- Compact size
- Up to 4-poles
- Sealed versions

TOUCH FEEDBACK SWITCHES



ORDER GUIDE

Momentary and alternate action switches.

Button Color	No. of SPDT Circuits			
	2 Mom. Action	2 Alt. Action	4 Mom. Action	4 Alt. Action
Black	2PB11-T2	82PB19-T2	—	84PB19-T2
	2PB732-T2 (M8805/23-001)	—	4PB714-T2 (M8805/23-003)	—
Red	2PB12-T2	82PB21-T2	—	—
	2PB717-T2 (M8805/23-002)	—	4PB717-T2 (M8805/23-004)	—
Green	2PB273-T2	82PB22-T2	—	—

SHORT TRAVEL SWITCHES



ORDER GUIDE

Momentary action switches.

Button	No. of SPDT Circuits	
	2	3
Black	2PB7	3PB7

These switches resemble the touch-feed-back design, but have a flexible leaf actuator for lower operating force and shorter button travel.

PANEL SEALED SWITCHES



An elastomer seal is bonded between actuating plunger and button collar. An O-ring seals the button assembly to the panel front.

Two-piece design enables button to be mounted separately. After switch unit is wired, it snaps into place from behind panel.

ORDER GUIDE

Momentary action switches.

Button Color	Collar Type	No. of SPDT Circuits	
		1	2
Black	Hex	1PB4	2PB4
Black	Round	1PB42	—
Red	Round	1PB43	2PB43

Pushbuttons

ELECTRICAL RATINGS

(Except 15PB and 700PB)

30 VDC: 5 amps, res., sea level or 50,000 ft.; 3 amps, ind., sea level; 2.5 amps ind., 50,000 ft; 24 amps, max. inrush.

UL and CSA rating for basic switches: 5 amps, 125 or 250 VAC.

Manual Switches

Pushbutton Switches

PB Series

WATERTIGHT SWITCH



ORDER GUIDE

Momentary action switches.
Has knurled chrome-finished facenut.

Button Color	No. of SPDT Circuits
Black	2
	2PB901-T2

Facenut-to-panel, button-to-facenut, and bushing-to-facenut, sealing helps prevent entry of water from behind panel, up and over bushing wall. Switch units potted in corrosion resistant metal enclosure. Meets submergence requirements of MIL-STD-108 (up to 10 PSI water pressure for one hour).

HERMETICALLY SEALED SWITCHES



These pushbuttons are equipped with HM hermetically sealed switch units, which have metal-to-metal fusion around the cover, actuator base, and mounting holes. Terminals are sealed glass-to-metal.

Vapor-proof construction enables use in damp locations without condensation on contacts. External parts corrosion resistant per MIL-S-8805. Meets explosion-proof requirements of MIL-S-8805.

ORDER GUIDE

Momentary action switches.

Button Color	No. of SPDT Circuits	
	2	4
Black	702PB1	704PB1

MINIATURE SIZE SWITCHES



1PB5



15PB2

ORDER GUIDE

Momentary action switches.

Button	No. of SPDT Circuits	
	1	2
Steel*	1PB5	—
White Plastic	—	15PB2

* Steel button enables use under hinged plates or paddle levers, in addition to manual operation.

ELECTRICAL RATINGS — 700PB and 15PB

700PB (With hermetically sealed switch units):

28 VDC and 115 VAC, 400 HZ: 3 amps, ind., 5 amps, res.

15PB:

30 VDC and 115 VAC: 2 amps, ind., 5 amps, res.; 1.0 amp, lamp load.

1PB5

250 VAC: 5 amps.

30 VDC: 5 amps, res., sea level or 50,000 ft.; 3 amps, ind., sea level; 2.5 amps ind., 50,000 ft.; 24 amps, max. inrush.

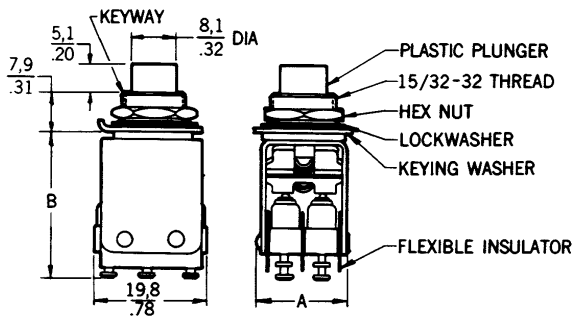
Manual Switches

Pushbutton Switches

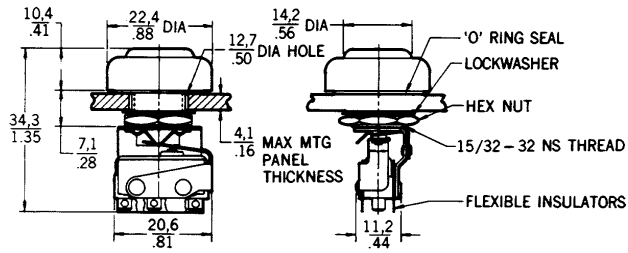
PB Series

MOUNTING DIMENSIONS (For reference only)

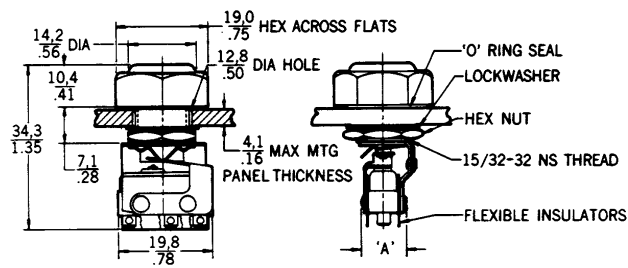
Touch Feedback Switches



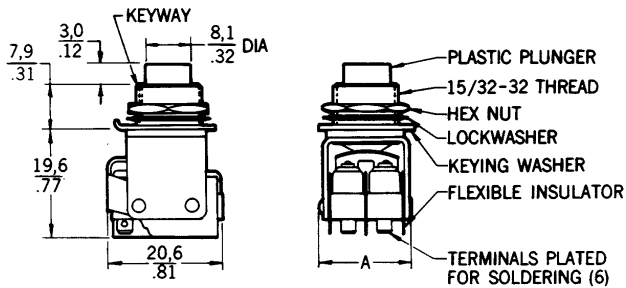
Panel Sealed Switches



		2-Pole	4-Pole
Dim. "A" (max.)	Mom.	16,8/66	30,0/1.18
	Alt. Act.	17,3/68	30,5/1.20
Dim. "B"	Mom.	26,7/1.05	26,7/1.05
	Alt. Act.	33,0/1.34	33,0/1.34



Short Travel Switches



	1-Pole	2-Pole
Dim. "A" (max.)	11,7/46	17,0/67

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

	2-Pole	3-Pole
Dim. "A" (max.)	17,0/67	23,8/94



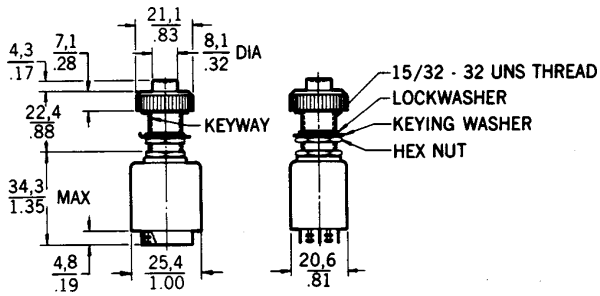
Manual Switches

Pushbutton Switches

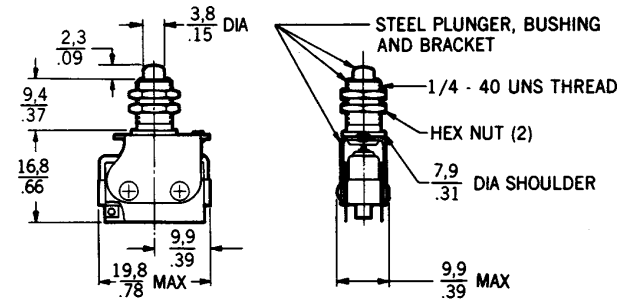
PB Series

MOUNTING DIMENSIONS (For reference only)

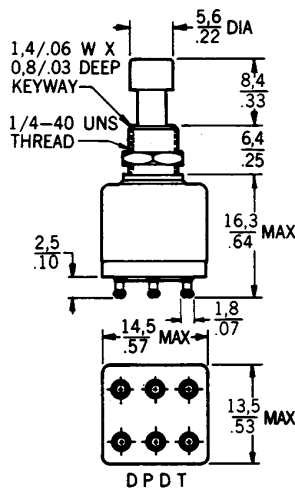
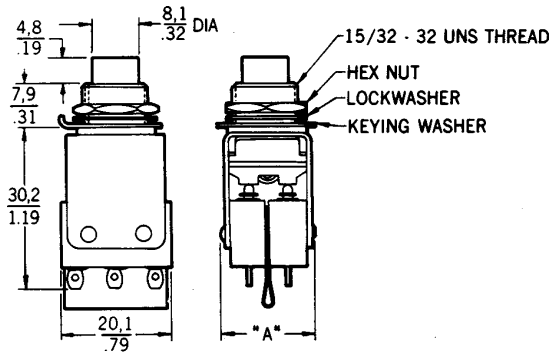
Watertight Switch



Miniature Size Switches



Hermetically Sealed Switches



Mounting hardware includes:
hexnut, lockwasher, and
keying washer.

	2-Pole	4-Pole
Dim. "A" (max.)	16,8/.66	30,0/1.18

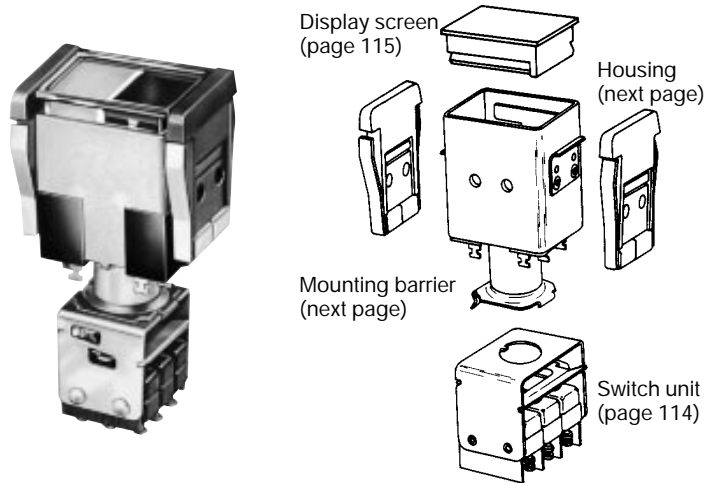
Key: $\frac{0,0}{0.00} = \text{mm}$
 $\frac{0,00}{0.00} = \text{inches}$

Manual Switches

Pushbutton Switches and Indicators

Series 2

BARRIER MOUNT



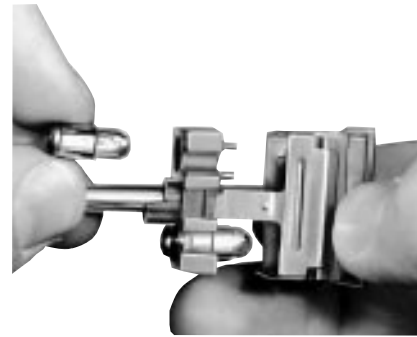
Mounting barriers attach to either the long or short sides of the housing. They have spring clips which grip the panel. Mounting barriers also separate display screens

to protect against inadvertent operation. Multiple units can be attached together in a strip and snapped into a panel slot; or they can be mounted individually.

FEATURES

- Easy-to-assemble modules provide thousands of display/control combinations
- Up to 4 incandescent lamps
- 1, 2, 3, or 4-section display
- Transmitted or projected color
- Integral hold-in coil option provides remote released contacts. Pull-in coils (flange mount only) enable remote actuation
- Switch guard accessory.

CHANGE LAMPS OR FILTERS FROM PANEL FRONT

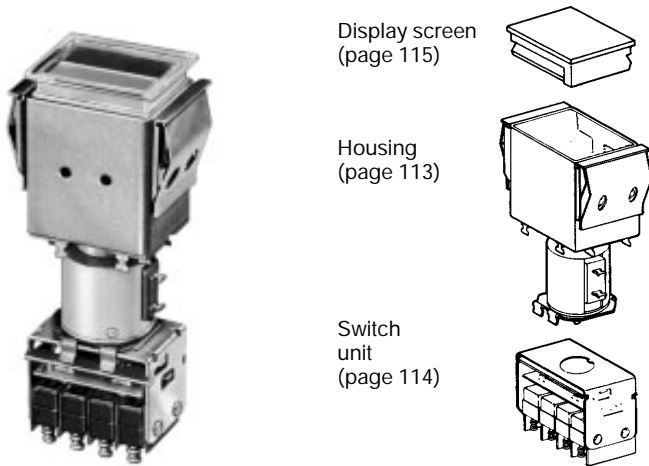


Without tool. Remove display screen/lampholder assembly from 2C200 operator-indicator (or 2F200 indicator). Unit is keyed to maintain proper orientation when replacing. Use only flange base T-1¼ lamps with 2C200 and 2F200 devices.

LAMPS AND FILTERS

Order lamps and filters for projected color from page 117.

FLANGE MOUNT



Flange mount units have mounting clips ready-attached to the housing. They can be individually installed or replaced; and

enable use of an overlay panel, if desired. Groupings can be separated by optional spacing barriers.

MODULES ASSEMBLE EASILY

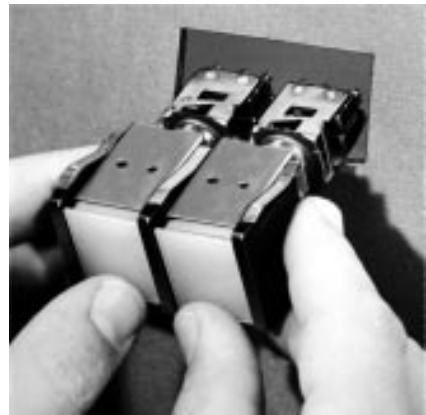
All modules are ordered as separate items which snap together for easy assembly.

Pushbuttons

Manual Switches

Pushbuttons Switches and Indicators

Series 2



Barriers on long sides

BARRIER MOUNT MODULES

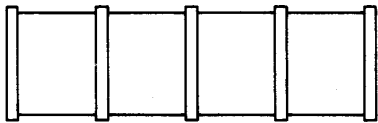
Barrier mount assemblies are identical in panel appearance. Operator-indicator housings have spring clips for attaching switch modules. This feature is not provided with indicator housings.

Barriers are necessary for mounting. They can be specified for attachment to the long or short side of the housing, as stated in the order guides.

BARRIER MOUNT HOUSING ORDER GUIDE

See "Application Data" for typical bailing circuits for coil-equipped modules.

Barriers Attach On:	No. of Lamp Sockets	Tool Not Required	
		Operator-Indicator	Indicator Only
Long Sides of Housing	2 (A & C) 4 (A-D)	2C207 2C209	
Short Sides of Housing	2 (A & C) 4 (A-D)	2C201 2C203	2F203

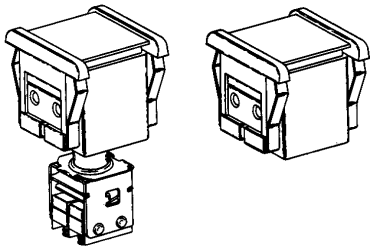


MOUNTING BARRIER ORDER GUIDE

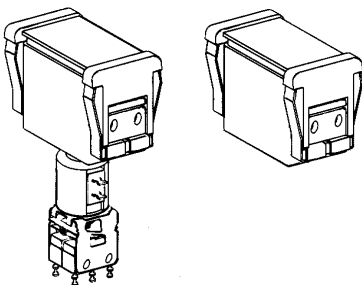
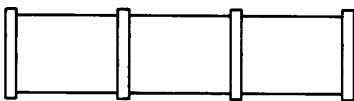
For strip mounting, specify one more barrier than the number of units in the group.

Mounting Barrier Type	For Panel Thickness	Catalog Listings	
		Gray	Black
Attach to Long Sides	.06-.19 in. (1,52-4,83 mm)	2B2	2B4
Attach to Short Sides	.06-.19 in. (1,52-4,83 mm)	2B1	2B3

Note: Panels .19 in. (1,52 mm) thick require the .06-.19 in. (1,52-4,83 mm) type barriers.

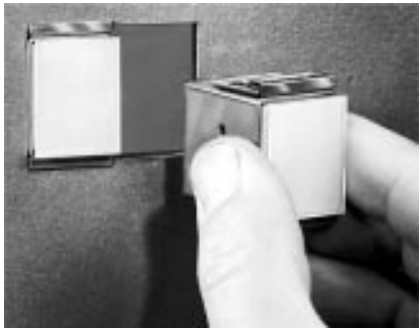


Barriers on short sides



Manual Switches

Pushbutton Switches and Indicators



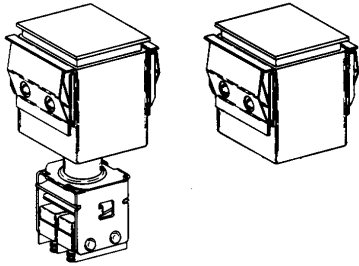
Flanges on long sides

FLANGE MOUNT MODULES

Flange mount assemblies are identical in panel appearance. Operator-indicator housings have spring clips for switch modules attachment (not provided with indicator housings).

Barriers are not required, since the panel mounting clips are ready-attached to flange sides of the housings. However, spacing barriers can be used for color-coding. They also aid in preventing inadvertent operation of two screens with one push.

Mounting dimensions on page 120.



FLANGE MOUNT HOUSING ORDER GUIDE

See "Application Data" for typical bailing circuits for coil-equipped modules.

Flanges On:	No. of Lamp Sockets	Tool Not Required	
		Operator-Indicator	Indicator Only
Long Sides of Housing	2 (A & C) 4 (A-D)	2C204 2C206	2F206

SPACING BARRIER ORDER GUIDE

For .06-31 in. (1,5-7,9 mm) thick panels.

Spacing Barrier Type	Catalog Listings	
	Gray	Black
For Long Flange Housing	2B9	2B18

Pushbuttons

Manual Switches

Pushbutton Switches and Indicators

Series 2

SWITCH MODULES



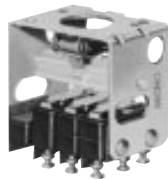
Interchangeable type 2D switch modules attach to spring clips on the bottom of operator-indicator housings. There is a wide selection of circuitry, electrical ratings, operating actions and terminations.

For mounting dimensions, see page 121.

SM SUBMINIATURE MULTI-SPDT SWITCH MODULES



Momentary action



Alternate action

SM switch modules offer a choice of two momentary action styles, one with a pronounced touch-feedback, the other with low operating force for rapid repeat ac-

tion. Also available with alternate-action and combination momentary/alternate action modules. Extra length turret solder terminals.

ELECTRICAL RATING

Silver contacts:

30 VDC: 5 amps res. sea level or 50,000 ft,
3 amps ind. sea level, 2.5 amps 50,000 ft.
Max. inrush, 24 amps.

UL and CSA rating for basic switch: 5
amps, 125 or 250 VAC.

Gold contacts:

30 VDC: 0.5 amp ind., 1 amp res., sea level
and 50,000 ft. Max. inrush, 2 amps.

SM SWITCH MODULE ORDER GUIDE

No. of SPDT Circuits	Momentary Action Touch-Feedback Type Silver Contacts	Alternate Action Low Force Type Silver Contacts
1	2D100	2D118
2	2D2	2D26
4	2D9	2D33

V3 COMPACT SPDT/DPDT SWITCH MODULES



ELECTRICAL RATING

30 VDC: 10 amps ind.* sea level, 6 amps ind.,* 50,000 ft. Motor load, 6 amps.** UL and CSA rating for basic switch: 10 amps, 1/3 Hp, 125 or 250 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.

* Inductive currents in accordance with AN3179.

** Motor load rating based on starting current.

V3 SWITCH MODULE ORDER GUIDE

No. of SPDT Circuits	Momentary Action
1	2D70
2	2D72

V3 switch modules have screw terminals with lockwashers. Quick-connect terminals (not shown) are also available. When used with short-flange operator indicators, add spacing barriers to prevent interference.

Manual Switches

Series 2

Pushbutton Switches and Indicators

ONE-PIECE DISPLAY SCREEN OPTIONS

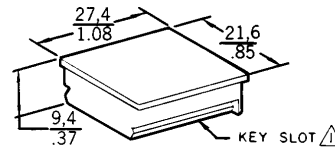


Single-section

These translucent solid color display screens are single-section/one piece construction

SINGLE-SECTION/ ONE-PIECE SCREENS ORDER GUIDE

	Standard
Red	2A1
Yellow	2A2
Green	2A3
White	2A5



⚠ KEY SLOT FACES SIDE OF HOUSING SHOWING CATALOG LISTING (ABOVE LAMP TERMINALS "A" AND "B")

THREE-PIECE DISPLAY SCREEN OPTIONS



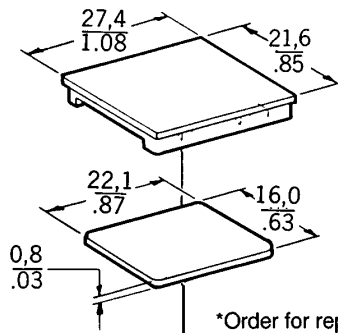
Single-section

These screens have transparent colored or colorless caps, transparent colorless legend inserts and translucent colored bases.

SINGLE-SECTION/THREE-PIECE SCREENS ORDER GUIDE

Color	Colorless Caps
Red	2A81
Yellow	2A82
Green	2A85
White	2A70
Amber	2A114

NOTE:
Add -L to catalog listing if button is to be legended.



2V10 CAP*

2V9 INSERT*

*Order for replacement only

BASE

KEY SLOT ①

① Key slot faces side of housing showing catalog listing (above lamp terminals "A" and "B")

TWO, THREE AND FOUR-SECTION DISPLAY SCREENS

Dotted lines show 3-section base configuration

Pushbuttons

Silicone rubber baffles prevent light spillage from one section to another. Screen caps and legend inserts are transparent colorless. Bases are translucent colored.

For more information on 2, 3, and 4-section display screens, contact the MICRO SWITCH Application Center.

Manual Switches

Series 2

Pushbutton Switches and Indicators

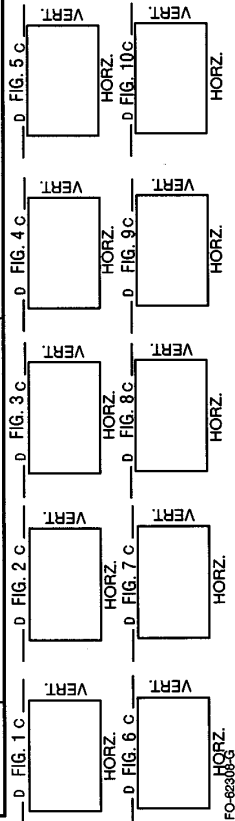
Honeywell

Series 2A, 2L and 2W Legend Order Sheet

ACCOUNT NO. 126-035

1. Complete ORDER SHEET for EACH NEW or REPEAT ORDER.
2. For each different legend, fill in a Diagram below as follows:
 - a. Determine proper orientation of the legend (HORIZONTAL or VERTICAL).
 - b. For SPLIT SCREEN ORDER, draw line(s) to show where the split occurs and indicate BASE COLOR for each section.
 - c. PRINT or TYPE the required legend in the diagrams provided.
 - d. Fill in QUANTITY and FIGURE NO. in the columns to the right.
 - e. Indicate keyed corner on all 2L listings.

Form No Shaded Area	HORIZONTAL				VERTICAL			
	1	2	3	4	1	2	3	4
TYPE SIZE	MAX. CHAR LINES /LINE /AREA	MAX. CHAR LINES /LINE /AREA	MAX. CHAR LINES /LINE /AREA	MAX. CHAR LINES /LINE /AREA	MAX. CHAR LINES /LINE /AREA	MAX. CHAR LINES /LINE /AREA	MAX. CHAR LINES /LINE /AREA	MAX. CHAR LINES /LINE /AREA
5/64	12 5 6 5	12 2 6 2	8 6 2 8	6 4 6 8	3 4 3 4	3 4 3	3	3
7/64	9 4 4 4	9 2 4 2	6 5 4 2	5 3 5 6	2 3 2	2 3 2	2	2
9/64	7 3 3 3	7 1 3 1	5 4 2 1	4 2 4 5	2 2 2	2 2 2	2	2
13/64	5 2 2 2	5 1 2 1	3 3 1 3	3 1 3 3	1 1 1	1 1 1	1	1
5/16	3 1 1 1	3 1 1 1	2 2 1 2	2 1 2 2	1 1 1	1 1 1	1	1
LEGEND AREAS								



Catalog Listing	
Customer P.O. No.	Customer Dwg. No.
MICRO SWITCH Sales Order	Schedule No.

Customer: _____
Address: _____

Quantity Ordered	Fig No.	Size	Ink Color		Customer Part Number
			BLK	WHT	

NOTE: Round, three and four-way splits are not available on 2W Series Display Screens. Only black and white type is available.

A3
Modified Gothic

Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.

STANDARD SYMBOLS AVAILABLE							
.	:	:	:	!	?	'	"
\$	¢	#	%	°	+	-	±
→	↑	↓	←	↔	↖	↗	∞
/	()	*	&				

(Signature) _____ (Date) _____

Manual Switches

Pushbutton Switches and Indicators

LEGEND INFORMATION

Honeywell MICRO SWITCH Division provides legend service on the inserts supplied with three-piece screens only. To specify your needs, add -L to the catalog listings (example: 2A81-L) and use Legend Order Sheet (Form FO-62308), shown on facing page. Reproduce it on your office copier.

On any one insert, only one size of type is provided in either black or white. After legending, the insert is assembled to the display screen. The type face used is "Modified Gothic".

LAMPS

T-1¼ incandescent lamps are available from MICRO SWITCH in 28 volt versions.

Use of neon lamps is not recommended. Light output is approximately 30% of an incandescent lamp. Also, a neon lamp will not illuminate blue or green filters or display screens due to the absence of these colors from the neon light spectrum.

LAMP POLICY

The 28 volt lamps are offered as a convenience to customers. Honeywell MICRO SWITCH Division does not extend any warranty as to such lamps, and cannot guarantee to provide lamps from specific manufacturers. Any technical or quality questions regarding such lamps should be directed to the lamp manufacturer.

COLOR FILTERS FOR PROJECTED COLOR

Projected color is achieved by using white buttons and color filters over clear lamps. When lamps are lighted, white button takes on color projected by the filters.

Filters used with type 2C200 and 2F200 housings (no-tool relamping) slip over lamp sockets in lampholder.

MIL-S-22885 ASSEMBLED DEVICES

Pushbutton switches and indicators can be ordered as assembled devices from a single MIL-S-22885 part number. Designated Series 2W, they are available for flange mounting and have the no-tool relamping feature. For ordering information, refer to MICRO SWITCH Catalog 80.

SCREEN/LEGEND COLORS

The chart below shows recommended display screen and legend color combinations for optimum legibility.

Screen Color	Legend Lettering	
	Black	White
Red		x
Green		x
Yellow	x	
Amber	x	x
White	x	

LAMP ORDER GUIDE

Catalog Listing	Base Style	Type No.	Rating			Life/Voltage†	
			Volts	Amps	Life in Hours	Volts	Expected Life (Hrs.)
2E1	Flange	327	28	.040	1000	24.0	7,500
						26.0	2,800
						30.0	400

† These are experimental continuous life test results supplied by a lamp manufacturer for reference only. Intermittent operation may reduce these figures as much as 50%. Ratings are based on median values of current and life.

Wattage should not exceed 2.4 watts (2 lamps) per switch, for continuous illumination.

FILTER ORDER GUIDE

Filter Style	Red	Green	Amber	White*
For Type 2C200 and 2F200 Housings	2G12	2G14	2G16	2G17

* Has blue tint to compensate for high yellow content of incandescent lamps at low voltages.

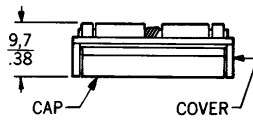
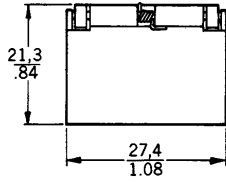


Manual Switches

Pushbutton Switches and Indicators

SWITCH GUARD ACCESSORY

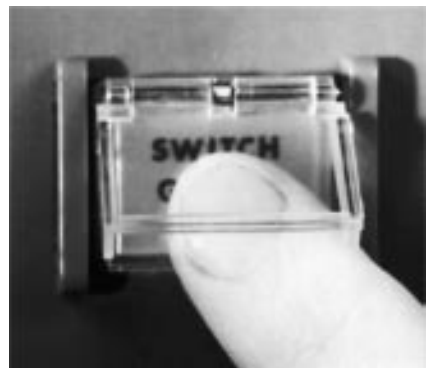
A hinged cover on the switch guard helps avoid inadvertent operation of the display screen. It is installed in place of the transparent slide-on cap furnished with three-piece screen. Note: When used with pull-in coil devices, specify the 2C200 operator-indicator housings which have the no-tool relamping feature.



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



Barrier mount assembly with guard installed. (Can also be used with all flange mount units.)



Guard requires a "lift-to-push" response to operate switch normally.

Order Catalog Listing **2H20**

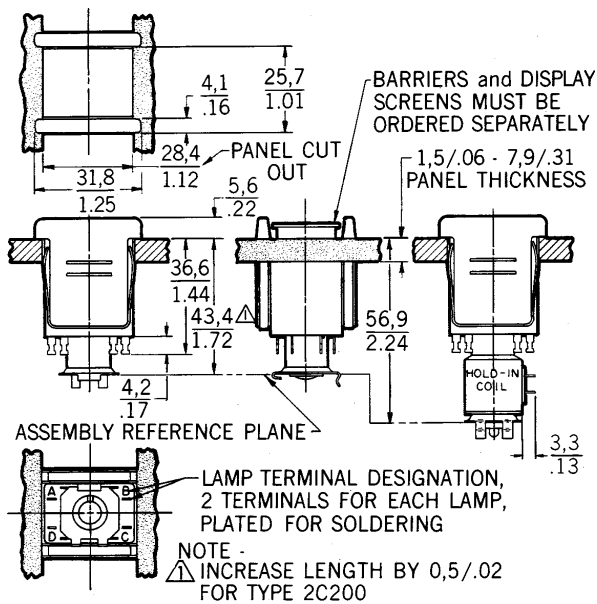
Manual Switches

Pushbutton Switches and Indicators

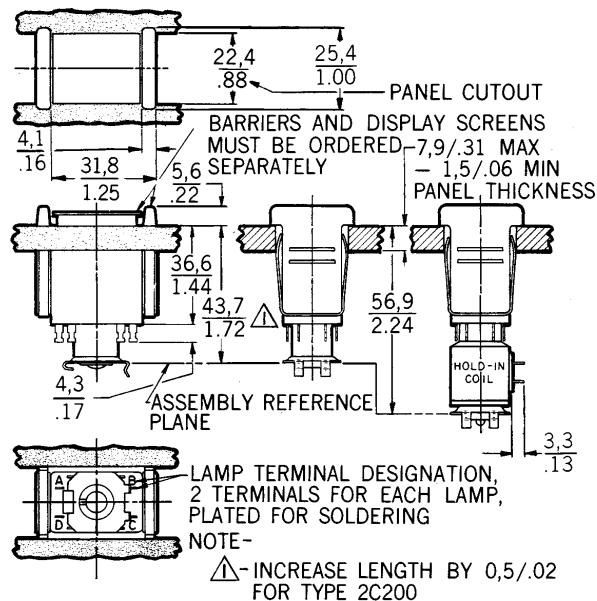
Series 2

MOUNTING DIMENSIONS (For reference only)

Long barrier operator-indicators

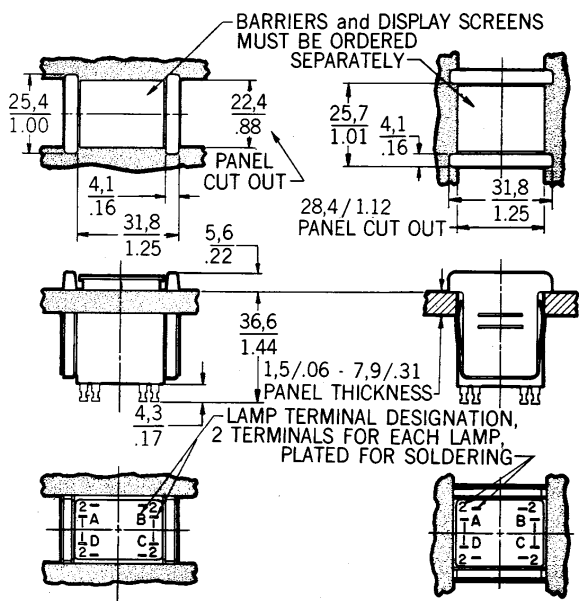


Short barrier operator-indicators

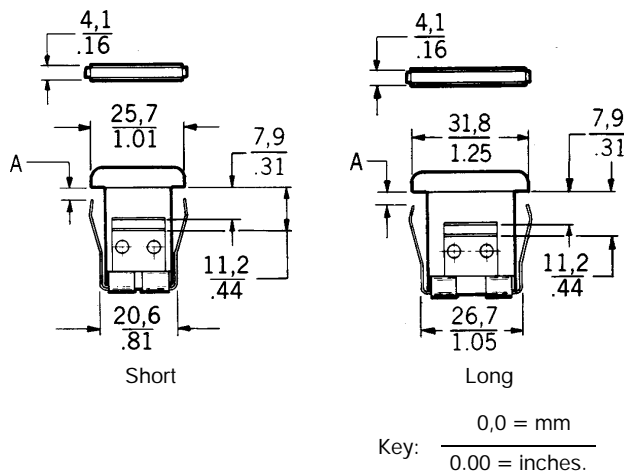


Short barrier indicators

Long barrier indicators



Mounting barriers



A	Panel Thickness
1,5/.06	1,5-4,81/.06-.19
4,6/.18	4,8-7,9/.19-.31

Pushbuttons

Length Of Panel Cutout*

Type of Indicator or Operator-Indicator		Number of Units						
		1	2	3	4	5	6	7
Short Barrier	mm	36,09	68,00	99,87	131,72	163,60	195,48	227,36
	in.	1.421	2.677	3.932	5.186	6.441	7.696	8.951
Long Barrier	mm	30,00	55,78	81,58	106,34	133,12	159,90	184,68
	in.	1.181	2.196	3.212	4.226	5.241	6.256	7.271

*Nominal dimensions, ±0,25 mm/0.10 in. (In 5% of the cases, the cutout will be undersized for the build-up of assembled units and will require enlargement.)

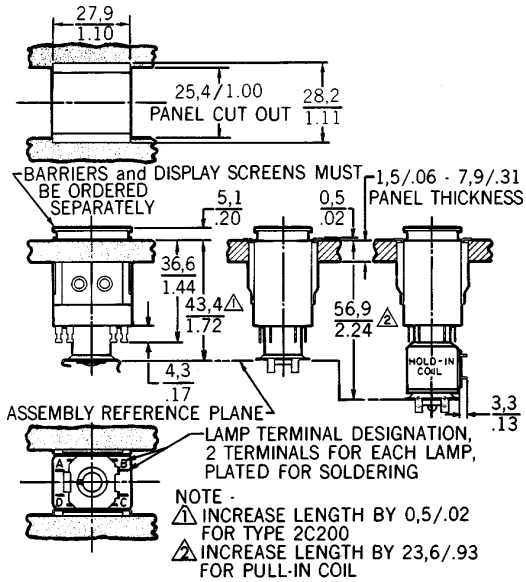
Manual Switches

Pushbutton Switches and Indicators

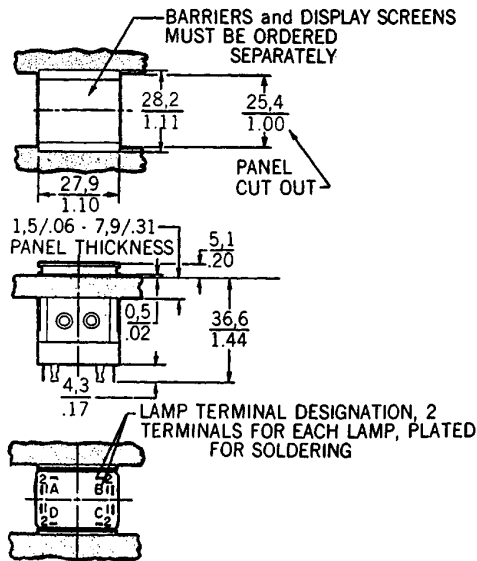
Series 2

MOUNTING DIMENSIONS (For reference only)

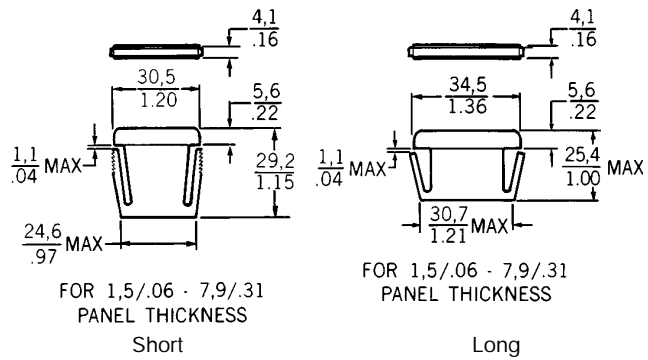
Long flange operator-indicators



Long flange indicators



Spacing barriers



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

Length Of Panel Cutout*

Add 4,19 mm/.165 in. to length for each optional spacing barrier used.

Type of Indicator or Operator-Indicator	Number of Units							
	1	2	3	4	5	6	7	
Long Flange	mm	27,94	55,75	83,57	111,36	139,17	166,98	194,77
	in.	1.1	2.195	3.290	4.384	5.479	6.574	7.668

*Nominal dimensions, $\pm 0,25$ mm/0.10 in. (In 5% of the cases, the cutout will be undersized for the build-up of assembled units and will require enlargement.)

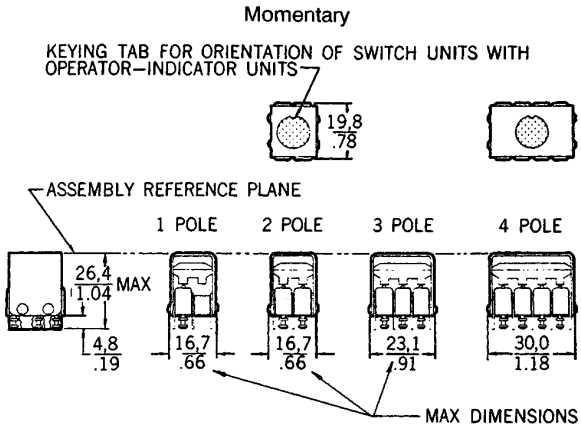
Manual Switches

Pushbutton Switches and Indicators

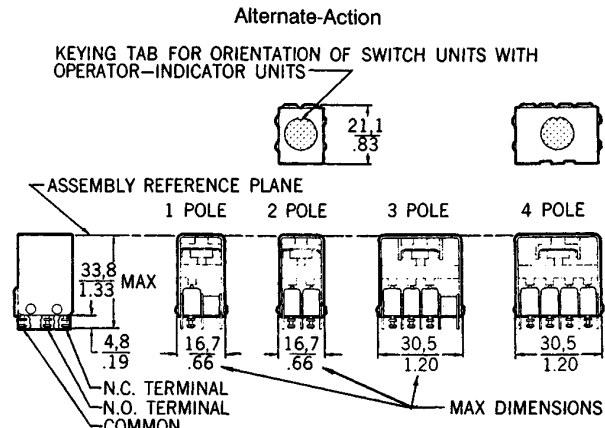
Series 2

MOUNTING DIMENSIONS (For reference only)

SM Switch Modules

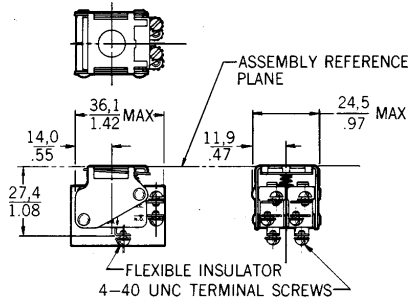
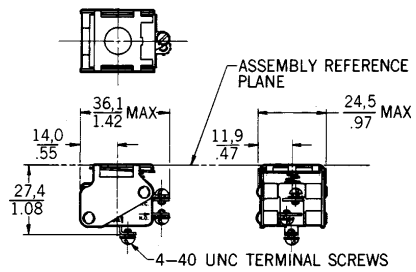


NOTE -
 1-'T2' TERMINALS ARE PLATED FOR SOLDERING
 2-SWITCHES DO NOT NECESSARILY OPERATE SIMULTANEOUSLY



NOTE -
 1-'T2' TERMINALS ARE PLATED FOR SOLDERING
 2-SWITCHES DO NOT NECESSARILY OPERATE SIMULTANEOUSLY

V3 Switch Modules



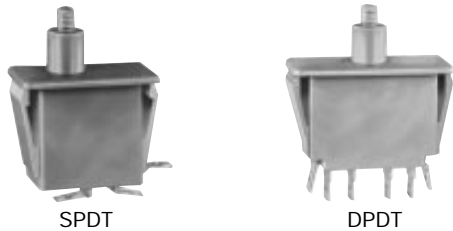
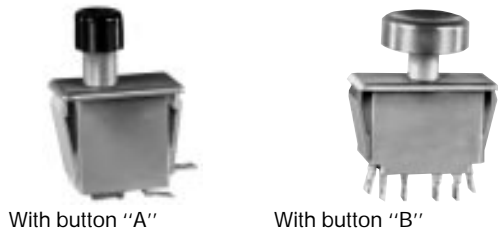
Pushbuttons

Manual Switches

Pushbutton Switches

DM Series

SWITCHES WITH SNAP-ON BUTTONS



SWITCH ORDER GUIDE

Switches have gray faceplates. Buttons are not included.

Circuitry	Momentary Action
SPDT	3DM1
DPDT	4DM1

Order buttons separately or ready-installed on switches from the order guide below.

SWITCH/BUTTON ORDER GUIDE

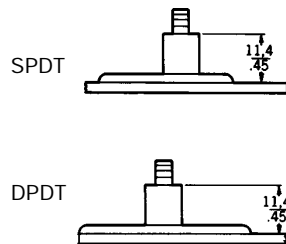
Switches have gray faceplates.

Button Style	Button Color	Button Only	Momentary Action		Alternate Action
			3DM1 (SPDT) and Button	4DM1 (DPDT) and Button	
 A	Black	31PA1	13DM1-A1	14DM1-A1	
	Red		13DM1-A2	14DM1-A2	
 B	Black	31PA3	13DM1-B1	14DM1-B1	
	Red	31PA4	13DM1-B2	—	2013DM1-B2

FEATURES

- Attractive, rugged snap-in panel mount design — easy installation.
- Snap-on or integral pushbuttons.
- Choice of momentary, alternate, push-pull and pull-to-cheat operation.
- Quick-connect terminals.
- Expected mechanical life: 1 million operations, 95% survival.
- Temperature range: -35° to +180°F (-37° to 82°C)
- UL recognized, (E12252) CSA certified (LR4442).

Three different styles of snap-on buttons can be used with the DM switches shown above. There is a choice of momentary or alternate-action, and single or double-pole circuitry.



ELECTRICAL RATING

UL and CSA rating: 10 amps, 1/2 Hp, 125, 250 or 277 VAC.

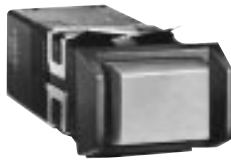
Manual Switches

Pushbutton Switches and Indicators

Series 4



Bezel on all sides



Barriers on short sides



Barriers on long sides



Barrier on one short side



Barriers on one long side

MOUNTING

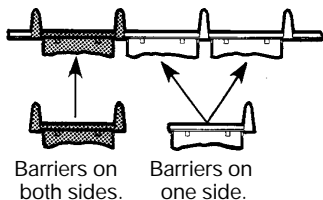
Snap-in mounting. Switch or indicator is easily inserted into the cutout. Mounting clips grip the panel. No tools are needed.



Housings with a full bezel can be front panel or sub-panel mounted, individually or in strips.

Barrier type housings are normally mounted top-of-panel in strips, but can also be individually mounted. Barriers can be on either the short or long housing sides.

The drawing shows how housings with a barrier on one side are used in a strip of two or more units. The first has a barrier on two sides, while all other units have a barrier on one side, and butt against each other.



Barriers on both sides.

Barriers on one side.

FEATURES

- Provides distinctive color display whether lighted or unlighted.
- Convenient front panel mounting and relamping, without tools.
- Matching indicators.
- Locked button option discourages tampering.
- Choice of transmitted color, projected color, or dead front display.
- UL recognized, CSA certified.



Button

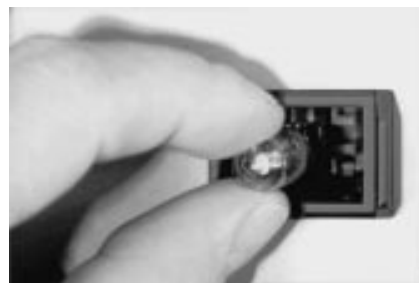
Incandescent Lamp

Housing

RELAMPING



1. Lamps and legends can be changed from panel front. When button is removed, lamp is extracted from its socket and retained in button.



2. Ease of lamp replacement. After the inoperative lamp is automatically removed with the button, the new lamp is inserted without the use of tools.

ELECTRICAL RATINGS

5-amp silver contacts —
5 amps res., 3 amps ind., 30 VDC.
UL code L-4: 5 amps, 250 VAC

10-amp silver contacts —
UL code L-285; 10 amps, 1/8 Hp, 125 or 250 VAC.

Gold contacts —
1 amp res., 0.5 amp, ind., 30 VDC
UL code L-22: 1 amp, 125 VAC

Gold alloy contacts —
0.1 amp, res., 30 VDC;
1 amp, 125 VAC.

LOCKED BUTTON OPTION

Series 4 can be furnished with a locked button option for use in areas accessible to the public, where tampering and vandalism are problems. The housing has a special mounting clip with built-in button retainer. This mounting clip must be removed from behind panel to allow button removal. Button movement during switch operation is unaffected by locked button feature. (These units cannot be relamped from front of panel.)

Manual Switches

Pushbutton Switches and Indicators

Series 4

SWITCH HOUSING ORDER GUIDE

Order buttons separately from page 116.

4A11B

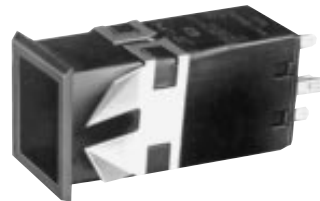
Switch Housing Style (Black)
<p>4A11B Bezel: all sides Mtg. clips: long sides</p> <p>4A12B Bezel: all sides Mtg. clips: short sides</p> <p>4A31B Barriers: long sides Mtg. clips: long sides</p> <p>4A32B Barriers: long sides Mtg. clips: short sides</p> <p>4A33B Barrier: one long side Mtg. clips: long sides</p> <p>4A34B Barrier: one long side Mtg. clips: short sides</p> <p>4A21B Barriers: short sides Mtg. clips: long sides</p> <p>4A22B Barriers: short sides Mtg. clips: short sides</p> <p>4A23B Barrier: one short side Mtg. clips: long sides</p> <p>4A24B Barrier: one short side Mtg. clips: short sides</p>
With Housing Provision for Locked Button
<p>4A13B Bezel: all sides Mtg. clips: long sides</p> <p>4A25B Barriers: short sides Mtg. clips: long sides</p> <p>4A26B Barrier: one short side Mtg. clips: long sides</p> <p>4A35 Barriers: long sides Mtg. clips: long sides</p> <p>4A36 Barrier: one long side Mtg. clips: long sides</p>

AA

Switching Element			
Electrical Data	Action	Terminals	
		.110 QC	PC*
1-Pole (SPDT), 5 a. silver contacts	Momentary	AA	AD
	Alt. Action	BA	BD
2-Pole (DPDT), 5 a. silver contacts	Momentary	EA	ED
	Alt. Action	FA	FD
1-Pole (SPDT), gold contacts	Momentary	CA	CD
	Alt. Action	DA	CD
2-Pole (DPDT), gold contacts	Momentary	GA	GD
	Alt. Action	HA	HD
1-Pole (SPDT), 10 a. silver contacts	Momentary	LA	
	Alt. Action	MA	
2-Pole (DPDT), 10 a. silver contacts	Momentary	NA	
	Alt. Action	PA	
1-Pole (SPDT), gold alloy contacts	Momentary	QA	
	Alt. Action	RA	
2-Pole (DPDT), gold alloy contacts	Momentary	TA	
	Alt. Action	VA	

11

Incandescent Illumination
<p>11 No lamp, has lamp socket for T-3/4 wedge base lamps.</p> <p>21 #161 12-volt T-3/4 lamp.</p> <p>31 #656 or 152 28-volt T-3/4 lamp</p> <p>91 Unlighted, no lamp socket.</p>



Example:
4A11BAA11

Black switch housing with a bezel on all sides, mounting clips on long sides, 1-pole momentary-action 5-amp silver contacts, 110" quick-connect/solder terminals, and a T-3/4 lamp socket.

MOUNTING CLIP ORIENTATION

Mounting clips on the **long sides** of the housing are specified when individually mounted or when the long sides of strip mounting housings parallel the long sides of the panel cutout slot. The most secure mounting is achieved when the mounting clips are on the long sides.

Mounting clips on the **short sides** of the housing are specified when short sides of strip mounted housings parallel the long sides of the panel cutout slot.

Manual Switches

Pushbutton Switches and Indicators

INDICATOR ORDER GUIDE

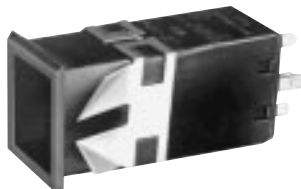
Order buttons separately from page 107.

4C11B

Indicator Housing Style (Black)		
Description	Terminals	
	.110 Q.C.	P.C.
Bezel: all sides Mtg. clips: long sides	4C11B	4D11B
Bezel: all sides Barriers: short sides	4C12B	4D12B
Barriers: short sides Mtg. clips: long sides	4C21B	4D21B
Barriers: short sides Mtg. clips: short sides	4C22B	4D22B
Barrier: one short side Mtg. clips: long sides	4C23B	4D23B
Barrier: one short side Mtg. clips: short sides	4C24B	4D24B
Barriers: long sides Mtg. clips: long sides	4C31B	4D31B
Barriers: long sides Mtg. clips: short sides	4C32B	4D32B
Barrier: one long side Mtg. clips: long sides	4C33B	4D33B
Barrier: one long side Mtg. clips: short sides	4C34B	4D34B
With Housing Provision for Locked Button		
Bezel: all sides Mtg. clips: long sides	4C13B	4D13B
Barriers: short side Mtg. clips: long sides	4C25B	4D25B
Barrier: one short side Mtg. clips: long sides	4C26B	4D26B
Barriers: long sides Mtg. clips: long sides	4C35B	4D35B
Barrier: one long side Mtg. clips: long sides	4C36B	4D36B

11

Incandescent Illumination
11 No lamp, has lamp socket for T-3/4 wedge base lamps.
21 #161 12-volt T-3/4 lamp.
31 #656 or 152 28-volt T-3/4 lamp
91 Unlighted, no lamp socket.



Example:

4C11B11

Black indicator housing with a bezel on all sides, mounting clips on long sides, .110" quick-connect/solder terminals, and a socket for a T-3/4 lamp.

MOUNTING CLIP ORIENTATION

Mounting clips on the **long sides** of the housing are specified when individually mounted or when the long sides of strip mounted housings parallel the long sides of the panel cutout slot. The most secure mounting is achieved when the mounting clips are on the long sides.

Mounting clips on the **short sides** of the housing are specified when short sides of strip mounted housings parallel the long sides of the panel cutout slot.

HOW TO ORDER ASSEMBLED SWITCHES OR INDICATORS

With lamp assembled:

To order a lamp assembled, enter the appropriate ILLUMINATION Code Number, as shown in the lamp chart on the next page. Example: 4A11BBA12 is furnished with a 6-volt lamp installed.

With button assembled:

To order a button assembled in the housing, add the code letters for BUTTON TYPE, DISPLAY COLOR, and LEGEND (page 60) to the housing listing. Example: 4A11BBA12AGN is furnished with a green transmitted-color unlegended button assembled in the housing (and with a 6-volt lamp installed).

Manual Switches

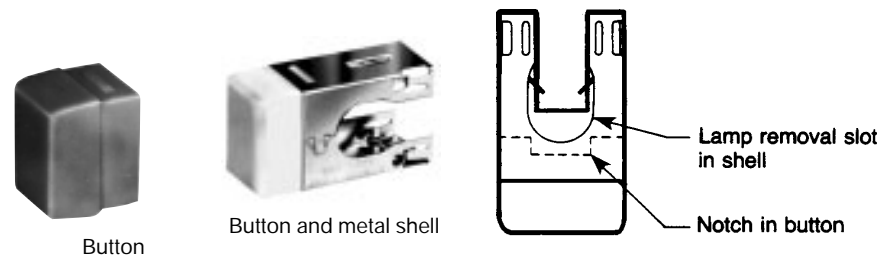
Pushbutton Switches and Indicators

Series 4

BUTTON ORDER GUIDE

4B1	A	G	N
Button With Metal Shell * 4B2 Both button and metal shell provided.	Button Type A Transmitted color. 5 sides lighted. 1-piece translucent button. B Projected color 5 sides lighted. Translucent white button & color insert. C Dead front, 5 sides lighted. Transparent black button & translucent color insert D Dead front, Only face lighted. Transparent black button & translucent color insert. E Transmitted color. 5 sides lighted. Transparent colorless button & translucent color insert. U, N, or K type only. F Transmitted color. Only face lighted. Transparent colorless button & color insert. U, N or K type only. G Same as type "A" except .250" higher	Display Color B Std. Blue G Std. Green R Std. Red S Transparent Black (Unlighted applications only) Y Std. Yellow W Std. White (Do not use with Type B button) A Std. Amber (For use with Type A or G button only)	Legend (Legend Order Sheet must accompany all orders for legended buttons) U No legend, button (incl. insert) unassembled. (For customer who does own legending.) Use with any button except 4B1A— N No legend, button assembled. (For applications not requiring legends.) Use with any button. L Legend on button only, button assembled. (For customer who prefers to have MICRO SWITCH provide legending.) Use with any button except E and F. K Legend on insert only, button assembled. (for C, D, E and F button types.) J Legends on both <i>button and insert</i> , button assembled. Use with C & D button types
Button With Metal Shell, With Provision for Locked Button * 4B3 Both button and metal shell provided.			
Button Without Metal Shell 4B1 Button only. (without metal shell). For replacement purposes only.			

* To be ordered with switch.



Example:
4B1AGN
 Green (transmitted color) unlegended button. (If the button shell is also desired, substitute 4B2 for 4B1.)



Note: legended button should be assembled as shown above, with button notch keyed to lamp removal slot in shell. This will reduce possibility of lamp droppage when button is removed from the housing. Buttons are legended in this manner.

LEGENDING

Pad printed legends

Use Legend Order Sheet FO-63039 (see page 110) to specify pad printed legends. Reproduce it on your office copier. Legends are oversprayed for maximum durability.

Film legends

Film legends are not supplied by MICRO SWITCH. However, this service is readily available from commercial sources or may be provided through your in-house capabilities. The film should be polyester to withstand lamp heat and must be precision cut, per the dimensions shown on the next page, to insure proper alignment.

The film fits into a small undercut on the face of the button insert. The film is held securely when the outer button and insert are snapped together. (Note: It is difficult to disassemble for legend changes without damaging the parts.)

Button and insert should be snapped together prior to being assembled to the button shell.

Pushbuttons

Manual Switches

Pushbutton Switches and Indicators

Series 4

LAMP ORDER GUIDE

Catalog Listing	Illum. Code	Incandescent Lamp Description
4Z221	21	#161 12-volt (T-3¼)
4Z231	31	#656 or #152 28-volt (T-3¼)

LAMP DATA

Following data was compiled from manufacturers' specifications and is provided for reference only.

Illum. Code	Industry Lamp No.	Design Volts	Incandescent Lamp Specifications			
			Socket volts	Amps	MSCP	Life (hrs. avg.)
21	161	14	14.0	12.0	11.0	
			.19	.17	.16	
			1.0	.60	.4	
			4,000	25,000	26,500	
31	656 or 152	28	28.0	27.0	26.0	
			.06	.057	.054	
			.65	.52	.49	
			5,000	7,500	10,000	

REPLACEMENT PARTS

MOUNTING CLIPS ORDER GUIDE

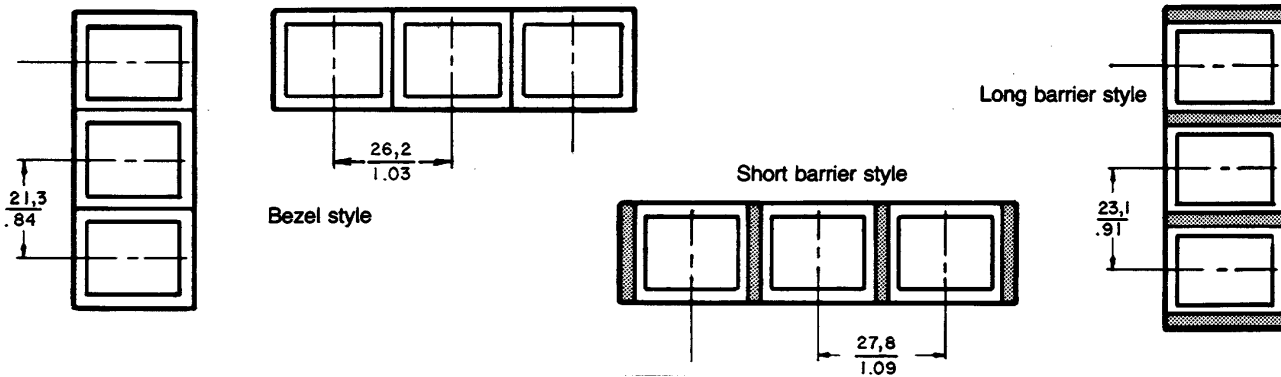
Catalog Listing	Description
4Z31	For long sides
4Z32	For short sides

* Each housing requires two long or short mounting clips.

METAL SHELL ORDER GUIDE

Catalog Listing	Description
4Z41	For type 4B1 buttons
4Z42	For type 4B3 buttons

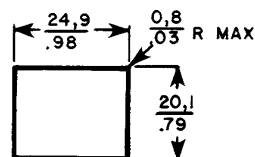
MOUNTING CENTERS FOR STRIP MOUNT



PANEL CUTOUT FOR STRIP MOUNT

	Housing Style	Dimensions $+0.38 +0.015$ $-0.00 -0.000$	
		Width	Length
Short Sides Abutting	Full Bezel	.79" (20,1 mm)	[No. of units x 1.03" (26,2 mm)] - .05" (1,4 mm)
	Short Barrier	.79" (20,1 mm)	[No. of units x 1.09" (27,8 mm)] - .12" (3,0 mm)
Long Sides Abutting	Full Bezel	.98" (24,8 mm)	[No. of units x .84" (21,3 mm)] - .05" (1,4 mm)
	Long Barrier	.98" (24,8 mm)	[No. of units x .91" (23,1 mm)] - .12" (3,0 mm)

PANEL CUTOUT FOR INDIVIDUAL MOUNT (any housing style)

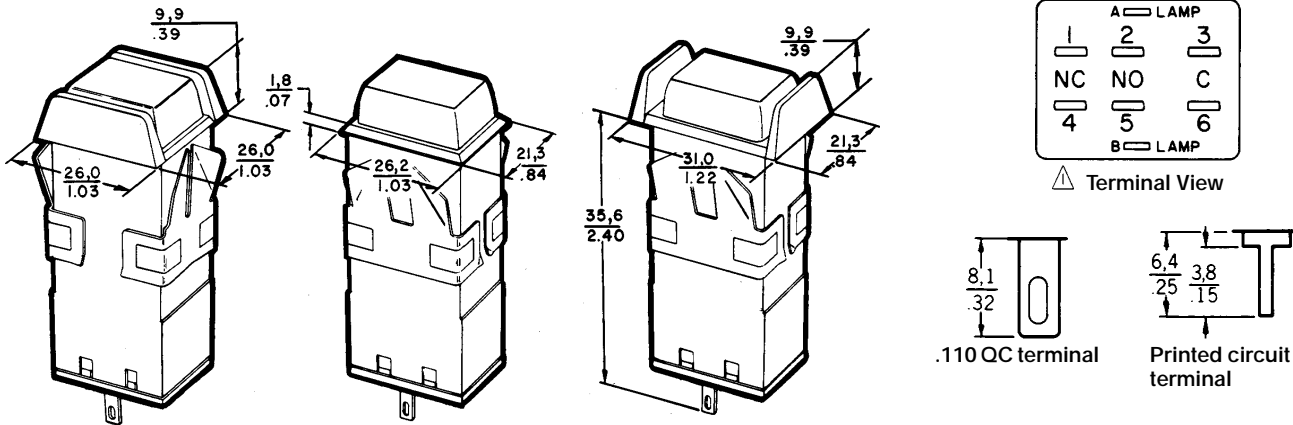


Manual Switches

Pushbutton Switches and Indicators

Series 4

MOUNTING DIMENSIONS (For reference only)



Type A Button (5 sides lighted)	Type B Button (5 sides lighted)	Type C & E Buttons (5 sides lighted)	Type D & F Buttons (Only face lighted)
<p>Translucent Colored Button</p>	<p>Translucent White Button</p>	<p>Transparent Button Type C-Black Type-E Colorless</p>	<p>Transparent Button Type D-Black Type F-Colorless</p>
<p>Translucent Colored Button</p>	<p>Transparent Colored Insert</p>	<p>FILM*</p> <p>Translucent Colored Insert</p>	<p>FILM*</p> <p>Opaque Black Insert With Translucent Colored Face</p>
<p>±.005/0,13 * Thickness: .004" to .007"/0,1 to 0,18 (Film furnished by customer)</p>			

Pushbuttons

Manual Switches

Series 4

Pushbutton Switches and Indicators

Honeywell

“Series 4” Legend Order Sheet

ACCOUNT NO. _____

1. Determine if legend is to be applied to outer button shell, or to button insert.
2. Select appropriate Fig. No. from Chart “A” or “B”, and enter on legend order chart.
3. Place ✓ in appropriate “TYPE SIZE” column (refer to CHART “C” for examples).
4. Place ✓ in BLACK or WHITE legend color column.
5. Indicate quantity desired.
6. Fill in legend description. (DO NOT EXCEED MAXIMUM NUMBER OF LINES OR

Catalog Listing 4	
Customer P.O. No.	Customer Dwg. No.
MICRO SWITCH Sales Order	Line Number
	Schedule No.

Customer: _____
 Address: _____

Legend Area	A Button: Legend on Top Surface		B Button Insert: Legend on Top Surface	
	Type Size	Without An "M" or "W"	With An "M" or "W"	Type Size
Fig. 1	5/64	9 4 9 4	7 3 7 3	5/64
	7/64	7 3 6 3	5 2 5 1	7/64
Fig. 2	9/64	6 2 5 2	5 1 5 1	9/64
	13/64	4 1 3 1	3 1 2 1	13/64
Fig. 3	5/16	2 1 2 1	2 1 1 1	5/16

C	Modified Gothic lettering (A thru Z), numerals (0 thru 9) and Symbols below available in 5/64, 7/64, 9/64, 13/64 and 5/16.	
	STANDARD SYMBOLS AVAILABLE	
	· , : ; ! ? ' _ " / () * &	A3 Modified Gothic
	\$ ¢ # % 0 + - ± × = ≠ > <	
	→ ↑ ↙ ↘	

LEGEND ORDER CHART

Customer Part No	Fig No	Type Size		Ink Color	Button Qty	Legend Description					
		REF. Chart A or B	REF. Chart A or B			Do Not Exceed Maximum Number of Lines or Characters					
		5/64	7/64	9/64	13/64	5/16	1st Line	2nd Line	3rd Line	4th Line	5th Line

FO-63035-B

(Signature)

(Date)

D	SPECIAL LEGENDS NOTE: Use this area to show special Legend Locations or Configurations NOT shown above. NON-STANDARD legends will involve additional charges and increased delivery time.
	Fig. "A"
	Fig. "B"

OBSOLETE

SLP1 Series

Manual Switches

Low-Profile Pushbutton Panels



FEATURES/BENEFITS

- Designed and manufactured to meet the specific needs of your application – including these feature options:
 - Custom layout.
 - Wide selection of button sizes and colors – capable of replacement from the panel front.
 - Full-face lighted buttons.
 - Legend service on buttons.
 - Can be furnished wired-only or with built-in interface electronics.
 - Provision for including lighted message displays.
 - Termination direct to PC board.
 - Custom enclosures available.
- Tactile feedback of switching action.
- Low-cost installation – complete assembly is furnished ready to attach with mounting screws. Mass termination to plug-in connector saves wiring time.
- Low energy contacts – compatible with microprocessors and other low level logic circuitry.
- Advanced construction and manufacturing processes reflect the MICRO SWITCH commitment to high quality, reliability, and performance.

These low-profile pushbutton panels combine the latest advancements in conductive rubber switching technology and pushbuttons in a custom package, tailored to your requirements. They meet the needs for reliable manual switching in applications that do not normally require high speed thruput.

Featuring .100 inch (2,4 mm) high buttons and a .505 inch (12,8 mm) panel frame depth, their low profile easily adapts to your system's styling and package size requirements. Your design can include a provision for digital readouts, CRTs, LCDs and other solid state lighted message displays, encoders, microprocessors, etc. – which can be either assembled by you or MICRO SWITCH.

TYPICAL APPLICATIONS

- Marine Control Panels
- Instrumentation
- Banking Machines
- Office Copiers
- Test Equipment
- Vending Machines
- Medical Monitoring and Diagnostic Devices
- Telecommunications Equipment
- Hand-Held Controllers
- Programmable Controllers
- Security Entrance Control
- Industrial Controls

SPECIFICATIONS

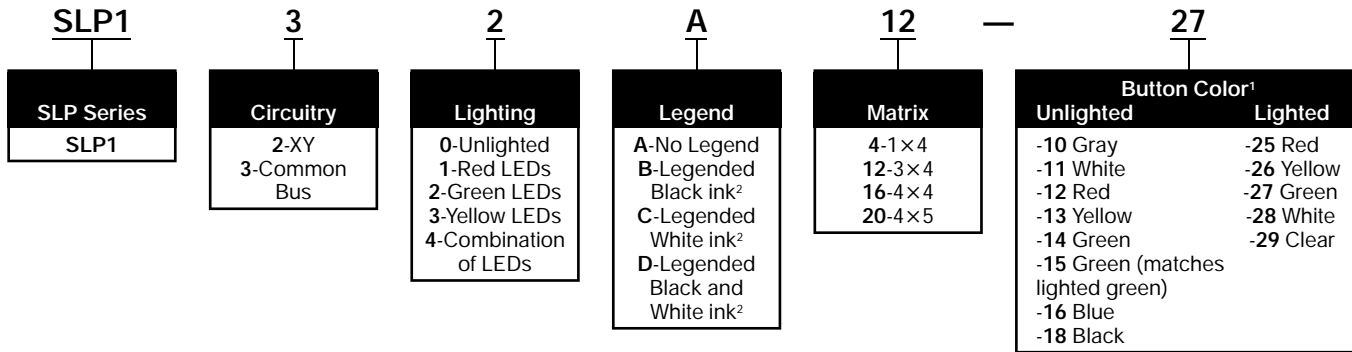
Environmental	
Operating Temperature	-40°C to 65°C (-40° to 149°F)
Storage Temperature	-40°C to 70°C (-40° to 158°F)
Altitude	-100 to 50,000 ft.
Vibration	MIL-STD-202F, Method 204, Condition A – frequency to 500 cycles: .06 in. double amplitude or 10 G's and a frequency range of 10 to 500 cycles.
Shock	MIL-STD-202F, Method 213B, Condition A – 50 G's, 1/2 sine, 11 millisecond pulse.
Sulphur Atmosphere	Withstands a sulphur atmosphere at 80% RH. 60°C (140°F) for 10 days
Steady State Humidity	MIL-STD-202F, Method 103B, Condition B – 90-95% RH at 40°C for 96 hours. Insulation resistance will not be less than 10 megohms min.
Mechanical	
Travel (nominal)	1,3 mm (.05 in.)
Operating Force (typical)	125 grams (4.4 oz. approx.)
Operating Life	10 x 10 ⁶ operations, 95% survival.
Force deflection (nominal)	Peak force, 125 grams (4.4 oz. approx.); Drop-off force, 60 grams (2.1 oz. approx.) (See force deflection curve chart.)
Electrical	
Contact Rating	30 mA @ 12 VDC, .500 sec. contact duration
Closed Circuit Resistance	500 ohms max. over life.
Open Circuit Resistance	10 megohms min.
Contact Disturbance Time	10 millisecc. max. at 2 lbs. (8,9 Newtons) full overtravel force, when mechanically actuated at 4 in. (10,6 mm) sec. plunger velocity.
Capacitance	Less than 20 picofarads per station.
Circuitry	X-Y or common bus.
LED	Vf Forward Voltage: 5V If Forward Current: 30 mA typ. Vr Reverse Voltage: 4V

Manual Switches

SLP1 Series

Low-Profile Pushbutton Panels

SLP1 ORDER GUIDE (All possible combinations may not be available.)



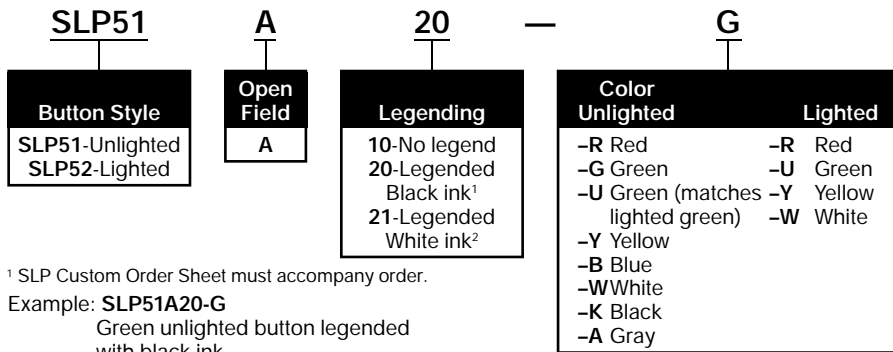
¹ Factory will assign non-standard LED and button colors and combinations. Complete SLP Custom Order Sheet.

² SLP Custom Order Sheet must accompany order.

Example:

SLP132A12-27 Common bus circuitry, green LEDs, no legend, 3×4 with green buttons.

INDIVIDUAL BUTTON CATALOGING



¹ SLP Custom Order Sheet must accompany order.

Example: SLP51A20-G

Green unlighted button legended with black ink.

ILLUMINATION

Full face button lighting is provided by red, green, and yellow LEDs. (LED colors should be the same as the button they illuminate.) The standard SLP1 offering is for use under general office lighting conditions, which is usually about 80 foot candles. (LEDs with less brightness can be provided.)

TERMINATION

A header type connector provides termination directly from the printed circuit board. Products shown here have straight exit headers (see mounting dimension drawings). Right angle exit header connectors can also be furnished. Connector pins are .025 inch (0,64mm) square, on .100 inch (2,54 mm) centers, by .318 inch long. Suitable for use with vast array connector manufacturers' standard products.

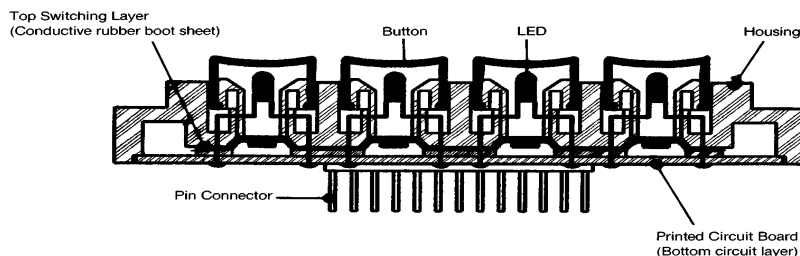
Pushbutton Panels

CONSTRUCTION

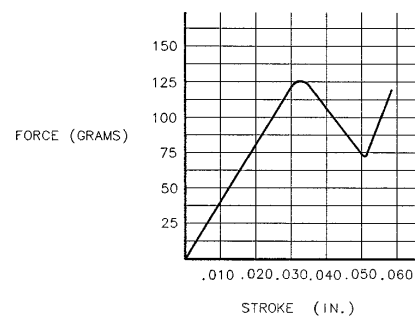
The top switching layer is a conductive rubber boot sheet (see cutaway drawing). When force is applied to a button, contact is made between the boot and the bottom circuit layer on a printed circuit board. The boots impart an excellent tactile feedback (see force deflection curve chart).

A molded plastic housing, with panel slots for buttons and mounting holes in each corner, is placed over all components and ultrasonically welded to the printed circuit board. Interface circuitry can be easily added to the PCB by the user or furnished built-in.

CUTAWAY VIEW



Force Deflection Curve

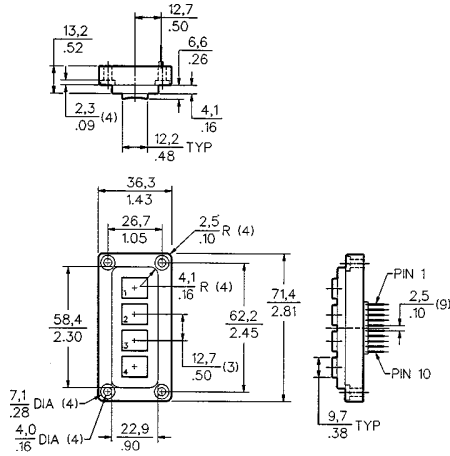


Manual Switches

Low-Profile Pushbutton Panels

SLP1 Series

1 X 4 PANEL



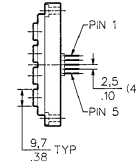
Note: Connector pins are .418 in./10.6 mm long.

LIGHTED

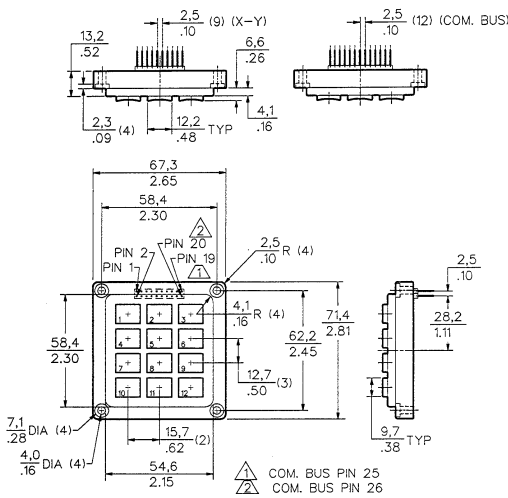
Station No.s	With C, Bus Sw. Cktry.	
	Switch Pins:	LED Pins: Pos. Neg.
1	3-8	1-5
2	4-8	2-5
3	6-8	10-5
4	7-8	9-5

NON-LIGHTED

Station No.	Switch Pins
1	1-5
2	2-5
3	3-5
4	4-5



3 X 4 PANEL



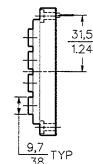
Note: Connector pins are .418 in./10.6 mm long.

LIGHTED

Station Nos.	With X-Y Sw. Cktry.		With C. Bus Cktry.	
	Switch Pins:	LED Pins: Pos. Neg.	Switch Pins:	LED Pins: Pos. Neg.
1	6-7	1-8	9-10	1-12
2	6-9	15-8	9-14	21-12
3	6-10	19-8	9-20	25-12
4	11-7	2-8	9-7	2-12
5	11-9	16-8	9-11	22-12
6	11-10	20-8	9-18	26-12
7	12-7	3-8	9-6	3-12
8	12-9	13-8	9-13	19-12
9	12-10	17-8	9-17	23-12
10	14-7	4-8	9-8	4-12
11	14-9	5-8	9-15	5-12
12	14-10	18-8	9-16	24-12

NON-LIGHTED

Station Nos.	With X-Y Cktry. Switch Pins:	With C. Bus Cktry. Switch Pins:
1	4-5	4-13
2	4-6	8-13
3	4-7	12-13
4	3-5	3-13
5	3-6	7-13
6	3-7	11-13
7	2-5	2-13
8	2-6	6-13
9	2-7	10-13
10	1-5	1-13
11	1-6	5-13
12	1-7	9-13

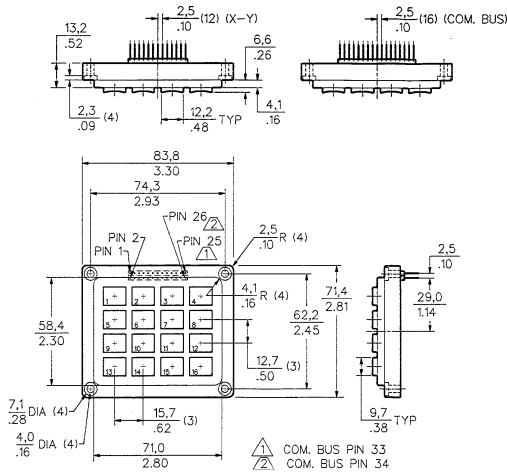


Manual Switches

Low-Profile Pushbutton Panels

SLP1 Series

4 x 4 PANEL



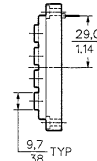
Note: Connector pins are .418 in./10.6 mm long.

LIGHTED

Station Nos.	With X-Y Sw. Cktry.		With C. Bus Sw. Cktry.	
	Switch Pins:	LED Pins: Pos. Neg.	Switch Pins:	LED Pins: Pos. Neg.
1	15-9	2-10	3-27	2-5
2	15-12	5-10	11-27	10-5
3	15-13	21-10	24-27	31-5
4	15-16	26-10	28-27	34-5
5	18-9	1-10	4-27	1-5
6	18-12	7-10	9-27	13-5
7	18-13	6-10	23-27	12-5
8	18-16	25-10	25-27	33-5
9	17-9	3-10	6-27	7-5
10	17-12	14-10	16-27	18-5
11	17-13	24-10	26-27	22-5
12	17-16	22-10	21-27	32-5
13	20-9	4-10	17-27	8-5
14	20-12	11-10	20-27	15-5
15	20-13	8-10	19-27	14-5
16	20-16	19-10	30-27	29-5

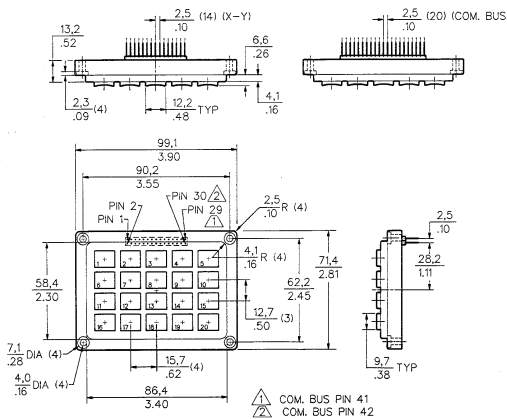
NON-LIGHTED

Station Nos.	With X-Y Cktry. Switch Pins:	With C. Bus Cktry. Switch Pins:
	1	3-2
2	3-6	8-17
3	3-7	12-17
4	3-8	16-17
5	5-2	3-17
6	5-6	7-17
7	5-7	11-17
8	5-8	15-17
9	4-2	2-17
10	4-6	6-17
11	4-7	10-17
12	4-8	14-17
13	1-2	1-17
14	1-6	5-17
15	1-7	9-17
16	1-8	13-17



Pushbutton Panels

5 X 4 PANEL



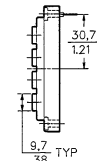
Note: Connector pins are .418 in./10.6 mm long.

LIGHTED 5 x 4 PANEL

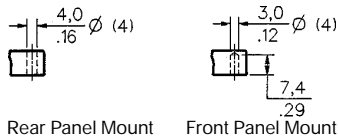
Station Nos.	With X-Y Sw. Cktry.		With C. Bus Cktry.	
	Switch Pins:	LED Pins: Pos. Neg.	Switch Pins:	LED Pins: Pos. Neg.
1	15-7	3-23	3-38	7-28
2	15-8	2-23	8-38	2-28
3	15-13	1-23	22-38	1-28
4	14-21	29-23	32-38	41-28
5	15-26	30-23	37-38	33-28
6	19-7	4-23	4-38	10-28
7	19-8	9-23	15-38	11-28
8	19-13	18-23	21-38	19-28
9	19-21	25-23	31-38	30-28
10	19-26	28-23	40-38	29-28
11	17-7	5-23	5-38	9-28
12	17-8	11-23	17-38	13-28
13	17-13	16-23	24-38	20-28
14	17-21	20-23	36-38	25-28
15	17-26	27-23	42-38	34-28
16	14-7	6-23	6-38	12-28
17	14-8	10-23	18-38	14-28
18	14-13	12-23	23-38	16-28
19	14-21	22-23	35-38	26-28
20	14-26	24-23	39-38	27-28

NON-LIGHTED

Station Nos.	With X-Y Cktry. Switch Pins:	With C. Bus Cktry. Switch Pins:
	1	4-5
2	4-6	8-21
3	4-7	12-21
4	4-8	16-21
5	4-9	20-21
6	3-5	3-21
7	3-6	7-21
8	3-7	11-21
9	3-8	15-21
10	3-9	19-21
11	2-5	2-21
12	2-6	6-21
13	2-7	10-21
14	2-8	14-21
15	2-9	18-21
16	1-5	1-21
17	1-6	5-21
18	1-7	9-21
19	1-8	13-21
20	1-9	17-21



NOTE: In addition to the recessed mounting hole style shown, units can be furnished with straight thru-holes for rear panel mounting or blind holes for front panel mounting (see drawings below).



Manual Switches

SLP1 Series

Custom Low-Profile Pushbutton Panels

MODULAR SWITCH DESIGN PROVIDES CUSTOM FLEXIBILITY

This new modular switch design incorporates the same basic construction features as the MICRO SWITCH SLP pushbutton panel, plus gives you the flexibility of specifying any switch matrix configuration.

Standard buttons are .583-inch square. Other button sizes can be furnished to suit your application needs.

The modular switch construction features good ergonomics with positive tactile feedback which imparts a good feel of the switching action, and compatibility with microprocessors and other low-level logic circuitry.

The addition of a polyurethane sheet, enables the SLP modular switch to meet water spray and dust sections of NEMA 12.

HOW TO SPECIFY CUSTOM ARRAYS

Use the SLP Custom Order Sheet to specify your desired button layout, button colors, LED colors (unless buttons are to be unlighted), and legend sizes and colors (unless the buttons are to be unlegended).

A copy of the order sheet is on the next two pages. Reproduce it on your office copier or request copies of form FO-64419.

Note: To enhance the display when the buttons are to be lighted by LEDs, the buttons should be either the same color as the LEDs or white buttons.

APPLICATION ASSISTANCE

Our field engineer/factory team will be happy to work with you every step of the way—through concept, design, and manufacturing—to help insure your custom package has a quality appearance and performs just the way you want it. Contact the 800 number.



PANEL SEAL ACCESSORY



SLP 3 × 4 array with panel seal.

Elastomer silicon seals fit over SLP panels to help protect their circuitry and behind panel components from contaminants that might enter through the switch. See photo. The seal is positioned between rear mounted units and the user's mounting panel. When properly installed, it meets NEMA 13, providing a degree of protection against dust, spraying of water, oil, detergent, and non-corrosive coolant. (Installation instructions furnished with seals.)

Silicon has good natural resistance to ultraviolet light and no UV inhibitors are required. This material has been thoroughly evaluated for chemical resistance. For further information, contact the 800 number. Use of the seal does not lessen operating life.

Note:

SLP panels with thru-hole mounting are recommended for use with the panel seal. Sealing is most effective when mounting screws are torqued to 6±1.5 in./lbs.

ORDER GUIDE – PANEL SEALS

Array	Catalog Listing
1×4	SLP61-4
3×4	SLP61-12
4×4	SLP61-16
5×4	SLP61-20

Manual Switches

Low-Profile Pushbutton Panels

SLP1 Series

Honeywell

SLP Custom Order Sheet

Instructions

- Fill in desired legends for the appropriate button layout. (Leave blank any buttons which are not to be legended.)
To determine if a given legend will fit, add the decimals shown for each letter (or number) under the desired type size in the Legending Capacity Table. In all cases, the total must not exceed .450.
EXAMPLE: The legend **START** specified in 7/64 type size consists of: **S(.086) + T(.087) + A(.086) + R(.095) + T(.087)**, for a total of **.441**. Since the total does not exceed .450, this legend will fit.
The 5/64 type size can be used for one-line or two-line legends. All other type sizes are used for one-line legends only. Legends will be centered on buttons.
- Fill in the desired button colors, LED colors (unless button is to be unlighted), legend sizes and legend colors (unless button is to be unlegended). See button layouts for station reference numbers.
Use only the number of lines for the appropriate button layout.
EXAMPLE: A 1 x 4 would have station no. lines 1-4 filled out.
LED colors are red, green, and yellow.
Standard button colors are red, green, yellow, white, gray, and blue. When buttons are to be lighted by LEDs, buttons should be either the same color as the LEDs or white buttons.
Standard legend colors are black and white.
- Submit a separate legend sheet for each SLP catalog listing.

Legends are applied by the pad printing process. Shown at right are examples of the standard typeface.

5/64
A - Z 0 - 9
 7/64
A - Z 0 - 9
 9/64
A - Z 0 - 9
 13/64
A - Z 0 - 9

FO-64418-B

Catalog Listing SLP	
Customer P.O. No.	Customer Dwg. No.
MICRO SWITCH Sales Order	Schedule No.
Line Number	

Customer: _____

Address: _____

(city) _____ (state) _____

Sheet prepared by: _____

Phone No.: _____

Legending Capacity Table

Legend	5/64	7/64	9/64	13/64	Legend	5/64	7/64	9/64	13/64
A	.070	.086	.097	0.152	S	.069	.086	.097	0.153
B	.079	.096	.108	0.162	T	.069	.087	.097	0.142
C	.080	.096	.108	0.162	U	.084	.106	0.123	0.179
D	.080	.105	0.122	0.171	V	.070	.087	.098	0.147
E	.070	.086	.097	0.153	W	.102	0.121	0.143	0.211
F	.069	.081	.096	0.142	X	.069	.085	.097	0.147
G	.079	.095	.105	0.171	Y	.069	.086	.097	0.145
H	.079	.106	0.122	.180	Z	.069	.081	.086	0.142
I	.034	.042	.054	.072	1	.069	.087	.098	0.142
J	.060	.072	.087	0.119	2	.070	.087	.095	0.142
K	.079	.095	.109	0.161	3	.068	.086	.095	0.142
L	.070	.081	.097	0.142	4	.070	.086	.097	0.142
M	.100	0.121	0.143	0.210	5	.070	.087	.097	0.141
N	.081	.106	0.123	0.181	6	.070	.087	.097	0.143
O	.080	.106	0.122	0.171	7	.070	.087	.097	0.141
P	.070	.087	.107	0.150	8	.070	.087	.097	0.142
Q	.080	.107	0.122	0.171	9	.070	.087	.097	0.142
R	.079	.095	.106	0.161	0	.070	.087	.096	0.142

Pushbutton Panels

Manual Switches

Low-Profile Pushbutton Panels

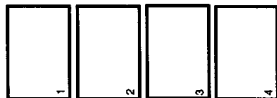
SLP1 Series

Honeywell

SLP Legend Order Sheet

1 x 4 Button Layout

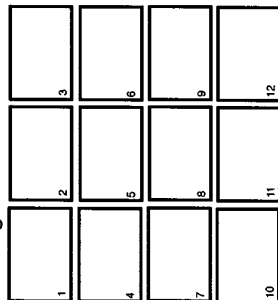
1. Fill in desired legends.



Stations numbered for reference only.

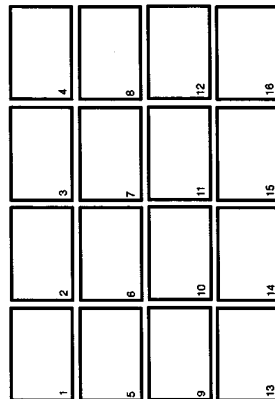
3 x 4 Button Layout

1. Fill in desired legends.



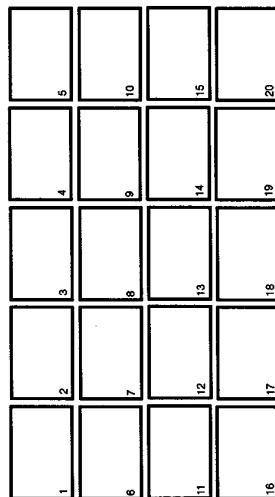
Stations numbered for reference only.

4 x 4 Button Layout



Stations numbered for reference only.

5 x 4 Button Layout



Stations numbered for reference only.

2. Fill in desired legends, LEDs and legends; and legend size.

Station No.	Button Color	LED Color	Legend Color	Legend Size
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

FB-64419-B - Pg2

Manual Switches

Low-Profile Pushbutton Panels

SLP1 Series

Honeywell

SLP 51/52 Button Legending Order Guide

INSTRUCTIONS:

- Fill in desired legends on the order chart below. To determine if a given legend will fit, add the decimals shown for each letter (or number) under the desired type size in the Legding Capacity Table. In all cases, the total must not exceed .450 for Fig. 2 or .350 for Fig. 1.

Example:

The legend **START** specified in 7/64 type size consists of: $S(.086) + T(.087) + A(.086) + R(.095) + T(.087)$, for a total of **.441**. Since the total does not exceed .450, this legend will fit.

- Fill in the catalog listing - one listing per sheet.
- Check proper Fig. #, Type Size and Type Color.
- Fill in quantity required for each legend.

NOTES:

- Legends will be centered within button.
- Legends will be pad printed and oversprayed with a protective, clear material.

Button Type	Figure	Maximum Lines/Area		
		5/64	7/64	9/64 13/64
	A 1	3	2	1
	A 2	2	1	1

SPECIAL LEGENDS	
NOTE: Use this area to show special Legend Locations or Configurations NOT shown to the left. NON-STANDARD legends will involve additional charges and increased delivery time.	
Fig. "A"	Fig. "B"

LEGEND ORDER CHART

Customer Part #	Fig #	Type Size	Legend Color		Button Qty.	Legend Description		
		5/64 7/64 9/64 13/64	BLK	WHT		1st Line	2nd Line	3rd Line

FO-84479-A

Catalog Listing	SLP5 _____
Customer P.O. No.	_____
MICRO SWITCH S.O. Number	_____
Line Number	_____
Schedule No.	_____

Customer: _____

Address: _____

(city) _____

(state) _____

Sheet prepared by: _____

Phone Number: _____

LEGENDING CAPACITY TABLE

	LEGEND 5/64	7/64	9/64	13/64	LEGEND 5/64	7/64	9/64	13/64
A	.070	.086	.097	.152	.069	.087	.098	.142
B	.079	.096	.108	.162	.070	.087	.095	.142
C	.080	.096	.108	.162	.068	.086	.095	.142
D	.080	.105	.122	.171	.070	.086	.097	.142
E	.070	.086	.097	.153	.070	.087	.097	.141
F	.069	.081	.096	.142	.070	.087	.097	.143
G	.079	.095	.105	.171	.070	.087	.097	.141
H	.079	.106	.122	.180	.070	.087	.097	.142
I	.034	.042	.054	.072	.070	.087	.097	.142
J	.060	.072	.087	.119	.070	.087	.096	.142
K	.079	.095	.109	.161	.069	.086	.097	.145
L	.070	.081	.097	.142	.069	.091	.107	.142
M	.100	.121	.143	.210	.080	.105	.122	.171
N	.081	.106	.123	.181	.084	.137	.164	.233
O	.080	.106	.122	.171	.064	.110	.120	.180
P	.070	.087	.107	.150	.035	.106	.117	.183
Q	.080	.107	.122	.171	.064	.139	.168	.250
R	.079	.095	.106	.161	.079	.139	.166	.250
S	.069	.086	.097	.153	.084	.126	.140	.207
T	.069	.087	.097	.142	.084	.139	.168	.250
U	.084	.106	.123	.179	.112	.139	.156	.251
V	.070	.087	.098	.147	.112	.139	.156	.251
W	.102	.121	.143	.211	.069	.140	.166	.250
X	.069	.085	.097	.147	.050	.062	.073	.097
Y	.069	.086	.097	.145	.050	.062	.073	.097
Z	.069	.081	.086	.142	.081	.097	.108	.170
					.054	.089	.102	.123
					.035	.042	.052	.072

Pushbutton Panels

Manual Switches

OBSOLETE

SN/SD Series

Hall Effect Keyboards/Modules

SD HALL EFFECT KEYBOARDS

MICRO SWITCH SD Series Hall effect keyboards meet high performance, custom design, full-travel keyboard needs. They're unsurpassed for switch speed, reliability and accuracy. Modular construction allows flexibility in keyboard layout and size.

Hall effect keyboards are offered in standard profile and low profile, sealed or unsealed, in standard arrays, and in custom arrays tailored to fit the user's specific application. Hall effect keyboards are capable of handling very high throughput applications.

A sealed version of the Hall effect keyboard (101SD29-2E-S-H) designed for harsh duty industrial environments meets NEMA 4 and 13 water/moisture resistance standards.

Request Product Sheets:

- 26SD - 84-02506
- 32SD - 84-02502
- 63SD - 84-02504
- 101SD - 84-02501
- 12/16SD - 84-02607



SN/SD HALL EFFECT KEYSWITCH MODULES

SN and SD Series keyswitch modules are ideal for building custom arrays, such as keyboards, control/switch panels, and switch matrices. Lighted display options are available.

SN modules are available in types that can be either snap-in panel mounted or mounted directly to printed circuit boards without additional mounting or support hardware. Request Product Sheet 84-02508.

SD modules have a lower profile than SN. They securely mount in a metal grid plate which provides support and enhances good keytop alignment between stations and rows. Request Product Sheet 84-02505.



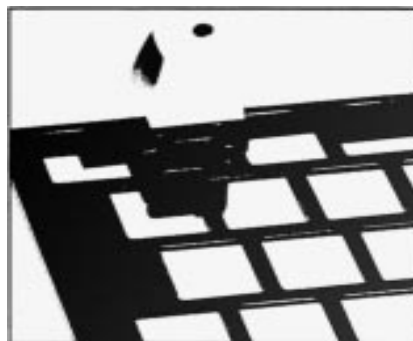
SN PC Board Mount



SN Snap-in Panel Mount



SD Grid Plate Mount



For further information on Hall effect keyboards, keytops, and modules, contact your nearest MICRO SWITCH sales office. Or call 1-800-537-6945.

Manual Switches

Sealed Toggle Switches

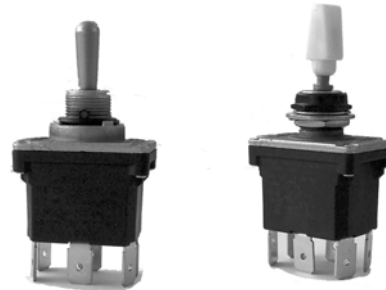
NT Series/Flat Base

FEATURES

- Completely sealed switching chamber
- IP67/IP68
- NEMA 3, 3R, 4, 13
- 2- or 3-position maintained and momentary action
- Flat base with quick connect terminals – mating connectors are available
- Spring-loaded actuating mechanism provides excellent tactile feedback
- UL recognized, File E12252, Vol. 1, Section 44
- CSA certified, CE certified
- Optional panel stand-off with O-ring panel seal

TYPICAL APPLICATIONS

- Industrial equipment
- Military and commercial aviation
- Construction equipment
- Test instruments
- Agricultural machinery
- Process control
- Medical instrumentation



GENERAL INFORMATION

Honeywell NT Series toggle switches meet the need for a rugged, cost-effective toggle switch. Quality construction features include a seal between the toggle lever and bushing, and between the cover and case. These switches can be used where panels are subject to splashes, hosedowns, or outdoor environments. Complete sealing of the switching chamber enables NT toggles to comply with UL 508, paragraph 13.3 hosedown test. 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. The “Easy Start” threaded bushing enables quick alignment of the mounting nut to decrease the chance of cross threading. The panel stand-off with O-ring feature available on some listings eliminates the need for behind-the-panel hardware, provides a uniform panel height, and provides a panel-to-cover seal.

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”

ELECTRICAL RATINGS

Elect. Rating Code	28 Volts DC			115 Vdc	250 Vdc	115 Vac, 60 Hz & 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

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Manual Switches

Sealed Toggle Switches

NT Series/Flat Base

NT 2-POSITION ORDER GUIDE

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

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

NT 2-POSITION ORDER GUIDE • PANEL STAND-OFF FEATURE

No. of poles	Circuits Made with Toggle At:			Elect. Rating Code	Catalog Listing Toggle Q-C
	Keyway Position	Opposite Keyway	UL Rating Code		
1	OFF	2-3	L191	1	631NT91-2 631NT91-3 631NT91-4 631NT91-6 631NT91-8
2	OFF	2-3, 5-6	L191	3	632NT91-2
	1-2, 4-5	2-3, 5-6	L191	3	632NT91-3 632NT91-4
	1-2, 4-5**	OFF	L192	4	632NT91-6 632NT91-8

** These positions are momentary. All others are maintained. Pick up Keyway Position / Opposite Keyway, etc from standard listings above that do not have the panel stand-off feature.

MATING CONNECTORS ORDER GUIDE

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

Manual Switches

Sealed Toggle Switches

NT Series/Flat Base

NT 3-POSITION ORDER GUIDE

No. of poles	Circuits made with toggle at:			UL Rating Code	Elect. 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, 5-6	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.

NT 3-POSITION ORDER GUIDE • PANEL STAND-OFF FEATURE

No. of poles	Circuits made with toggle at:			UL Rating Code	Elect. Rating Code	Catalog Listing Toggle Q-C
	Keyway Position	Center Position	Opposite Keyway			
1	1-2**	OFF	2-3**	L192	2	631NT91-7 631NT91-1 631NT91-5
2	1-2, 4-5	OFF	2-3, 5-6	L191	3	632NT91-1
	1-2, 4-5**	OFF	2-3, 5-6	L192	4	632NT91-5
	1-2, 4-5**	OFF	2-3, 5-6**	L192	4	632NT91-7 632NT91-70

** These positions are momentary. All others are maintained

Manual Switches

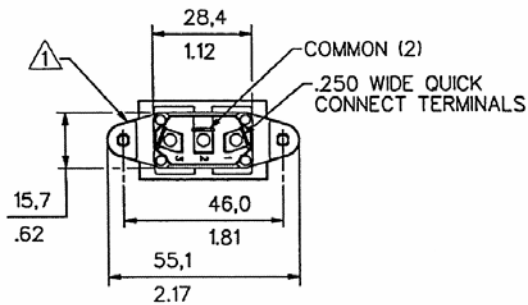
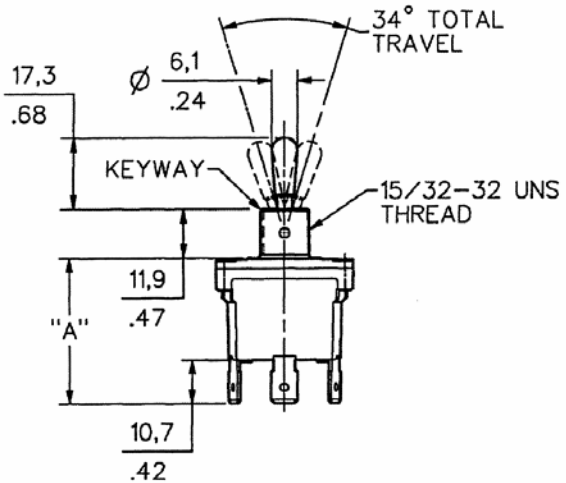
Sealed Toggle Switches

NT Series/Flat Base

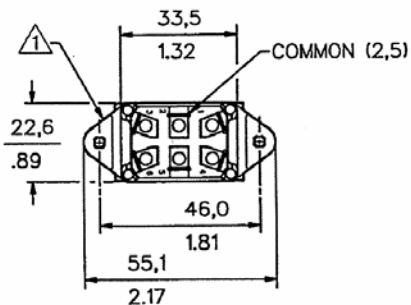
MOUNTING DIMENSIONS

For reference only mm/in

Toggle Switches



IDENTIFICATION LUG SIDE



IDENTIFICATION LUG SIDE

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

1-800-537-6945 USA

1-800-737-3360 Canada

1-815-235-6847 International

FAX

1-815-235-6545 USA

INTERNET

www.honeywell.com/sensing

info.sc@honeywell.com

Honeywell

Sensing and Control

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11 West Spring Street
Freeport, Illinois 61032

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www.honeywell.com/sensing

Manual Switches

Sealed Toggle Switches

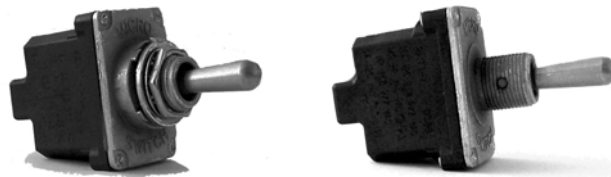
NT Series/Step Base

FEATURES

- Completely sealed switching chamber
- IP67/IP68
- NEMA 3, 3R, 4, 13
- Step-design case provides added space between terminals to prevent shorting
- 1, 2, or 4-pole circuitry
- Spring-loaded actuating mechanism provides excellent tactile feedback
- UL recognized, File E12252, Vol. 1, Section 44 CSA certified, CE certified
- Optional panel stand-off with O-ring panel seal

TYPICAL APPLICATIONS

- Industrial equipment
- Military and commercial aviation
- Construction equipment
- Test instruments
- Agricultural machinery
- Process control
- Medical instrumentation



GENERAL INFORMATION

Honeywell NT Series toggle switches meet the need for a rugged, cost-effective toggle switch. Quality construction features include a seal between the toggle lever and bushing, and between the cover and case. These switches can be used where panels are subject to splashes, hosedowns, or outdoor environments. Complete sealing of the switching chamber enables NT toggles to comply with UL 508, paragraph 13.3 hosedown test. 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. The “Easy Start” threaded bushing enables quick alignment of the mounting nut to decrease the chance of cross threading. The panel stand-off with O-ring feature available on some listings eliminates the need for behind-the-panel hardware, provides a uniform panel height, and provides a panel-to-cover seal.

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”

ELECTRICAL RATINGS

Elect. Rating Code	28 Volts DC			115 Vdc	250 Vdc	115 Vac, 60 Hz & 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

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

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Manual Switches

Sealed Toggle Switches

NT Series/Step Base

NT 2-POSITION ORDER GUIDE

No. of Poles	Circuits made with toggle at:		UL Rating Code	Elect. Rating Code	Standard Lever		
	Keyway Position	Opposite Keyway			Termination Style		
					Screw	Solder	Q-C
1	OFF	2-3	L191	1	1NT1-2	11NT1-2	1NT91-2
	1-2	2-3	L191	1	1NT1-3	11NT1-3	1NT91-3
	OFF*	2-3	L192	2	1NT1-4	11NT1-4	1NT91-4
	1-2*	OFF	L192	2	1NT1-6	11NT1-6	1NT91-6
	1-2*	2-3	L192	2	1NT1-8	11NT1-8	1NT91-8
2	OFF	2-3, 5-6	L191	3	2NT1-2	12NT1-2	2NT91-2
	1-2, 4-5	2-3, 5-6	L191	3	2NT1-3	12NT1-3	2NT91-3
	OFF*	2-3, 5-6	L192	4	2NT1-4	12NT1-4	2NT91-4
	1-2, 4-5*	OFF	L192	4	2NT1-6	12NT1-6	2NT91-6
	1-2, 4-5*	2-3, 5-6	L192	4	2NT1-8	12NT1-8	2NT91-8
4	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-2	14NT1-2	4NT91-2
	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-3	14NT1-3	4NT91-3
	OFF*	2-3, 5-6, 8-9, 11-12	L192	6	4NT1-4	14NT1-4	4NT91-4
	1-2, 4-5, 7-8, 10-11*	OFF	L192	6	4NT1-6	14NT1-6	4NT91-6
	1-2, 4-5, 7-8, 10-11*	2-3, 5-6, 8-9, 11-12	L192	6	4NT1-8	14NT1-8	4NT91-8

* These positions are momentary. All others are maintained.

NT 2-POSITION ORDER GUIDE • PANEL STAND-OFF FEATURE

No. of Poles	Circuits Made with Toggle At:		UL Rating Code	Elect. Rating Code	Standard Lever
	Keyway Position	Opposite Keyway			Screw
1	OFF	2-3	L191	1	61NT1-2
	1-2	2-3	L191	1	61NT1-3
	1-2*	OFF	L192	2	61NT1-6
	1-2*	2-3	L192	2	61NT1-8
2	OFF	2-3, 5-6	L191	3	62NT1-2
	1-2, 4-5	2-3, 5-6	L191	3	62NT1-3
	1-2, 4-5*	OFF	L192	4	62NT1-6
	1-2, 4-5*	2-3, 5-6	L192	4	62NT1-8

* These positions are momentary. All others are maintained.

Manual Switches

Sealed Toggle Switches

NT Series/Step Base

NT 3-POSITION ORDER GUIDE

No. of Poles	Circuits Made with Toggle At:			UL Rating Code	Elect. Rating Code	Standard Lever Termination Style		
	Keyway Position	Center Position	Opposite Keyway			Screw	Solder	Q-C
1	1-2	OFF	2-3	L191	1	1NT1-1	11NT1-1	1NT91-1
	1-2*	OFF	2-3	L192	2	1NT1-5	11NT1-5	1NT91-5
	1-2*	OFF	2-3*	L192	2	1NT1-7	11NT1-7	1NT91-7
	NONE**	OFF	2-3	L191	1	1NT1-21	11NT1-21	1NT91-21
	NONE**	1-2	2-3	L191	1	1NT1-31	11NT1-31	1NT91-31
	NONE**	1-2	2-3*	L192	2	1NT1-51	11NT1-51	1NT91-51
2	1-2, 4-5	OFF	2-3, 5-6	L191	3	2NT1-1	12NT1-1	2NT91-1
	1-2, 4-5*	OFF	2-3, 5-6	L192	4	2NT1-5	12NT1-5	2NT91-5
	1-2, 4-5	OFF	2-3, 5-6*	L192	4	2NT1-7	12NT1-7	2NT91-7
	NONE*	OFF	2-3, 5-6	L191	3	2NT1-21	12NT1-21	2NT91-21
	NONE**	1-2, 4-5	2-3, 5-6	L191	3	2NT1-31	12NT1-31	2NT91-31
	NONE**	1-2, 4-5	2-3, 5-6*	L192	4	2NT1-51	12NT1-51	2NT91-51
	1-2, 4-5*	OFF	NONE**	L192	4	2NT1-61	12NT1-61	2NT91-61
	1-2, 4-5	2-3, 4-5	2-3, 5-6	L191	3	2NT1-12	12NT1-12	2NT91-12
	1-2, 4-5	1-2, 5-6	2-3, 5-6	L191	3	2NT1-10	12NT1-10	2NT91-10
	1-2, 4-5*	1-2, 5-6	2-3, 5-6	L192	4	2NT1-50	12NT1-50	2NT91-50
4	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
	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
	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
	NONE*	OFF	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-21	14NT1-21	4NT91-21
	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
	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
	1-2, 4-5, 7-8, 10-11*	OFF	NONE**	L192	6	4NT1-61	14NT1-61	4NT91-61
	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
	1-2, 4-5, 7-8, 10-11	2-3, 4-5	2-3, 5-6, 8-9, 11-12	L191	5	4NT1-10	14NT1-10	4NT91-10
	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	4NT1-50	14NT1-50	4NT91-50
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	

* 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.

NT 3-POSITION ORDER GUIDE • PANEL STAND-OFF FEATURE

No. of Poles	Circuits Made with Toggle At:			UL Rating Code	Elect. Rating Code	Termination
	Keyway Position	Center Position	Opposite Keyway			Screw
1	1-2	OFF	2-3	L191	1	61NT1-1
	1-2*	OFF	2-3*	L192	2	61NT1-7
2	1-2, 4-5	OFF	2-3, 5-6	L191	3	62NT1-1
	1-2, 4-5	OFF	2-3, 5-6*	L192	4	62NT1-7

* These positions are momentary. All others are maintained.

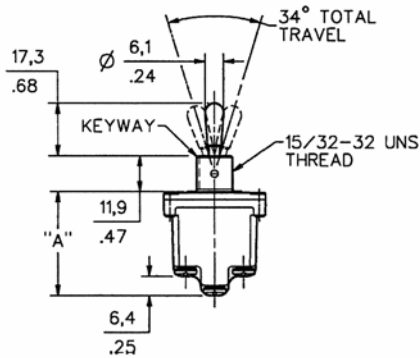
Manual Switches

Sealed Toggle Switches

NT Series/Step Base

MOUNTING DIMENSIONS

For reference only mm/in



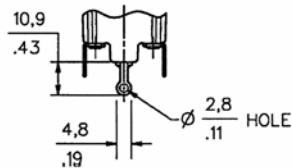
DIM "A"

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

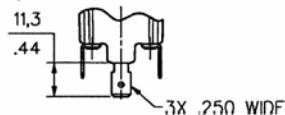
NOTES:

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

Solder Terminals

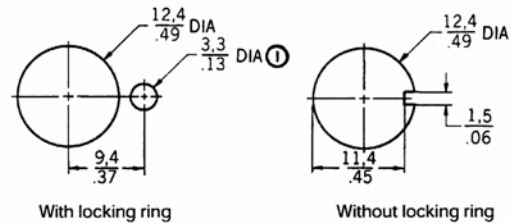


Quick Connect Terminals



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

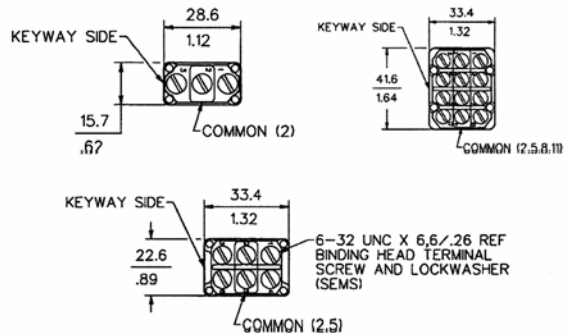
Panel cutout



Note:

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

Terminal Circuit Identification



WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

- 1-800-537-6945 USA
- 1-800-737-3360 Canada
- 1-815-235-6847 International

FAX

1-815-235-6545 USA

INTERNET

www.honeywell.com/sensing
info.sc@honeywell.com

Honeywell

Sensing and Control

Honeywell
 11 West Spring Street
 Freeport, Illinois 61032

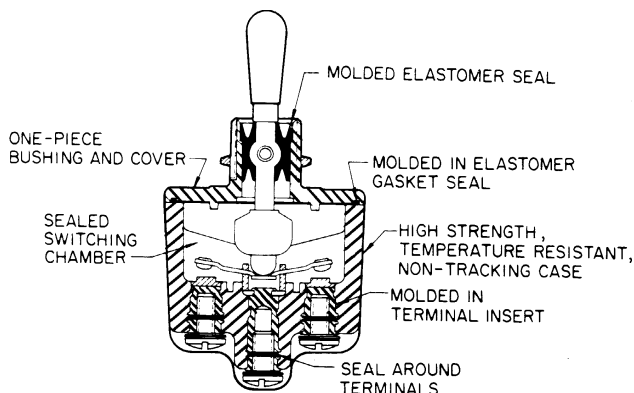
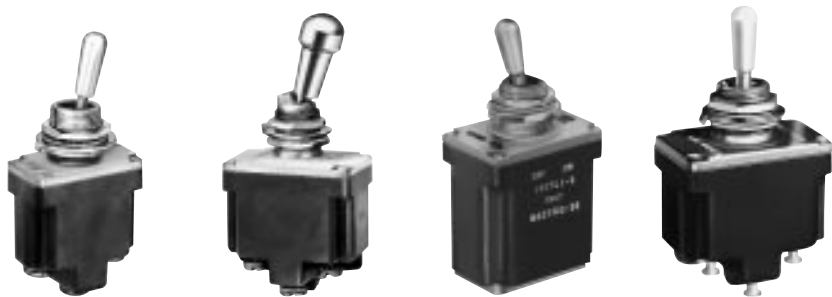
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www.honeywell.com/sensing

Manual Switches

Environment-Sealed 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)
- Screw, turret solder, and IWTS terminals available
- UL recognized
- Colored tab levers available

CONSTRUCTION

TLS have high strength, temperature resistant, non-tracking case material and silver cadmium oxide contacts. Gold contacts are also available.

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. (16mm) 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. (2.3mm) to change positions. Thirteen different locking configurations are available. This lever style also has a non-glare matte nickel finish.

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
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 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.

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 contact. If you have specific questions, contact the MICRO SWITCH Application Center at 1-800-537-6945.

Manuals

Manual Switches

Environment-Sealed Toggle Switches

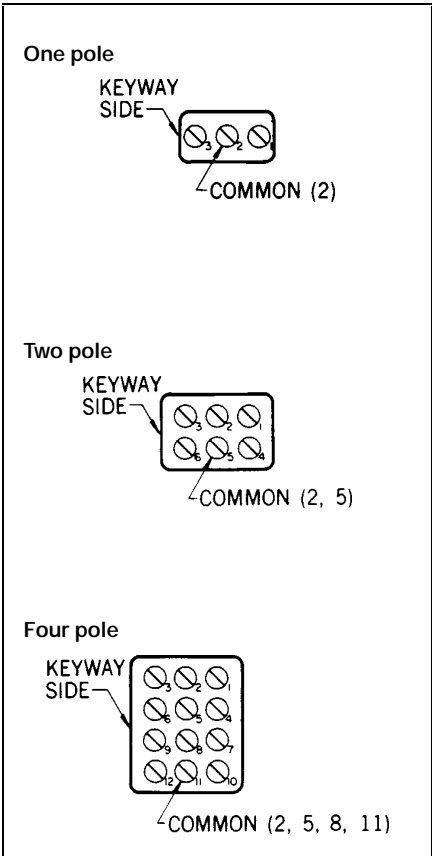
TERMINAL CIRCUIT IDENTIFICATION

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).

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 main-

tained, 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			

Manual Switches

Environment-Sealed Toggle Switches

TL 2-POSITION ORDER GUIDE














	No. of Poles	Circuit(s) Made With Toggle At:		Page 39		Standard Toggle		Pull-to-Unlock Toggle Locking Configuration	
		Keyway Position	Opposite Keyway	Electrical Rating Code	UL/CSA Rating Code	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	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

TL Series

Environment-Sealed Toggle Switches

TL 3-POSITION ORDER GUIDE

	No. of Poles	Circuit(s) Made With Toggle At:			Page 39		Standard Toggle		Pull-to-Unlock Toggle Locking Configuration	
		Keyway Position	Center Position	Opposite Keyway	Elec. Rating Code	UL/CSA Rating Code	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	OFF	2-3, 5-6	5	L191	4TL1-1	MS24525-21
7-8, 10-11	OFF			8-9, 11-12	6	L192	4TL1-5	MS24525-31	E, F, K, L, M, N	MS24660-31
1-2, 4-5	OFF			2-3, 5-6	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
7-8, 10-11*	OFF			8-9, 11-12	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
1-2, 4-5	OFF			2-3, 5-6	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
7-8, 10-11*	OFF			8-9, 11-12*	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
None**	OFF			2-3, 5-6	5	L191	4TL1-21	MS24525-24	E, F, K, M	MS24660-24
None**	1-2, 4-5			2-3, 5-6	5	L191	4TL1-31	MS24525-33	E, F, K, M	MS24660-33
None**	7-8, 10-11			8-9, 11-12	6	L192	4TL1-51	MS24525-32	E	MS24660-32
None**	1-2, 4-5			2-3, 5-6	6	L192	4TL1-51	MS24525-32	E	MS24660-32
None**	7-8, 10-11			8-9, 11-12*	6	L192	4TL1-61	MS24525-28	E	MS24660-28
1-2, 4-5	OFF			None**	6	L192	4TL1-61	MS24525-28	E	MS24660-28
7-8, 10-11*	2-3, 4-5			2-3, 5-6	5	L191	4TL1-10	—	ALL TYPES	—
1-2, 4-5	2-3, 4-5			2-3, 5-6	6	L192	4TL1-50	MS27406-2	E, F, K, L, M, N	MS27409-2
7-8, 10-11	7-8, 11-12			8-9, 11-12	6	L192	4TL1-70	—	E, L, N	—
1-2, 4-5	2-3, 4-5			2-3, 5-6	6	L192	4TL1-70	—	E, L, N	—
7-8, 10-11*	2-3, 4-5			2-3, 5-6	5	L191	4TL1-12	MS27406-1	ALL TYPES	MS27409-1
1-2, 4-5	7-8, 11-12	8-9, 11-12	6	L192	4TL1-72	MS27406-3	E, L, N	MS27409-3		
7-8, 10-11*	2-3, 4-5	2-3, 5-6	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	12TL	MS27735	MS27738
Four Pole	14TL	MS27736	MS27739

Manual Switches

Environment-Sealed Toggle Switches/IWTS

GENERAL INFORMATION

IWTS (Integrated Wire Termination System) provides you with a reliable, completely serviceable unit which meets MIL-S-3950 requirements. IWTS improves maintainability since wiring bundles need not be disturbed. Leads are quickly and easily assembled or removed with an insert-extract tool.

A unique three-rib (grommet style) elastomer seal protects the lead connections without potting. There are no exposed metal terminals.

Versions are available that will accept No. 16 wire with M39029/1-102 contact pins or No. 20 wire with M39029/1-101 contact pins. Connections are resistant to shock, vibration, and high pulling force.

TYPICAL APPLICATIONS

- Military and civilian aircraft and marine navigational equipment
- Command and control systems
- Radar and air defense systems
- Test, ground support, and training equipment
- Tanks, armored personnel carriers, and other military vehicles

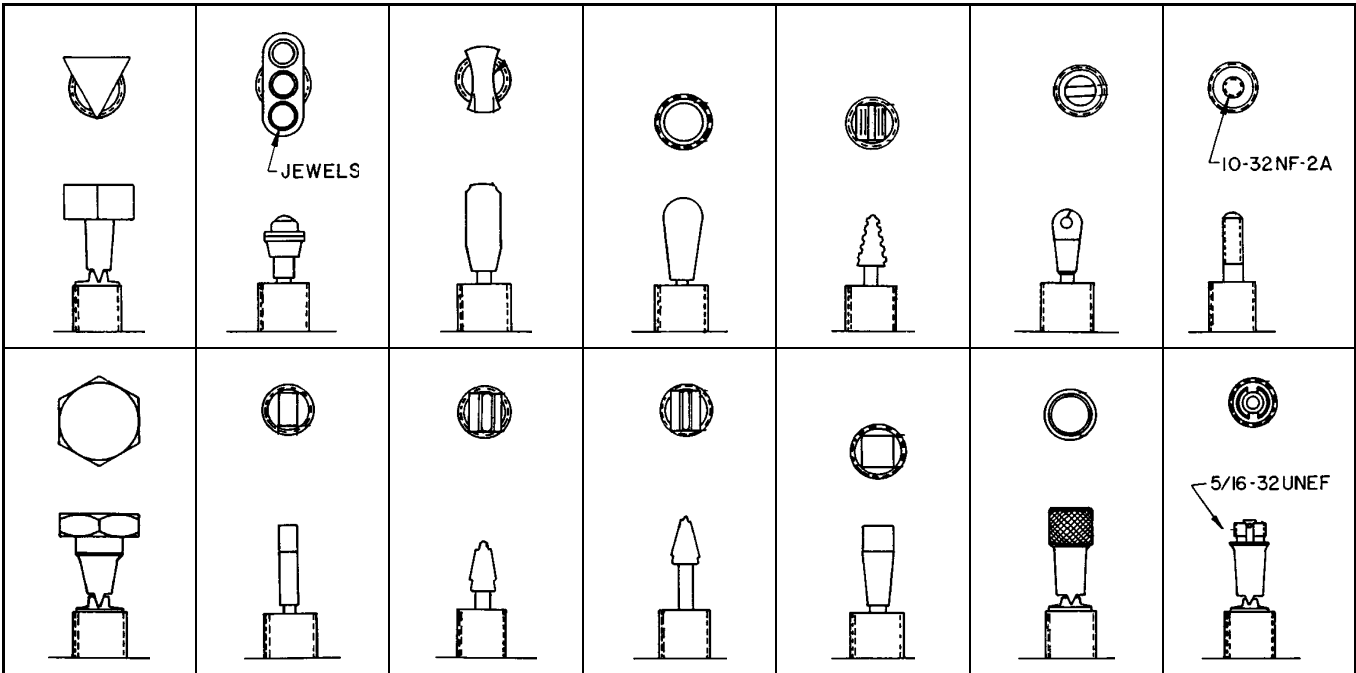
POSSIBLE VARIATIONS

In addition to the contact arrangements shown in the order guide, IWTS switches can be furnished with all the Series TL combinations shown in order guides on the previous pages.

Pull-to-unlock toggle lever versions can be made available. Contact the 800 number.

SPECIAL TL LEVERS

Some of the lever variations available for TL toggle switches are shown below. They can also have the same colored tab levers furnished with TW toggle switches. For further information, contact the 800 number.






Manuals

Manual Switches




Environment-Sealed Toggle Switches

TL Series

TL 2-POSITION VERSIONS WITH IWTS TERMINATION ORDER GUIDE

	No. Poles	Circuit(s) Made With Toggle At:		Page 39		No. 16 Termination		No. 20 Termination	
		Keyway Position	Opposite Keyway	Electrical Rating Code	UL/CSA Rating Code	Catalog Listing	MIL Part No.	Catalog Listing	MIL Part No.
	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	101TL1-2 101TL1-4 101TL1-6 101TL1-3 101TL1-8	MS27722-22 MS27722-29 MS27722-30 MS27722-23 MS27722-26	101TL2-2 101TL2-4 101TL2-6 101TL2-3 101TL2-8	MS27784-22 MS27784-29 MS27784-30 MS27784-23 MS27784-26
	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	102TL1-2 102TL1-4 102TL1-6 102TL1-3 102TL1-8	MS27723-22 MS27723-29 MS27723-30 MS27723-23 MS27723-26	102TL2-2 102TL2-4 102TL2-6 102TL2-3 102TL2-8	MS27785-22 MS27785-29 MS27785-30 MS27785-23 MS27785-26
	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	5 6 6 5 6	L191 L192 L192 L191 L192	104TL1-2 104TL1-4 104TL1-6 104TL1-3 104TL1-8	MS27724-22 MS27724-29 MS27724-30 MS27724-23 MS27724-26	104TL2-2 104TL2-4 104TL2-6 104TL2-3 104TL2-8	MS27786-22 MS27786-29 MS27786-30 MS27786-23 MS27786-26

TL 3-POSITION VERSIONS WITH IWTS TERMINATION ORDER GUIDE

	No. Poles	Circuit(s) Made With Toggle At:			Electrical Rating Code	UL/CSA Rating Code	No. 16 Termination		No. 20 Termination	
		Keyway Position	Center Position	Opposite Keyway			Catalog Listing	MIL Part No.	Catalog Listing	MIL Part No.
	1	1-2 1-2* 1-2*	OFF OFF OFF	2-3 2-3 2-3*	1 2 2	L191 L192 L192	101TL1-1 101TL1-5 101TL1-7	MS27722-21 MS27722-31 MS27722-27	101TL2-1 101TL2-5 101TL2-7	MS27784-21 MS27784-31 MS27784-27
	2	1-2, 4-5 1-2, 4-5* 1-2, 4-5*	OFF OFF OFF	2-3, 5-6 2-3, 5-6 2-3, 5-6*	3 4 4	L191 L192 L192	102TL1-1 102TL1-5 102TL1-7	MS27723-21 MS27723-31 MS27723-27	102TL2-1 102TL2-5 102TL2-7	MS27785-21 MS27785-31 MS27785-27
	4	1-2, 4-5 7-8, 10-11 1-2, 4-5 7-8, 10-11* 1-2, 4-5 7-8, 10-11*	OFF OFF OFF 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	L191 L192 L192	104TL1-1 104TL1-5 104TL1-7	MS27724-21 MS27724-31 MS27724-27	104TL2-1 104TL2-5 104TL2-7	MS27786-21 MS27786-31 MS27786-27

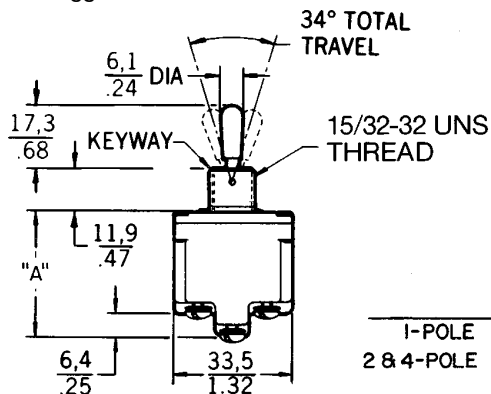
* These positions only are momentary. All others are maintained.

Manual Switches

TL Series

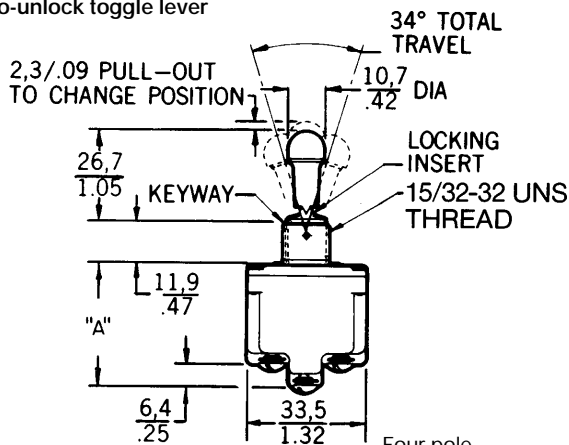
Environment-Sealed Toggle Switches

MOUNTING DIMENSIONS (For reference only)
Standard toggle lever



One pole

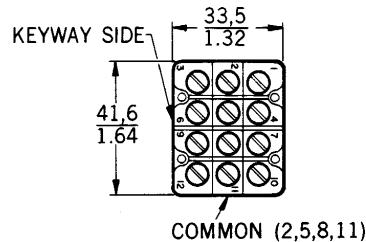
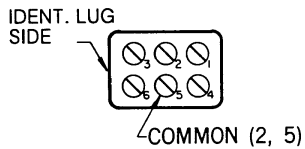
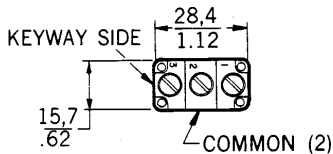
Pull-to-unlock toggle lever



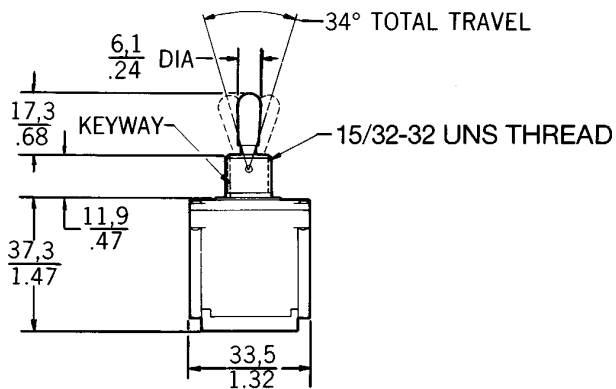
Four pole

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

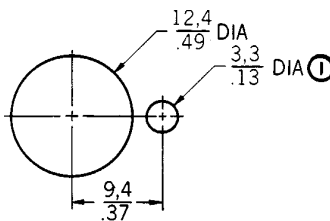
Two pole



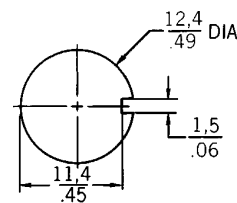
Standard toggle lever, IWTS termination



Panel cutout

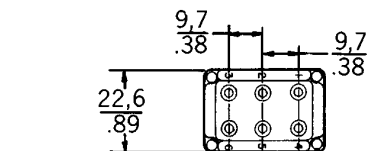


With locking ring



Without locking ring

Note:
1,4 / .06 Min deep to accommodate locking ring. (15PA87 panel seal requires blind hole to insure seal integrity.)



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

0,0 = mm

Key: 0.00 = inches



Manual Switches

Environment-Sealed Rocker Switches

TP Series



FEATURES

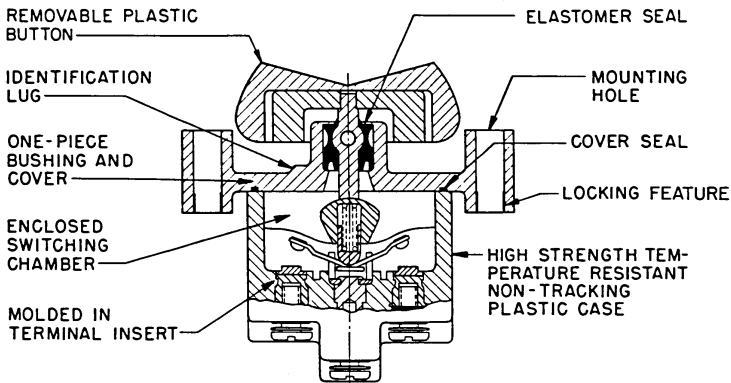
- 2 and 3 position pushbutton action
- Various button colors
- 1, 2, and 4 pole circuitry
- Flush panel and above panel mounting
- Temperature range is from -65°F to +160°F (-54°C to +71°C)
- UL recognized, CSA certified

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).

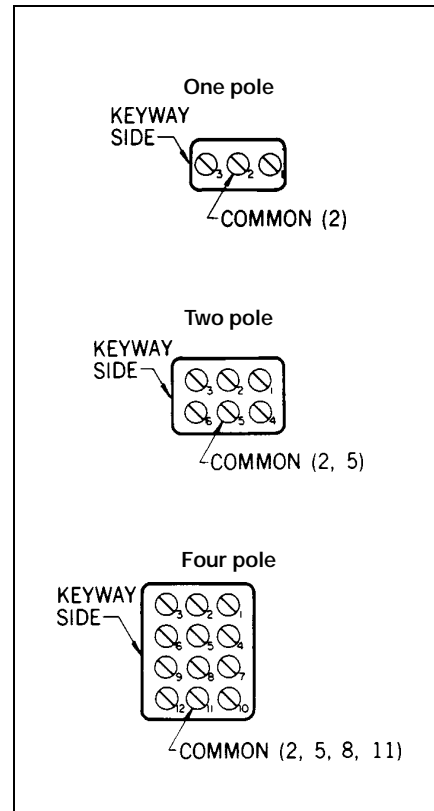


ELECTRICAL RATINGS (In amperes)

Elec. 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	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; 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-125 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. If you have specific questions, contact the MICRO SWITCH Application Center at 1-800-537-6945.



Manual Switches

Environment-Sealed Rocker 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.

LEGENGING

MICRO SWITCH provides hot stamp legending on the button face. Use TP Legend Order Sheet FO-53730 (page 49) to specify your needs. Additional copies are available from your nearest MICRO SWITCH Sales Office. (MICRO SWITCH does not provide legending service on legend inserts.)

Translucent and opaque buttons may also be engraved and filled by the user.

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

TP 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	1TP12-4	1TP216-4	1TP4-4
	1-2*	OFF	L192	2	1TP201-6	1TP12-6	1TP216-6	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	1TP4-8
2	OFF	2-3, 5-6	L191	3	2TP201-2	2TP12-2	2TP216-2	2TP4-2
	OFF*	2-3, 5-6	L192	4	2TP201-4	2TP12-4	2TP216-4	2TP4-4
	1-2,4-5*	OFF	L192	4	2TP201-6	2TP12-6	2TP216-6	2TP4-6
	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	—	4TP4-2
	OFF*	2-3, 5-6, 8-9, 11-12	L192	6	4TP201-4	4TP12-4	4TP216-4	4TP4-4
	1-2, 4-5, 7-8, 10-11*	OFF	L192	6	4TP201-6	4TP12-6	—	—
	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	4TP201-8	4TP12-8	4TP216-8	—

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

Manuals

Manual Switches

TP Series

Environment-Sealed Rocker Switches

TP 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	L191	5	4TP201-1	4TP12-1	4TP216-1	4TP4-1
	1-2, 4-5	OFF	8-9, 11-12	L192	6	4TP201-5	4TP12-5	—	4TP4-5
	7-8, 10-11*	OFF	2-3, 5-6	L192	6	4TP201-7	4TP12-7	4TP216-7	4TP4-7
	1-2, 4-5, 7-8, 10-11*	OFF	8-9, 11-12*	L191	5	4TP201-21	4TP12-21	4TP216-21	4TP4-21
	NONE**	1-2, 4-5	8-9, 11-12	L191	5	4TP201-31	—	4TP216-31	4TP4-31
	NONE**	7-8, 10-11	8-9, 11-12	L192	6	4TP201-51	—	4TP216-51	4TP4-51
	NONE**	1-2, 4-5	2-3, 5-6	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,	L191	5	4TP201-10†	4TP12-10†	—	4TP4-10†
	1-2, 4-5, 7-8, 10-11	2-3, 4-5	8-9, 11-12	L192	6	4TP201-50†	4TP12-50†	4TP216-50†	4TP4-50†
	1-2, 4-5, 7-8, 10-11*	7-8, 11-12	8-9, 11-12	L192	6	4TP201-70†	4TP12-70†	4TP216-70†	4TP4-70†
	1-2, 4-5, 7-8, 10-11*	2-3, 4-5	2-3, 5-6,	L191	5	4TP201-10†	4TP12-10†	—	4TP4-10†
	1-2, 4-5, 7-8, 10-11	2-3, 4-5	8-9, 11-12	L192	6	4TP201-50†	4TP12-50†	4TP216-50†	4TP4-50†
	1-2, 4-5, 7-8, 10-11*	7-8, 11-12	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 circuitry. See page 40.

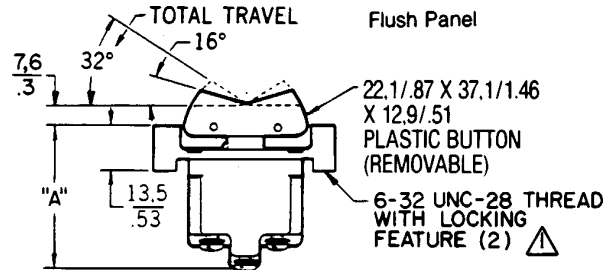
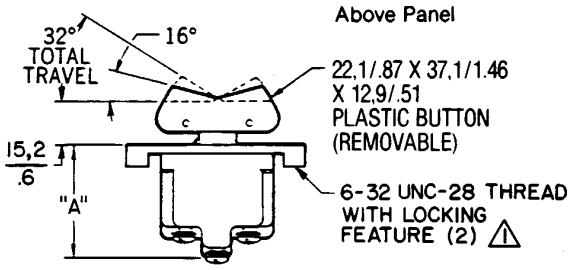
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Manual Switches

Environment-Sealed Rocker Switches

TP Series

MOUNTING DIMENSIONS (For reference only)

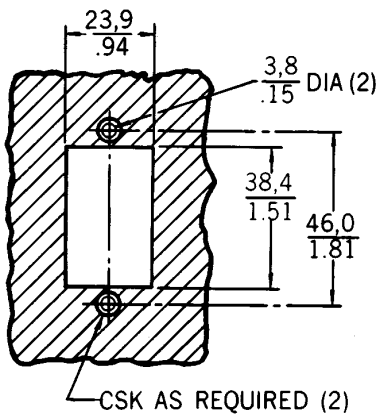


	DIM. "A"
1-POLE	29,5 / 1.16
2 & 4-POLE	34,4 / 1.35

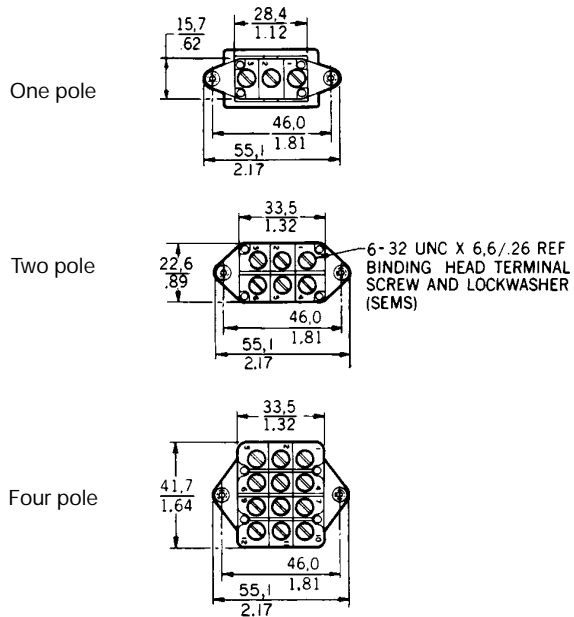
	DIM. "A"
1-POLE	36,8 / 1.45
2 & 4-POLE	41,7 / 1.64

⚠ 4-POLE HAS 6-32 UNC-28 THREAD LOCKNUT

Panel cutout



Key: 0,0 = mm
0.00 = inches



Manual Switches

Miniature Toggle Switches



11TW Standard toggle lever
15/32" bushing



1TW Standard unsealed toggle lever
1/4" bushing



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



2TW101 Standard sealed toggle lever
1/4" bushing

FEATURES

- Qualified to MIL-S-83731
- 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

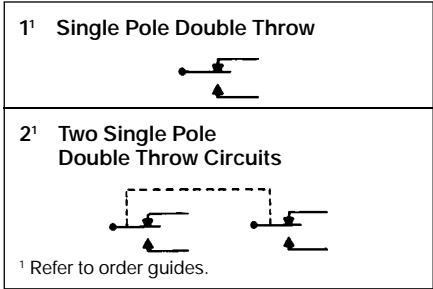
GENERAL INFORMATION

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

ELECTRICAL RATINGS

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

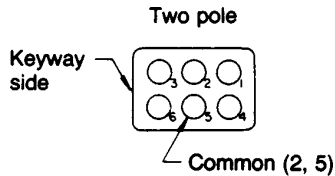
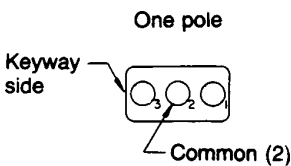
CIRCUITRY



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

TW Series

TW 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 to Standard 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.

TW 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 to Standard 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 Listing	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.

Manual Switches

Miniature Toggle Switches (IWTS)

LOCKING CONFIGURATIONS

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.

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

TW 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	2-1 ON	2-3 ON	111TW1-3	D, F, G
1	2-1 ON*	2-3 ON	111TW1-8	F
2	2-1 & 5-4 ON	2-3 & 5-6 ON	112TW1-3	D, F, G
2	2-1 & 5-4 ON*	2-3 & 5-6 ON	112TW1-8	F

TW 3-POSITION ORDER GUIDE — IWTS TERMINATION

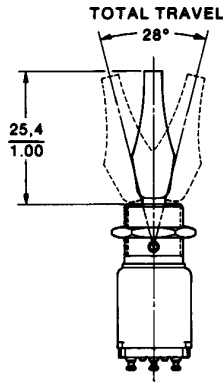
No. Poles	Circuits Made With Toggle At:			Standard Toggle	Pull-to-Unlock Toggle
	Keyway Position	Center Position	Opposite Keyway	Catalog Listing	Add Suffix to Standard Listing
1	2-1 ON	OFF	2-3 ON	111TW1-1	ALL
1	2-1 ON*	OFF	2-3 ON	111TW1-5	E, F, K, L, M, N
1	2-1 ON*	OFF	2-3 ON*	111TW1-7	E, L, N
2	2-1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

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

Manuals

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/sealed lever
- Available in IWTS termination versions

TW ORDER GUIDE

To order, combine the basic (function) listing from Table 1 with the desired lever color suffix from Table 2.

TABLE 1 — TOGGLE POSITION AND CONTACT ARRANGEMENT

Positions	No. Poles	Circuits Made With Toggle At:			Basic Listing Color Suffix See 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 ORDER GUIDE

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
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.

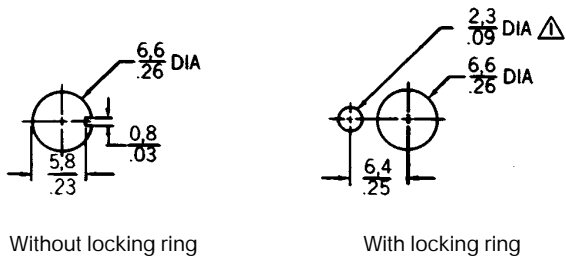
Manual Switches

Miniature Toggle Switches

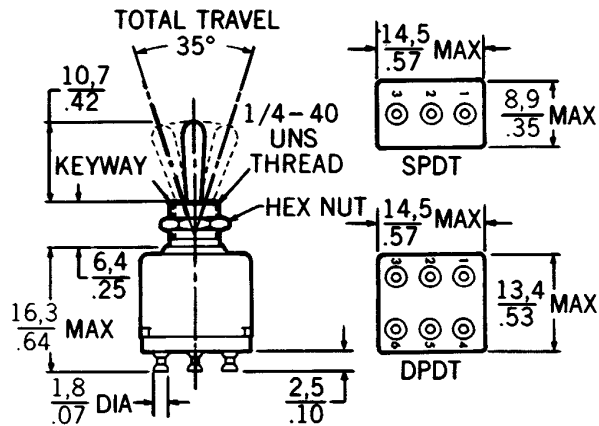
TW Series

MOUNTING DIMENSIONS (For reference only)

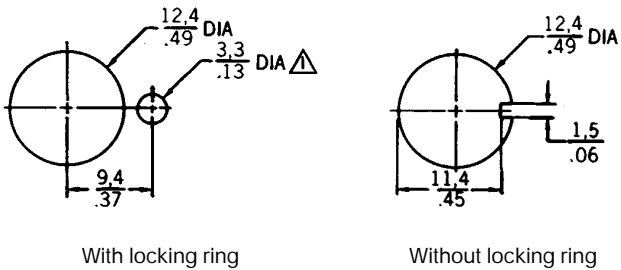
Mounting detail for 1/4" bushing switches



Dimensions for 1/4" bushing switches



Mounting detail for 15/32" bushing switches

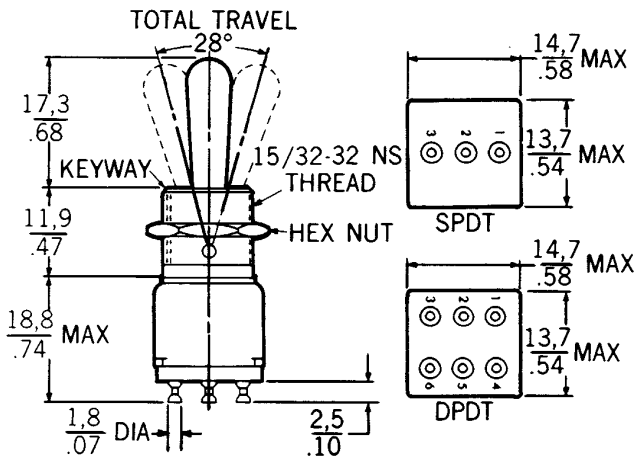


Note: \triangle 1,1/.05 MIN. DEEP TO ACCOMMODATE LOCKING RING. FOR SWITCHES USING PANEL SEAL, DO NOT ALLOW THRU HOLE MOUNTING.

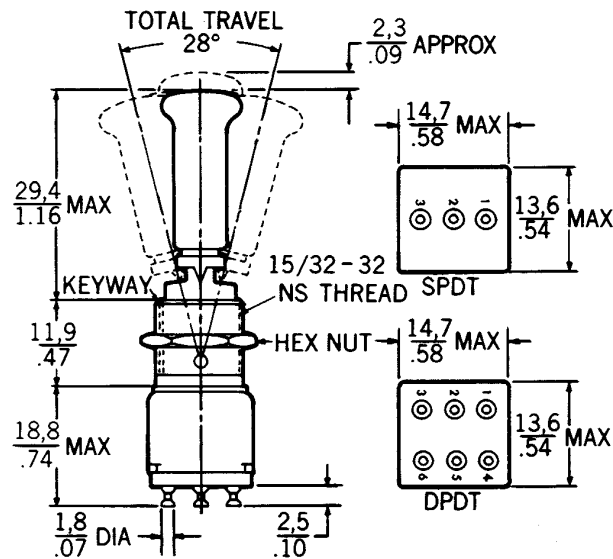
Key: 0,0 = mm
0.00 = inches

Dimensions for 15/32" switches

Standard toggle lever



Pull-to-unlock toggle lever



Manuals

Manual Switches

Toggle Switches



2-pole shown

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

Colored tab levers and special “on-on-on” circuitry can also be furnished.

TERMINAL CIRCUIT IDENTIFICATION

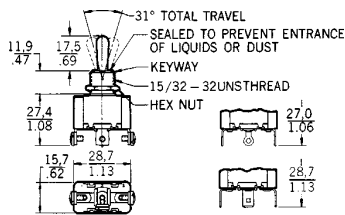
Terminal identifications in the order guides indicate which circuits are made in each position (i.e., 1-2 indicates circuit closure through terminals 1 and 2).

ELECTRICAL RATINGS

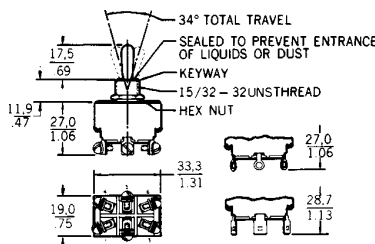
Rating Code	UL/CSA Rating
L192	10 Amps, 125, 250, 277 VAC ¼ HP, 125 VAC ½ HP, 250, 277 VAC 3 Amps, 125 VAC “L”
L191	15 Amps, 125, 250, 277 VAC ½ HP, 125 VAC 1 HP, 250, 277 VAC 5 Amps, 125 VAC (L)

MOUNTING DIMENSIONS

1-pole



2-pole



TS 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		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	

TS 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
	2-1 ON*	OFF	2-3 ON	L192	11TS15-5	11TS115-5	11TS95-5
	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
	2-1 & 5-4 ON*	OFF	2-3 & 5-6 ON	L192	12TS15-5	12TS115-5	12TS95-5
	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

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

Manual Switches

Toggle Switches



2-pole shown

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

Colored tab levers and special “on-on-on” circuitry can also be furnished.

TERMINAL CIRCUIT IDENTIFICATION

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

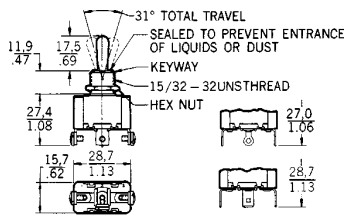
ELECTRICAL RATINGS

Rating Code	UL/CSA 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)

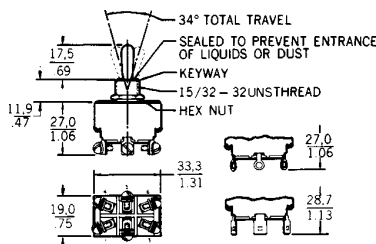
NOTE: Application Note on Page 57 applies to TS switches.

MOUNTING DIMENSIONS

1-pole



2-pole



TS 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		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	

TS 3-POSITION ORDER GUIDE

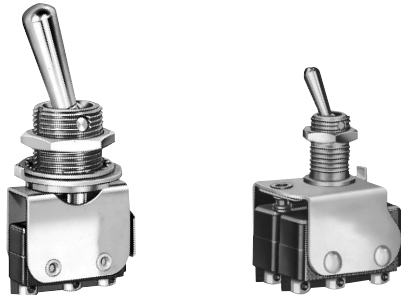
No. Of Poles	Circuit(s) Made With Toggle At:			UL/CSA Rating Code	Screw Terminals	Solder Terminals	Quick-Connect Terminals
	Keyway Position	Center Position	Opposite Keyway				
1	2-1 ON	OFF	2-3 ON	L191	11TS15-1	11TS115-1	11TS95-1
	2-1 ON*	OFF	2-3 ON	L192	11TS15-5	11TS115-5	11TS95-5
	2-1 ON*	OFF	2-3 ON*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

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

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

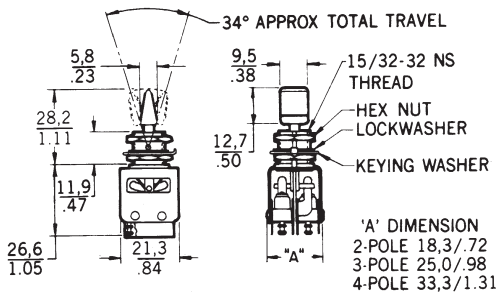
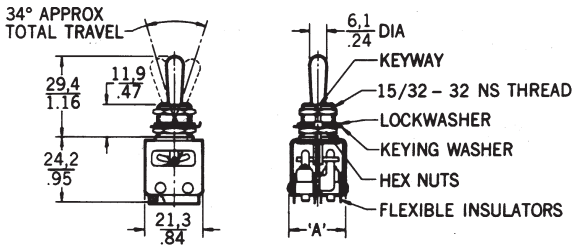
Manual Switches

Toggle Switch Assemblies

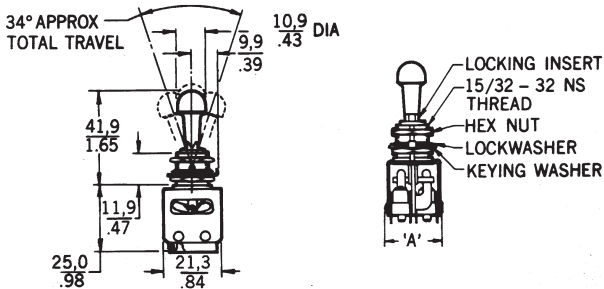
AT Series

MOUNTING DIMENSIONS (For reference only)

13/23AT

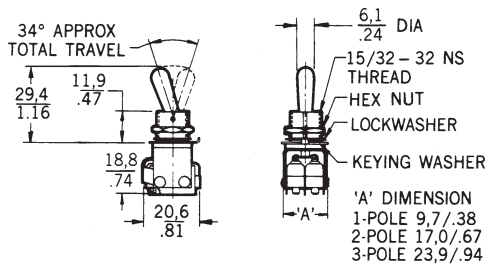


13AT40I-T2

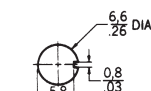


6AT

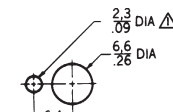
PANEL CUTOUTS



1/4" Bushing

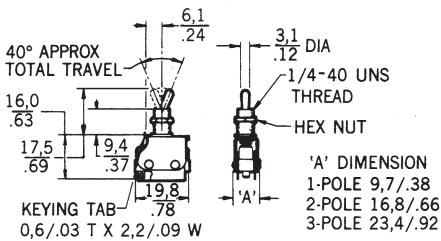


Without Locking Ring

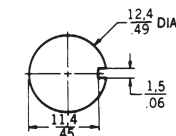


With Locking Ring

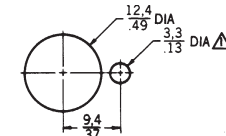
NOTE -
Δ 1.1/.05 MIN DEEP TO ACCOMMODATE LOCKING RING



1 5/32" Bushing



Without Locking Ring



With Locking Ring

NOTE -
Δ 1.4/.06 MIN DEEP TO ACCOMMODATE LOCKING RING

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

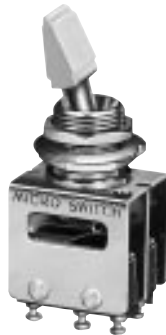
NOTE—
64AT300, 66AT300, and 68AT300 (M8805/98) listings have a bushing seal and MS25196 panel seal.

Manual Switches

Toggle Switch Assemblies



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.

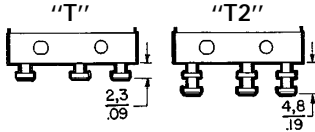
ELECTRICAL RATINGS — Basic Switches

	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 the following page.

TERMINALS



AT 2-POSITION ORDER GUIDE

Toggle Lever Position		No. of Poles/ Switches	Type Contacts	Standard Lever "T"			Tab Lever "T2"	Pull-To-Unlock Lever Solder Terminals (Add locking letter to catalog listings below)			
Keyway	Opposite Keyway			Solder Terminals	Terminals	"T2" Terminals	Terminals	Terminals	Terminals		
Maint.	Maint.	2	Silver	23AT1	23AT1-T	23AT1-T2	23AT402-T2	23AT1-	Locking letters: D, F, or G		
			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										

AT MIL-S-8805/26 VERSIONS ORDER GUIDE

Toggle Lever Position		No. of Poles/ Switches	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

Manuals

Manual Switches

Toggle Switch Assemblies

13T Series

AT 3-POSITION ORDER GUIDE

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

AT MIL-S-8805/26 VERSIONS ORDER GUIDE

Toggle Lever Position			No. of Poles/ Switches	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.

HERMETICALLY SEALED BASIC SWITCH OPTION

AT's with ¹⁵/₃₂" 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. For more information, contact your MICRO SWITCH Sales Office.



Shown with HM basic switches

LOCKING CONFIGURATIONS

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.

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

Manual Switches

Toggle Switch Assemblies



Standard lever



Pull-to-unlock lever

FEATURES

- Compact multi-pole design conserves space and weight
- 2, 4, 6, or 8 SPDT precision basic switches
- 2 or 3-position, momentary and maintained action
- 15/32" bushing
- Standard or pull-to-unlock toggle levers
- MIL-S-8805/98 qualified versions

PULL-TO-UNLOCK OPTION

As a guard against accidental operation, pull-to-unlock levers must be pulled .090 in./2,3 mm (approx.) to change positions. See chart on facing page which shows locking configurations and locking letter suffix codes which are referred to in the order guides.

Note: To order replacements for the resilient white caps which are screwed onto 60AT locking levers, specify Catalog Listing **15PA90-6W**.

ELECTRICAL RATINGS — Basic Switches (in amperes)

Load	Sea Level			50,000 Ft.		
	28 VDC	115 VAC* 400 Hz	250 VAC 60 Hz	28 VDC	115 VAC* 400 Hz	250 VAC 60 Hz
Resistive	7	7	7	7	7	7
Inductive	4**	7	7	2.5**	7	7
Motor	4	3.3	3.3	4	3.3	3.3
Lamp	2.5	2	2	2.5	2	2

Inrush: 20 amps * 75% power factor. ** Use AN31796 inductor.

C = common, NC = normally closed, NO = normally open.
Numbers = basic switch designations.

AT 2-POSITION ORDER GUIDE

No. of Poles/ Switches	Circuits Made With Toggle At:				Standard Lever Catalog Listing		Pull-To-Unlock Lever Suffix (Add locking letter to cat. listings)
	Keyway Position		Opposite Keyway		With MIL-S-6743 Basic Switches	With MIL-S-8805/4 Basic Switches	
	C-NC	C-NO	C-NC	C-NO			
2	1, 2 1, 2* 1, 2	— — —	— — —	1, 2 1, 2 1, 2*	62AT11-3 62AT11-8 62AT11-82	62AT22-3 62AT22-8 62AT22-82	D, G F G
4	1, 2	3, 4	3, 4	1, 2	64AT11-3	64AT22-3	D, F, G
6	1, 2, 3	4, 5, 6	4, 5, 6	1, 2, 3	66AT11-3	66AT22-3	D, F, G
8	1, 2, 3, 4	5, 6, 7, 8	5, 6, 7, 8	1, 2, 3, 4	68AT11-3	68AT22-3	D, F, G

AT MIL-S-8805/98 VERSIONS (WITH BUSHING AND PANEL SEALS) ORDER GUIDE

No. of Poles/ Switches	Circuits Made With Toggle At:				Standard Lever Version	
	Keyway Position		Opposite Keyway		Catalog Listing	Military No.
	C-NC	C-NO	C-NC	C-NO		
4	1, 2	3, 4	3, 4	1, 2	64AT300-3	M8805/98-015
6	1, 2, 3	4, 5, 6	4, 5, 6	1, 2, 3	66AT300-3	M8805/98-046
8	1, 2, 3, 4	5, 6, 7, 8	5, 6, 7, 8	1, 2, 3, 4	68AT300-3	M8805/98/077

* Momentary positions. All others are maintained.

Manuals

Manual Switches

Toggle Switch Assemblies

60AT Series

60AT SERIES 3-POSITION ORDER GUIDE

C = common, NC = normally closed, NO = normally open.
Numbers = basic switch designations.

No. of Poles/ Switches	Circuits Made With Toggle At:						Standard Lever Catalog Listing		Pull-To-Unlock Lever Suffix (Add locking letter to cat. listings)
	Keyway Position		Center Position		Opposite Keyway		With MIL-S-6743 Basic Switches	With MIL-S-8805/4 Basic Switches	
	C-NC	C-NO	C-NC	C-NO	C-NC	C-NO			
2	1	2	1, 2	—	2	1	62AT11-1	62AT22-1	All Types
4	1, 2	3, 4	All	—	3, 4	1, 2	64AT11-1	64AT22-1	All Types
	1, 2	3, 4	All	—	3, 4*	1, 2*	64AT11-514	64AT22-514	B, E, G, L, N, P
	1, 2*	3, 4*	All	—	3, 4	1, 2	64AT11-5	64AT22-5	E, F, K, L, M, N
	1, 2*	3, 4*	All	—	3, 4*	1, 2*	64AT11-7	64AT22-7	E, L, N
6	1, 2, 3	4, 5, 6	All	—	4, 5, 6	1, 2, 3	66AT11-1	66AT22-1	All Types
	1, 2, 3*	4, 5, 6*	All	—	4, 5, 6	1, 2, 3	66AT11-5	66AT22-5	E, F, K, L, M, N
	1, 2, 3*	4, 5, 6*	All	—	4, 5, 6*	1, 2, 3*	66AT11-7	66AT22-7	E, L, N
	1, 2, 3	4, 5, 6	All	—	4, 5, 6*	1, 2, 3*	66AT22-514	66AT22-514	B, E, G, L, N, P
8	1, 2, 3, 4	5, 6, 7, 8	All	—	5, 6, 7, 8	1, 2, 3, 4	68AT11-1	68AT22-1	All Types
	1, 2, 3, 4*	5, 6, 7, 8*	All	—	5, 6, 7, 8	1, 2, 3, 4	68AT11-5	68AT22-5	E, F, K, L, M, N
	1, 2, 3, 4*	5, 6, 7, 8*	All	—	5, 6, 7, 8*	1, 2, 3, 4*	68AT11-7	68AT22-7	E, L, N
	1, 2, 3, 4	5, 6, 7, 8	All	—	5, 6, 7, 8*	1, 2, 3, 4*	68AT11-514	68AT22-514	B, E, G, L, N, P

60AT MIL-S-8805/98 Versions (With bushing and panel seals)

No. of Poles/ Switches	Circuits Made With Toggle At:						Standard Lever Version (Pull-to-unlocks listed below order guide)	
	Keyway Position		Center Position		Opposite Keyway		Catalog Listing	Military No.
	C-NC	C-NO	C-NC	C-NO	C-NC	C-NO		
4	1, 2	3, 4	All	—	3, 4	1, 2	64AT300-1	M8805/98-001
	1, 2*	3, 4*	All	—	3, 4	1, 2	64AT300-5	M8805/98-019
	1, 2*	3, 4*	All	—	3, 4*	1, 2*	64AT300-7	M8805/98-026
6	1, 2, 3	4, 5, 6	All	—	4, 5, 6	1, 2, 3	66AT300-1	M8805/98-032
	1, 2, 3*	4, 5, 6*	All	—	4, 5, 6	1, 2, 3	66AT300-5	M8805/98-050
	1, 2, 3*	4, 5, 6*	All	—	4, 5, 6*	1, 2, 3*	66AT300-7	M8805/98-057
8	1, 2, 3, 4	5, 6, 7, 8	All	—	5, 6, 7, 8	1, 2, 3, 4	68AT300-1	M8805/98-063
	1, 2, 3, 4*	5, 6, 7, 8*	All	—	5, 6, 7, 8	1, 2, 3, 4	68AT300-5	M8805/98-081
	1, 2, 3, 4*	5, 6, 7, 8*	All	—	5, 6, 7, 8*	1, 2, 3, 4*	68AT300-7	M8805/98-092

* Momentary positions. All others are maintained.

60AT MIL-S-8805/98 Pull-to-Unlock Versions (With bushing and panel seals)

These switches have the same circuitry as their companion standard lever catalog listings in the MIL-S-8805/98 order guides. Example: 64AT300-1 has the same circuitry as 64AT300-1A. (Refer to locking chart on page 53.) Note: It is not necessary to add locking letter suffixes to M8805/98 military numbers.

Cat. Listing	Military No.	Cat. Listing	Military No.	Cat. Listing	Military No.	Cat. Listing	Military No.
64AT300-1A	M8805/98-002	64AT300-5M	M8805/98-024	66AT300-3F	M8805/98-048	68AT300-1K	M8805/98-072
-1B	-003	-5N	-025	-3G	-049	-1L	-073
-1D	-004	64AT300-7E	M8805/98-027	66AT300-5E	-051	-1M	-074
-1E	-005	-7L	-028	-5F	-052	-AN	-075
-1F	-006	-7N	-029	-5K	-053	-1P	-076
-1G	-007			-5L	-054	68AT300-3D	M8805/98-078
-1H	-008	66AT300-1A	M8805/98-033	-5M	-055	-3F	-079
-1J	-009	-1B	-034	-5N	-056	-3G	-080
-1K	-010	-1D	-035	66AT300-7E	M8805/98-058	68AT300-5E	-082
-1L	-011	-1E	-036	-7L	-059	-5F	-083
-1M	-012	-1F	-037	-7N	-060	-5K	-084
-1N	-013	-1G	-038			-5L	-085
-1P	-014	-1H	-039	68AT300-1A	M8805/98-064	-5M	-086
64AT300-3D	M8805/98-016	-1J	-040	-1B	-065	-5N	-087
-3F	-017	-1K	-041	-1D	-066	68AT300-7E	-089
-3G	-018	-1L	-042	-1E	-067	-7L	-090
64AT300-5E	M8805/98-020	-1M	-043	-1F	-068	-7N	-091
-5F	-021	-1N	-044	-1G	-069		
-5K	-022	-1P	-045	-1H	-070		
-5L	-023	66AT300-3D	M8805/98-047	-1J	-071		

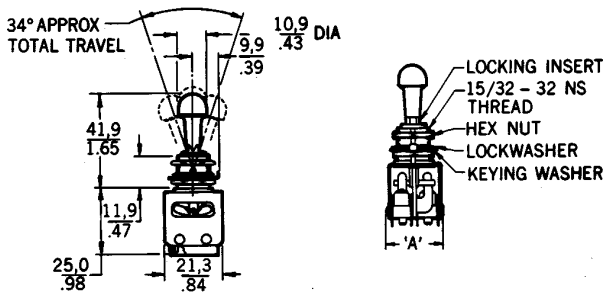
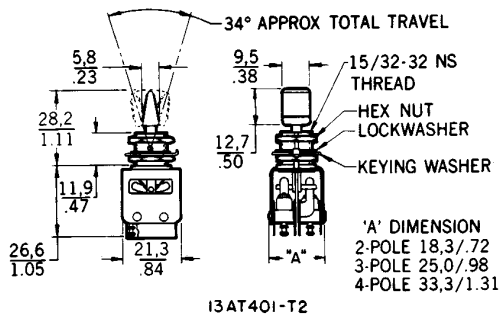
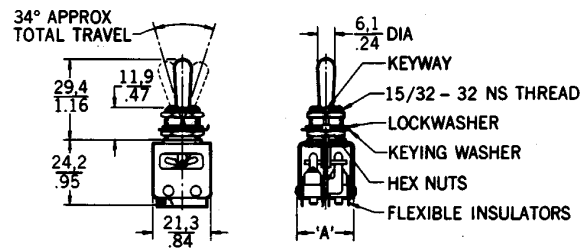
Manual Switches

Toggle Switch Assemblies

AT Series

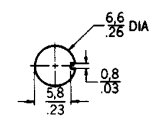
MOUNTING DIMENSIONS (For reference only)

13/23AT

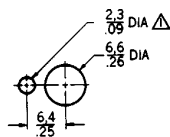


PANEL CUTOUTS

1/4" Bushing



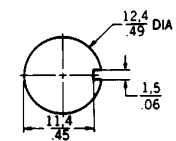
Without Locking Ring



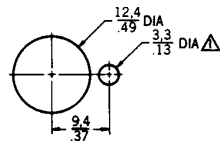
With Locking Ring

NOTE—
△ 1.1/.05 MIN DEEP TO ACCOMMODATE LOCKING RING

1/2" Bushing



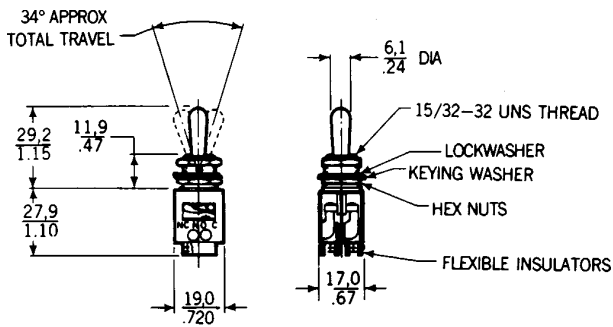
Without Locking Ring



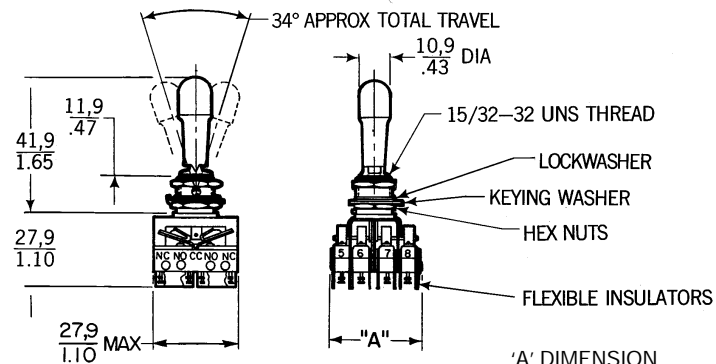
With Locking Ring

NOTE—
△ 1.4/.06 MIN DEEP TO ACCOMMODATE LOCKING RING

62AT



64/66/68AT



'A' DIMENSION

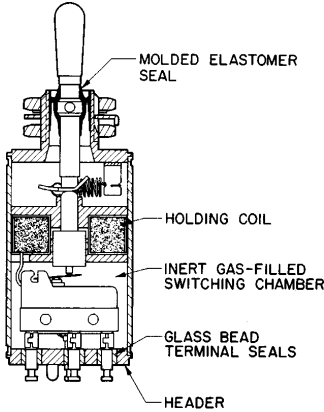
4-POLE 17.0/.67
6-POLE 23.6/.93
8-POLE 29.7/1.17

Manuals

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

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)

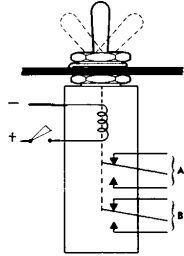
PRINCIPLE OF OPERATION

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

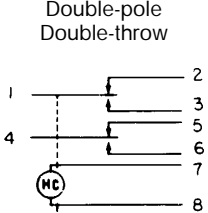
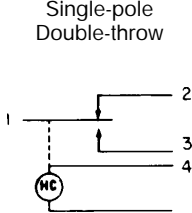
* These positions are magnetically held when coil is energized, and momentary when coil is not energized.

CIRCUIT OPERATION

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

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

CIRCUITRY



Manuals

Manual Switches

ET Series

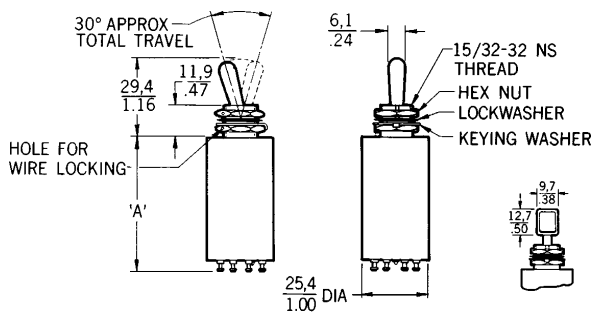
Magnetically Held Toggle Switches

ET ORDER GUIDE

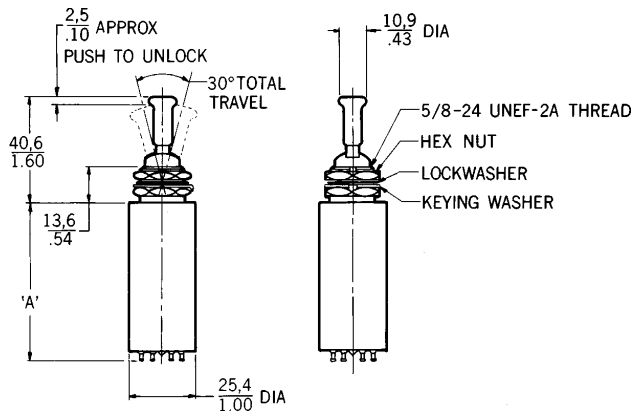
Circuitry	No. of Toggle Positions	Lever Type	Terminals	Elec. Rating Code Page 72	Max. Weight		Max. Dimension A		Catalog Listing
					grams	ounces	mm	inches	
SPDT	2	Standard	Leadwire (90° from Keyway)	B	241	8.5	51,6	2.03	25ET61-6 (M5594/1-1)
	2	Standard	Solder Turret	B	113	4.0	47,5	1.87	25ET61-T (M5594/1-2)
	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)
SPDT	2	Standard	Leadwire (180° from Keyway)	B	241	8.5	51,6	2.03	25ET63-6 (M5594/1-5)
	2	Standard	Leadwire (90° from Keyway)	B	241	8.5	51,6	2.03	25ET64-6 (M5594/1-6)
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)

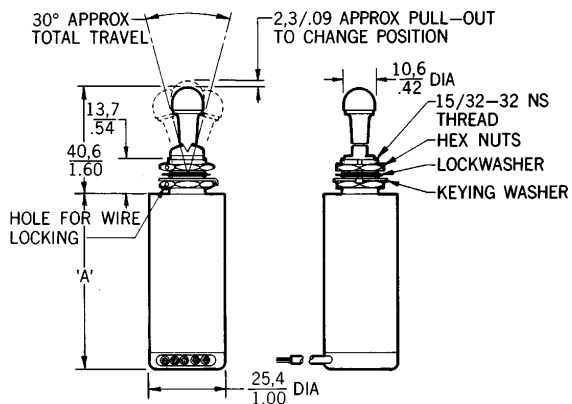
Standard and tab toggle levers



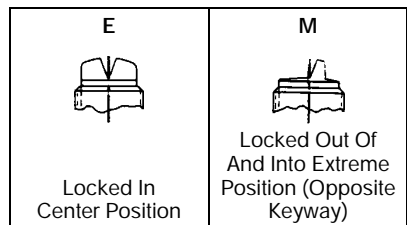
Push-to-unlock toggle lever



Pull-to-unlock toggle lever



LOCKING CONFIGURATION



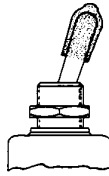
Key: 0,0 = mm
0.00 = inches

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

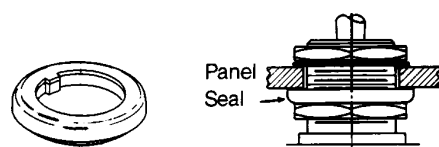
Toggle Switch Type		Basic Catalog Listing	Color Suffix					
			Blue	Black	White	Green	Yellow	Red
AT with 1/4" bushing	Short lever	15PA90-1	BL	BK	W	G	Y	R
	Long lever	15PA90-3			W			R
AT, TL, TK, TS, TW, ET with 15/32" bushing and standard lever		15PA90-4	BL	BK	W	G	Y	R

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 cup washer has a silicone elastomer lining and keying tab for sealing the bushing keying slot. Use in panels up to .125 in./31,8 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

Manuals

Manual Switches

Sealed Pushbutton Switches



FEATURES

- High-intensity LEDs indicate status changes – brilliant color display can be distinguished even under high ambient lighting conditions
- Soft-glow LED backlighted legends for low ambient viewing
- Rugged sealed construction withstands effects of shock and vibration – provides dependable switching/lighted display in severe environment applications
- Designed to comply with MIL-S-22885
- Suitable for use in NEMA 4 and 13 enclosures
- Low travel (.030 in. max.), with tactile feedback for definite feel of switching action
- Front-of-panel, hard mounting
- Compact size
- Field-replaceable legends
- UL recognized, CSA certified, and MIL-S-8805 qualified basic switches
- EPM22 electronic control and EPM32 power duty switching for electrical flexibility
- Matching EPM41 indicators for uniform panel appearance
- Choice of two housing styles:
 - Type C: Standard sealed EPM housings
 - Type B: Enhanced sealed EPM housings with IR filters for vehicle lighting security, designed to MIL-STD-461 (EMI shielding), NBC compliance per AR70-71

EPM Series Sealed Pushbutton Switches meet high-performance needs for rugged, compact size sealed switches that are exposed to water, oil, cleaning solvents, and many industrial chemicals. They provide long, reliable operating life under conditions of high shock and vibration in severe environment applications.

In addition to being built to stand up to demanding environments, EPM switches adhere to good human factors principles. The design combines low travel with high tactile feedback and meets arctic glove requirements. Raised barriers on the bezel enhance finger positioning and help prevent inadvertent operation of two abutting units at one push. Lighted display options provide further application versatility.

LED ILLUMINATION

Long-life LEDs enable reliable illumination. They resist effects of shock and vibration, reducing service and maintenance requirements. (Unlighted versions are also available.)

The following lighting functions can be furnished: High-intensity display using two LEDs to create a brilliant light signal that can be distinguished under high ambient conditions, and/or a pair of LEDs which softly backlight the legend for viewing under low ambient conditions.

There is a choice of red, green or yellow LEDs. Matching indicators, which provide lighted display only, complement the switches to help present a uniform panel design.

ELECTRICAL FLEXIBILITY

EPM switches can be furnished with one or two SPDT basics. EPM22 electronic control switches handle up to 1 amp, EPM32 power duty switches up to 7 amps.

EASY TO INSTALL

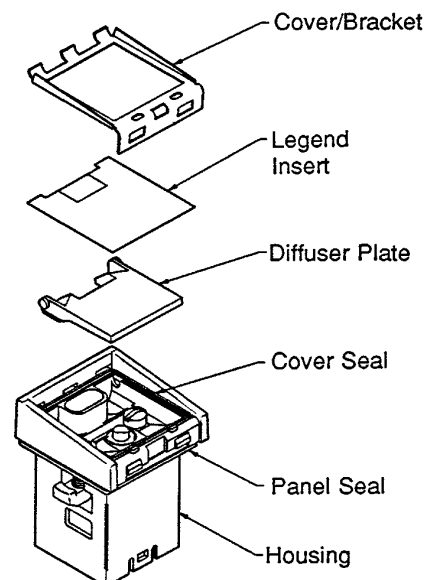
Front panel hard-mounting is quick and easy. Only a screwdriver is needed to tighten the swing-out mounting lugs, which securely lock and seal the unit in the panel. Though the cover/bracket simply snaps onto the housing, it has inherent tamper resistance. The cover can be removed intentionally with a small screwdriver (or other tool) to add or change legends.

EPM's 3/4-inch square panel cutout on 1-inch centers is suited to row, column, or matrix arrays.

CONSTRUCTION

Insert can be furnished with or without legends. If legends are to be backlighted, darker colors are recommended for the insert. Black provides maximum contrast in lighted legend displays.

Diffuser plates specified for lighted legend devices are coated on the underside for even illumination. When unlighted legends are specified, diffuser plates are molded from opaque plastic and are not interchangeable with those used for lighted legends.



Manual Switches

Sealed Pushbutton Switches

EPM Series

SPECIFICATIONS

Environmental	Operating Temperature	-40 to 85°C (-40 to 185°F)
	Storage Temperature	-54 to 85°C (-65 to 185°C)
	Seals	Viton bezel-to-panel gasket seal and neoprene cover seal
	Protection	NEMA 4 and 13
Mechanical	Total Travel	.030 in. (0,76 mm) max.
	Operating Force	20 to 60 oz. (5,56 to 16,7 N) typical
Electrical	Contact arrangement	1 or 2 SPDT
	Electrical rating	EPM22/24 switches – 28 VDC: .5 amp ind., 1 amp res. (sea level or 50,000 ft.), 2 amps max. inrush. 1 amp, 125 VAC (UL code L22). EPM32/34 switches – 28 VDC: 4 amps ind., 7 amps res. (sea level), 2.5 amps ind., 4 amps res. (50,000 ft.). 115 VAC, 60 Hz: 7 amps res. or ind. (sea level).

EPM22/32 SWITCHES WITH SINGLE INDICATOR ORDER GUIDE

EPM22B	Y	R	6	AC	L
Housing Type and Switch Contacts Standard Type C Sealed Housing: EPM22C (Gold Contacts) EPM32C Silver Contacts <hr/> Enhanced Type B Sealed Housing, with IR filters, EMI shielding & NBC compliance: EPM22B (Gold Contacts) EPM32B (Silver Contacts)	Legend Color¹ R Red Y Yellow G Green X No LED	Hi-Intensity Indicator Color R Red Y Yellow G Green X No LED	Switch and LED Terminals 2 Printed Circuit 6 Hook style LED terminals and solder T2 switch terminals	Circuitry Code AC 1-Pole BC 2-Pole (All are momentary action)	Insert Type L Legended insert. Use Legend Order Sheet FO-43973 to designate insert color and legend. X No insert furnished. ² Unlegended insert: ¹ B Blue R Red Y Yellow G Green W White K Black

- When specifying Legend Color (R, Y, G), the insert Type suffix letter must be either: L (legended insert), or X (no insert furnished).
- To order insert separately, see EPM95 order guide.

Example: EPM22BYR6ACL
 Enhanced Type B sealed housing, gold contacts; high-intensity single indicator red lighted display and yellow legend backlighting, hook style LED terminals and solder T2 switch terminals; 1-pole circuitry, momentary action, furnished with legended insert, as specified in FO-43973.

Manual Switches

Sealed Pushbutton Switches

EPM24B

Y

D

6

AC

L

Housing Type and Switch Contacts
Standard Type C Sealed Housing: EPM24C (Gold Contacts) EPM34C (Silver Contacts)
Enhanced Type B Sealed Housing, incl. IR filters, EMI shielding & NBC compliance: EPM24B (Gold Contacts) EPM34B (Silver Contacts)

Legend Color ¹
R Red
Y Yellow
G Green
X No LED

Hi-Intensity Indicator Colors		
Color Code	Upper LED	Lower LED
R	Red	Red
Y	Yellow	Yellow
G	Green	Green
F	Red	Green
A	Yellow	Green
B	Yellow	Red
C	Green	Yellow
D	Green	Red
E	Red	Yellow

Switch and LED Terminals
2 Printed Circuit
6 Hook style LED terminals and solder T2 switch terminals

Circuitry Code
AC 1-Pole
BC 2-Pole (All are momentary action)

Insert Type
L Legended insert. Use Legend Order Sheet FO-43973 to designate insert color and legend.
X No insert furnished. ²
Unlegended Insert: ¹ B Blue R Red G Green W White K Black

- When specifying Legend Color (R, Y, G), the insert Type suffix letter must be either: L (legended insert), or X (no insert furnished).
- To order insert separately, see EPM97 order guide.

Example: EPM24BYD6ACL
Enhanced Type **B** sealed housing, gold contacts; yellow legend backlighting; high-intensity dual indicator green/red lighted display; hook style LED terminals and solder T2 switch terminals; 1-pole momentary action, furnished with legended insert, as specified in FO-43973.

EPM41B

Y

R

2

L

Housing Type and Switch Contacts
Standard Type C Sealed Housing: EPM41C
Enhanced Type B Sealed Housing with IR filters, EMI shielding & NBC compliance: EPM41B

Legend Color ¹
R Red
Y Yellow
G Green
X No LED

Hi-Intensity Indicator Color
R Red
Y Yellow
G Green
X No LED

LED Terminals
2 Printed Circuit
6 Hook style

Insert Type
L Legended insert. Use Legend Order Sheet FO-43973 to designate insert color and legend.
X No insert furnished. ²
Unlegended Insert: ¹ B Blue R Red Y Yellow G Green W White B Black

- When specifying Legend Color (R, Y, G), the insert Type suffix letter must be either: L (legended insert), or X (no insert furnished).
- To order insert separately, see EPM95 order guide.

Example: EPM41BYR2L
Enhanced Type **B** sealed housing; high-intensity single indicator red lighted display and yellow legend backlighting, printed circuit LED and switch terminals; furnished with legended insert, as specified in FO-43973.

Manual Switches

Sealed Pushbutton Switches

EPM44 DUAL INDICATORS (NO SWITCHES) ORDER GUIDE

<u>EPM44B</u>	<u>Y</u>	<u>D</u>	<u>2</u>	<u>L</u>																														
Housing Type and Switch Contacts	Legend Color¹	Hi-Intensity Dual Indicator Colors	LED Terminals	Legend Insert Type																														
Standard Type C Sealed Housing: EPM44C	R Red Y Yellow G Green X No LED	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: black; color: white;">Color Code</th> <th style="background-color: black; color: white;">Upper LED</th> <th style="background-color: black; color: white;">Lower LED</th> </tr> </thead> <tbody> <tr><td>R</td><td>Red</td><td>Red</td></tr> <tr><td>Y</td><td>Yellow</td><td>Yellow</td></tr> <tr><td>G</td><td>Green</td><td>Green</td></tr> <tr><td>F</td><td>Red</td><td>Green</td></tr> <tr><td>A</td><td>Yellow</td><td>Green</td></tr> <tr><td>B</td><td>Yellow</td><td>Red</td></tr> <tr><td>C</td><td>Green</td><td>Yellow</td></tr> <tr><td>D</td><td>Green</td><td>Red</td></tr> <tr><td>E</td><td>Red</td><td>Yellow</td></tr> </tbody> </table>	Color Code	Upper LED	Lower LED	R	Red	Red	Y	Yellow	Yellow	G	Green	Green	F	Red	Green	A	Yellow	Green	B	Yellow	Red	C	Green	Yellow	D	Green	Red	E	Red	Yellow	2 Printed Circuit 6 Hook style	L Legended insert. Use Legend Order Sheet FO-43973 to designate insert color and legend. X No insert furnished. ² Unlegended Insert: ¹ B Blue R Red G Green W White K Black
Color Code	Upper LED	Lower LED																																
R	Red	Red																																
Y	Yellow	Yellow																																
G	Green	Green																																
F	Red	Green																																
A	Yellow	Green																																
B	Yellow	Red																																
C	Green	Yellow																																
D	Green	Red																																
E	Red	Yellow																																

- When specifying Legend Color (**R, Y, G**), the insert Type suffix letter must be either: **L** (legended insert), or **X** (no insert furnished).
- To order insert separately, see EPM97 order guide.

Example: EPM44BYD2L
Enhanced Type **B** sealed housing; yellow legend backlighting; high-intensity dual indicator green/red display; printed circuit LED and switch terminals; furnished with legended insert, as specified in FO-43973.

HOW TO ORDER INSERTS SEPARATELY

Legended inserts: To order inserts legended by MICRO SWITCH as separate items, order Catalog Listing EPM94, and use Legend Order Sheet to specify the insert color and desired legend. **Unlegended inserts:** Use order guide below to order inserts without legends.

EPM95 UNLEGENDED INSERTS ORDER GUIDE

Unlegended inserts can be furnished with or without a display window for hi-intensity LED lighting.

Color	Inserts for Type B Housings:		Inserts For Type C Housings:	
	With window	Without window	With window	Without window
Blue	EPM95BBW	EPM95BBN	EPM95CBW	EPM95CBN
Green	EPM95BGW	EPM95BGN	EPM95CGW	EPM95CGN
Red	EPM95BRW	EPM95BRN	EPM95CRW	EPM95CRN
White	EPM95BWW	EPM95BWN	EPM95CWW	EPM95CWN
Yellow	EPM95BYW	EPM95BYN	EPM95CYW	EPM95CYN
Black	EPM95BKW	EPM95BKN	EPM95CKW	EPM95CKN
Gray	EPM95BPW	EPM95BPN	EPM95CPW	EPM95CPN

EPM97 INSERTS FOR DUAL INDICATOR DEVICES

Color	Inserts for Type B Housings:		Inserts For Type C Housings:	
	With window	Without window	With window	Without window
Blue	EPM97BBW	EPM97BBN	EPM97CBW	EPM97CBN
Green	EPM97BGW	EPM97BGN	EPM97CGW	EPM97CGN
Red	EPM97BRW	EPM97BRN	EPM97CRW	EPM97CRN
White	EPM97BWW	EPM97BWN	EPM97CWW	EPM97CWN
Yellow	EPM97BYW	EPM97BYN	EPM97CYW	EPM97CYN
Black	EPM97BKW	EPM97BKN	EPM97CKW	EPM97CKN
Gray	EPM97BPW	EPM97BPN	EPM97CPW	EPM97CPN



EPM Series – Legend Order Sheet

MICRO SWITCH

Instructions:

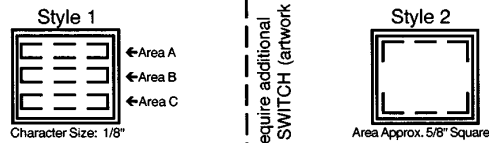
1. Enter complete **catalog listing** at right. (Only one catalog listing per legend order sheet).
2. Enter **quantity** for this order and indicate est. annual use.
3. Enter **style**. (Be consistent with catalog listing in regard to lighted and non-lighted legends and high intensity LED).
4. and 5. Enter **area(s)** and print **legend(s)** corresponding to proper area(s). (Do not exceed the maximum number of characters per area).
6. Designate **legend color** for each legend. (If legends are to be lighted, color must be translucent. If legends are not to be lighted, indicate either black or white).
7. Designate **character size** for each area. (Be consistent with available sizes for style entered. If a special legend is desired, contact MICRO SWITCH for assistance).
8. Enter **background color** (letter) using chart below:

Internal Use Only: Job Number:
 Station Number: Parylene Coat?:
 Reference P/N:

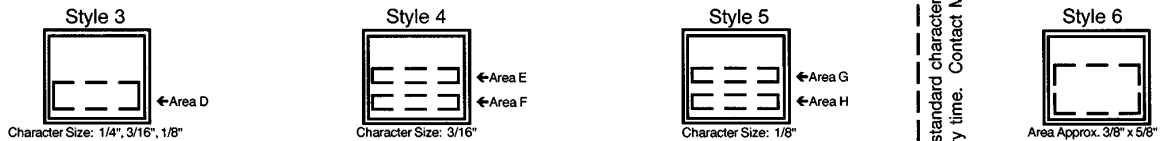
Catalog Listing EPM		
Customer P.O. No.	Customer Drawing No.	
MICRO SWITCH Sales Order	Line No.	Sched.
Customer: _____		
Address: _____		
Prepared by: _____		
Phone: _____		

R - Red	B - Blue	W - White
Y - Yellow	K - Black	*Special - Contact MICRO SWITCH
G - Green	P - Gray	

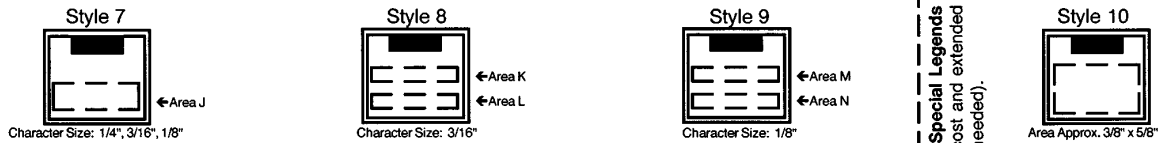
Non-lighted Legends - without high intensity LED Display



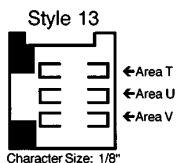
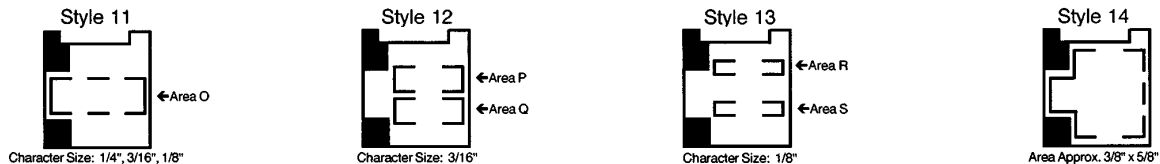
Lighted or Non-Lighted-Without Indicator LED Display:



Lighted or Non-Lighted-With Indicator LED Display:



Lighted or Non-Lighted - Dual Indicator LED Display:



Quantity		Style	Area(s)	Legend - Max Characters/Area 1/4"-3, 3/16"-4, 1/8"-7 Using only one "M" or "W"	Legend Color			Character Size			Back-ground Color
This Order	Est. Annual				Lighted	Unlighted	1/4"	3/16"	1/8"	Special	
					Trans	Black	White				

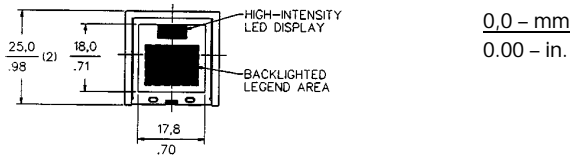
FD-43973-C



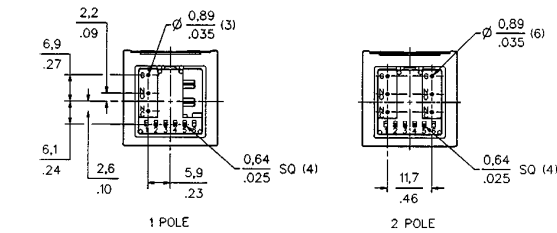
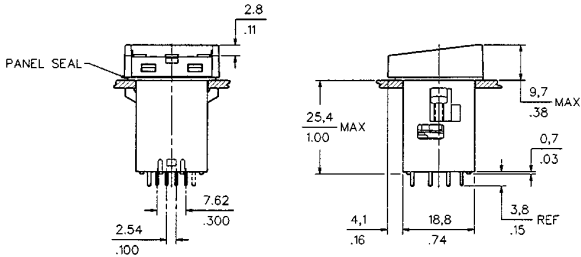
Manual Switches

Sealed Pushbutton Switches

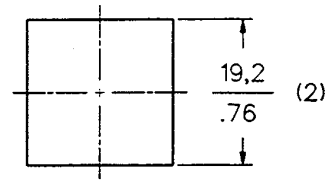
MOUNTING DIMENSIONS (For reference only)



0,0 – mm
0.00 – in.



Panel Cutout

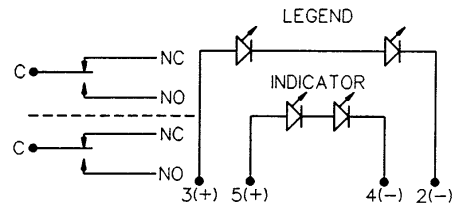


Panel thickness: .063 to .189 in.
(1,6 to 4,8 mm)

Center-to-center: 1 in. (25,4 mm)
rows or columns

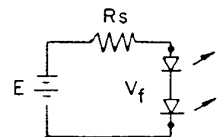
Circuit Diagram

Switch Circuitry LED Circuitry



LED Application Data

External resistors should be added to maintain the LED current at 30 mA max., 20 mA typical. A minimum of 10 VDC open circuit voltage with an appropriate series resistance be used to drive the LEDs. This minimized the effect of temperature (current variation) on forward voltage of the LEDs. The example below illustrates a simple DC circuit and the equation used to determine the value of the series resistance.



$$R_s = \frac{E - V_f}{I_f}$$

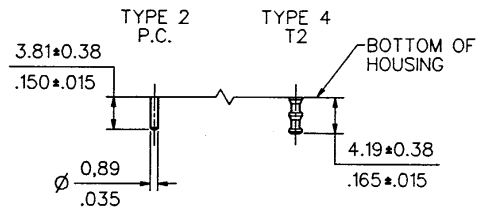
Where: R_s = Series Resistance
 E = Supply
 V_f = Forward Voltage of LED
 I_f = Circuit Current

Example: $R_s = \frac{10 - 4.4}{.020} = 280 \text{ ohms}$

For: $E = 10 \text{ volts}$
 $V_f = 4.4 \text{ volts}$
 $I_f = .020 \text{ amp}$

Characteristics: LED forward voltage @ .020 mA, V_f : Red, 4.4; yellow, 4.4; green, 4.6.

Terminal Detail



Notes:

1. LED terminals are Type 2 – PC only.
2. Mounting torque: 2 to 2½ in.-lbs.

Manual Switches

Sealed Rocker Switches

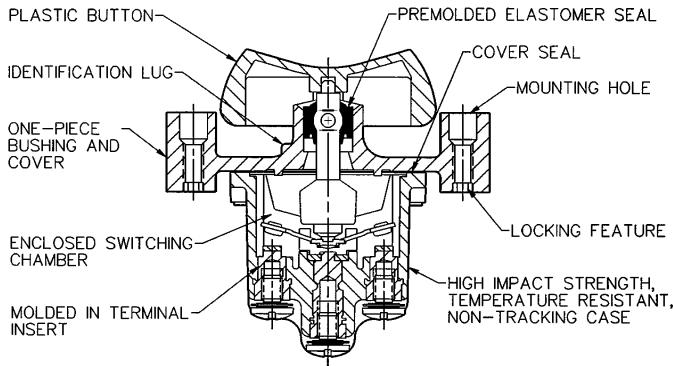


GENERAL INFORMATION

MICRO SWITCH NR Series Rocker Switches meet severe environment application needs for a rugged, cost-effective manual switch. They combine the advantages of toggle switch circuit versatility with pushbutton control.

Quality construction features include a premolded elastomer seal between the actuator and bushing and an elastomer cover/case gasket seal. Also, the terminal inserts are molded into the high impact strength thermoplastic case.

Complete sealing of the switching chamber enables compliance 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.



Above Panel Mount

Flush Panel Mount

12PA ROCKER ORDER GUIDE

Note: These listings are used to specify rockers only.

Rocker Color	Catalog Listing
White	12PA12-W
Red	12PA12-R
Yellow	12PA12-Y
Black	12PA12-BK
Green	12PA12-G
Blue	12PA12-BL

FEATURES

- Completely sealed switching chamber
- Colored removable rockers
- Flush-panel or above-panel mounting
- Step-design case provides added space between terminals to help prevent shorting
- 1, 2 or 4-pole circuitry
- 2 or 3 positions, maint./mom. 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

ELECTRICAL RATINGS

- L191: 15 amps, 125, 250, 277 VAC; ½ Hp, 125 VAC; 1 Hp, 250, 277 VAC; 5 amps, 125 VAC "L"
- L192: 10 amps, 125, 250, 277 VAC; ¼ Hp, 125 VAC; ½ Hp, 250, 277 VAC; 3 amps, 125 VAC "L"

HOW TO ORDER

1. To order flush panel mount switches *without rockers*, specify the listings in the NR order guides.
 2. To specify above-panel mount switches, *without rockers*, change the 1 (after "NR") in 1NR1, 11NR1, 2NR1, 12NR1, 4NR1, and 14NR1 listings in the NR order guides to 4. Example: 1NR1-2W converts to 1NR4-2W, 11NR1-2W to 11NR4-2W.
- For 1NR91, 2NR91, and 14NR91 listings add 4 (after the "NR") to specify the above panel mount version. Example: 1NR91-2W becomes 1NR491-2W.
3. To order rockers separately, specify listings in the 12PA order guide.
 4. To specify rockers furnished with switches, add the appropriate suffix letter to the switch listings, e.g., W=White, R=Red, Y=Yellow, BK=Black, G=Green, BL=Blue. Example: 1NR1-2 with a white rocker is 1NR1-2W.

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

Manual Switches

Sealed Rocker Switches

NOTE: Catalog listings in the order guides below do not include rocker operators. See "How to Order."

NR 2-POSITION FLUSH-PANEL MOUNT ROCKERS ORDER GUIDE

No. of Poles	Circuits Made With Rocker At:			Termination Style		
	Ident. Lug Position	Opposite Lug Position	UL Rating Code	Screw	Solder	Q-C
1	OFF	2-3	L191	1NR1-2	11NR1-2	1NR91-2
	1-2	2-3	L191	1NR1-3	11NR1-3	1NR91-3
	OFF*	2-3	L192	1NR1-4	11NR1-4	1NR91-4
	1-2*	OFF	L192	1NR1-6	11NR1-6	1NR91-6
	1-2*	2-3	L192	1NR1-8	11NR1-8	1NR91-8
2	OFF	2-3, 5-6	L191	2NR1-2	12NR1-2	2NR91-2
	1-2, 4-5	2-3, 5-6	L191	2NR1-3	12NR1-3	2NR91-3
	OFF*	2-3, 4-6	L192	2NR1-4	12NR1-4	2NR91-4
	1-2, 4-5*	OFF	L192	2NR1-6	12NR1-6	2NR91-6
	1-2, 4-5*	2-3, 4-6	L192	2NR1-8	12NR1-8	2NR91-8
4	OFF	2-3, 5-6, 8-9, 11-12	L191	4NR1-2	14NR1-2	4NR91-2
	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	4NR1-3	14NR1-3	4NR91-3
	OFF*	2-3, 5-6, 8-9, 11-12	L192	4NR1-4	14NR1-4	4NR91-4
	1-2, 4-5, 7-8, 10-11*	OFF	L192	4NR1-6	14NR1-6	4NR91-6
	1-2, 4-5, 7-8, 10-11*	2-3, 5-6, 8-9, 11-12	L192	4NR1-8	14NR1-8	4NR91-8

NR 3-POSITION FLUSH-PANEL MOUNT ROCKERS ORDER GUIDE

No. of Poles	Circuits Made With Toggle At:				Termination Style		
	Ident. Lug Position	Center Position	Opposite Lug Position	UL Rating Code	Screw	Solder	Q-C
1	1-2	OFF	2-3	L191	1NR1-1	11NR1-1	1NR91-1
	1-2*	OFF	2-3	L192	1NR1-5	11NR1-5	1NR91-5
	1-2*	OFF	2-3*	L192	1NR1-7	11NR1-7	1NR91-7
	NONE**	OFF	2-3	L191	1NR1-21	11NR1-21	1NR91-21
	NONE**	1-2	2-3	L191	1NR1-31	11NR1-31	1NR91-31
	NONE**	1-2	2-3*	L192	1NR1-51	11NR1-51	1NR91-51
	1-2*	OFF	NONE**	L192	1NR1-61	11NR1-61	1NR91-61
	1-2, 4-5	OFF	2-3, 5-6	L191	2NR1-1	12NR1-1	2NR91-1
1-2, 4-5*	OFF	2-3, 5-6	L192	2NR1-5	12NR1-5	2NR91-5	
1-2, 4-5*	OFF	2-3, 5-6*	L192	2NR1-7	12NR1-7	2NR91-7	
NONE*	OFF	2-3, 5-6	L191	2NR1-21	12NR1-21	2NR91-21	
NONE**	1-2, 4-5	2-3, 5-6	L191	2NR1-31	12NR1-31	2NR91-31	
NONE**	1-2, 4-5	2-3, 5-6*	L192	2NR1-51	12NR1-51	2NR91-51	
1-2, 4-5*	OFF	NONE**	L192	2NR1-61	12NR1-61	2NR91-61	
1-2, 4-5	1-2, 4-5	2-3, 5-6	L191	2NR1-12	12NR1-12	2NR91-12	
1-2, 4-5*	1-2, 5-6	2-3, 5-6	L192	2NR1-50	12NR1-50	2NR91-50	
1-2, 4-5*	1-2, 5-6	2-3, 5-6*	L192	2NR1-70	12NR1-70	2NR91-70	
4	1-2, 4-5, 7-8, 10-11	OFF	2-3, 5-6, 8-9, 11-12	L191	4NR1-1	14NR1-1	4NR91-1
	1-2, 4-5, 7-8, 10-11*	OFF	2-3, 5-6, 8-9, 11-12	L192	4NR1-5	14NR1-5	4NR91-5
	1-2, 4-5, 7-8, 10-11*	OFF	2-3, 5-6, 8-9, 11-12*	L192	4NR1-7	14NR1-7	4NR91-7
	NONE*	OFF	2-3, 5-6, 8-9, 11-12	L191	4NR1-21	14NR1-21	4NR91-21
	NONE**	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12	L191	4NR1-31	14NR1-31	4NR91-31
	NONE**	1-2, 4-5, 7-8, 10-11	2-3, 5-6, 8-9, 11-12*	L192	4NR1-51	14NR1-51	4NR91-51
	1-2, 4-5, 7-8, 10-11*	OFF	NONE**	L192	4NR1-61	14NR1-61	4NR91-61
	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	4NR1-12	14NR1-12	4NR91-12
	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	4NR1-50	14NR1-50	4NR91-50
	1-2, 4-5, 7-8, 10-11*	2-3, 4-5	2-3, 5-6, 8-9, 11-12*	L192	4NR1-70	14NR1-70	4NR91-70

* 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.

TERMINAL CIRCUIT IDENTIFICATION

Terminal identification numbers referenced in the order guides are molded into the switch base.

These numbers indicate which circuits are made in each rocker position (e.g. "1-2" refers to circuit closure through terminals 1 and 2).



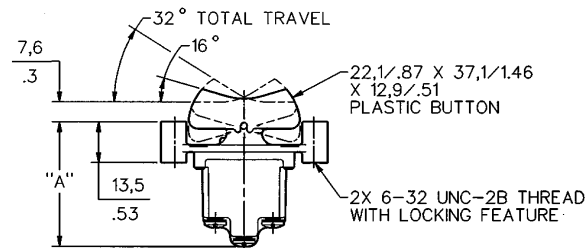
Manual Switches

Seated Rocker Switches

MOUNTING DIMENSIONS (For reference only)

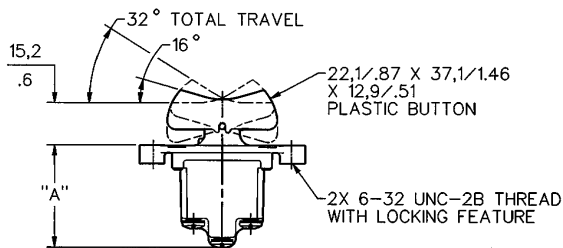
Key: $\frac{0,0}{0.00} = \text{mm}$
 $\frac{0,00}{0.00} = \text{inches}$

Flush Panel



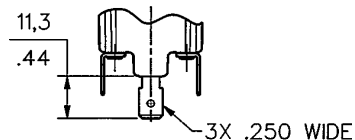
DIM "A"	
1-POLE	36,8/1.45
2 & 4-POLE	41,7/1.64

Above Panel

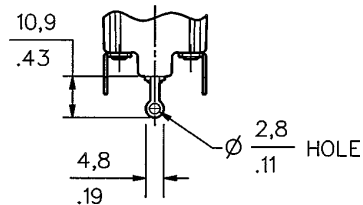


DIM "A"	
1-POLE	29,5/1.16
2 & 4-POLE	34,4/1.35

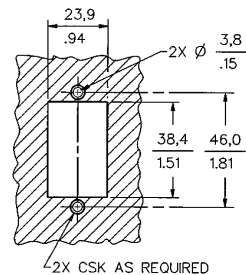
Quick Connect Terminals



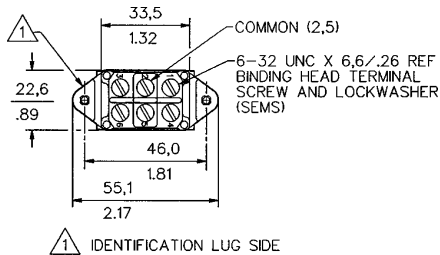
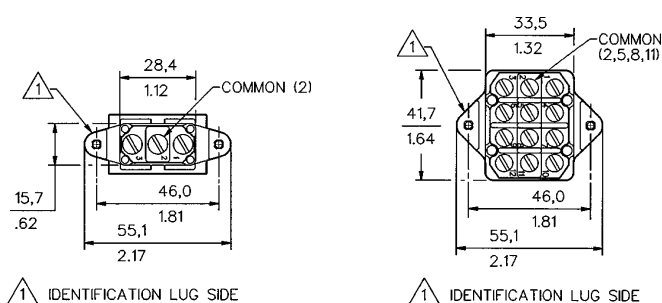
Solder Terminals



Panel Cutout



Terminal Circuit Identification



Manual Switches

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
- Brightly colored removable rockers
- 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

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

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

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/NR switches use silver cadmium oxide contacts. If you have specific questions, 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	1-2, 4-5	2-3, 5-6	L191	3	32NT91-12
	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

Manual Switches

Flat Base Sealed Rockers

NR 2-POSITION ORDER GUIDE

No. of Poles	Circuits Made At:		UL Rating Code	Catalog Listing Rocker* Q-C
	Keyway Position	Opposite Keyway		
1	OFF	2-3	L191	31NR91-2
	1-2	2-3	L191	31NR91-3
	OFF**	2-3	L192	31NR91-4
	1-2**	OFF	L192	31NR91-6
	1-2**	2-3	L192	31NR91-8
2	OFF	2-3, 5-6	L191	32NR91-2
	1-2, 4-5	2-3, 5-6	L191	32NR91-3
	OFF**	2-3, 4-6	L192	32NR91-4
	1-2, 4-5**	OFF	L192	32NR91-6
	1-2, 4-5**	2-3, 4-6	L192	32NR91-8

ELECTRICAL RATING

L191: 15 amps, 125, 250, 277 VAC; ½ Hp, 125 VAC; 1 Hp, 250, 277 VAC; 3 amps, 125 VAC "L"

L192: 10 amps, 125, 250, 277 VAC; ¼ Hp, 125 VAC; ½ Hp, 250, 277 VAC; 3 amps, 125 VAC "L"

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).

NR 3-POSITION ORDER GUIDE

No. of Poles	Circuits Made At:			UL Rating Code	Catalog Listing Rocker* Q-C
	Keyway Position	Center Position	Opposite Keyway		
1	1-2	OFF	2-3	L191	31NR91-1
	1-2**	OFF	2-3	L192	31NR91-5
	1-2**	OFF	2-3**	L192	31NR91-7
	NONE***	OFF	2-3	L191	31NR91-21
	NONE***	1-2	2-3	L191	31NR91-31
	NONE***	1-2	2-3**	L192	31NR91-51
	1-2**	OFF	NONE***	L192	31NR91-61
2	1-2, 4-5	OFF	2-3, 5-6	L191	32NR91-1
	1-2, 4-5**	OFF	2-3, 5-6	L192	32NR91-5
	1-2, 4-5**	OFF	2-3, 5-6**	L192	32NR91-7
	NONE***	OFF	2-3, 5-6	L191	32NR91-21
	NONE***	1-2, 4-5	2-3, 5-6	L191	32NR91-31
	NONE***	1-2, 4-5	2-3, 5-6**	L192	32NR91-51
	1-2, 4-5**	OFF	NONE***	L192	32NR91-61
	1-2, 4-5	1-2, 4-5	2-3, 5-6	L191	32NR91-12
	1-2, 4-5**	1-2, 5-6	2-3, 5-6	L192	32NR91-50
	1-2, 4-5**	1-2, 5-6	2-3, 5-6**	L192	32NR91-70

Top specify above-panel mount rockers: add 4 (after the "NR") to specify the above panel version. Example: 31NR91-5 becomes 31NR491-5.

ROCKER BUTTONS ORDER GUIDE

Rocker Color	Catalog Listing
White	12PA12-W
Red	12PA12-R
Yellow	12PA12-Y
Black	12PA12-BK
Green	12PA12-G
Blue	12PA12-BL

* Does not include rocker button. Order separately from chart.
 ** 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

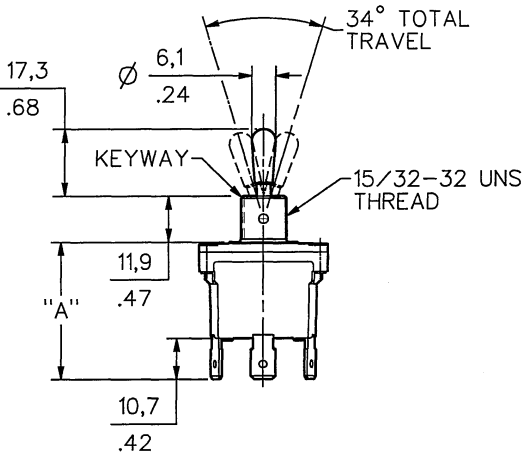


Manual Switches

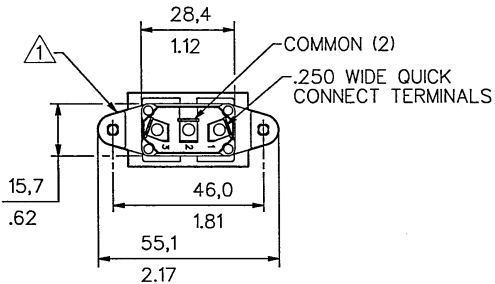
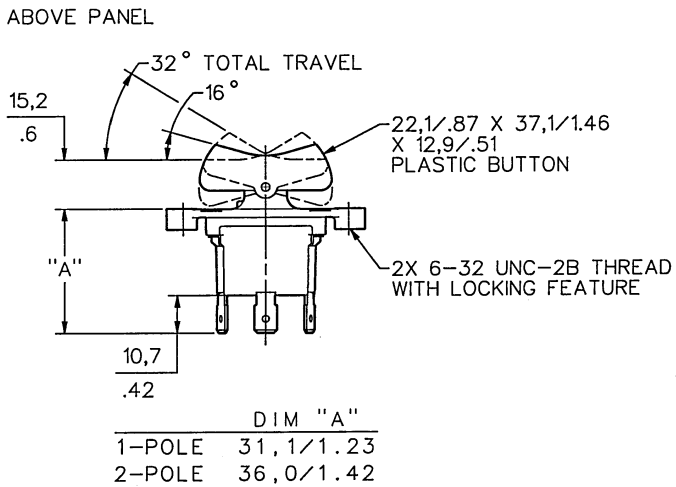
Flat Base Sealed Toggles and Rockers

MOUNTING DIMENSIONS (For reference only)

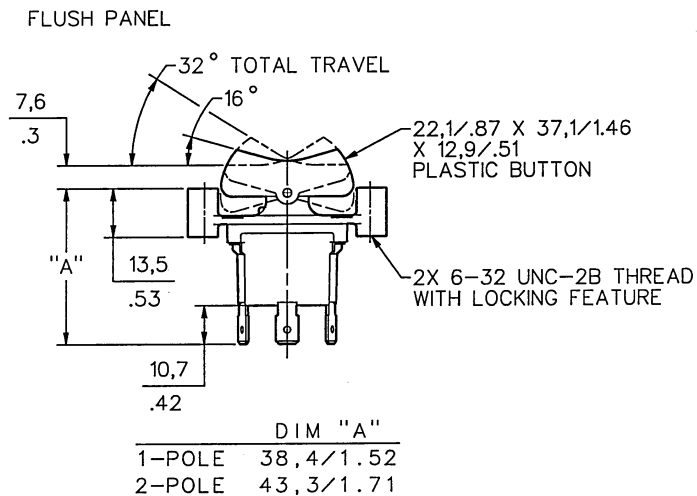
Toggle Switches



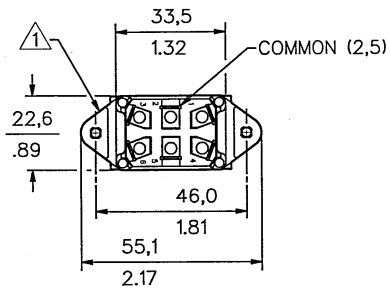
Rocker Switches, Above Panel



Rocker Switches, Flush Panel



IDENTIFICATION LUG SIDE



IDENTIFICATION LUG SIDE

87940 Series

Push-Pull Switch



DESCRIPTION

The Honeywell push-pull switch is a robust, environmentally sealed, sliding contact switch incorporating two circuits with multiple combinations. The sliding contacts provide positive contact closure and opening when the switch knob is operated. The switch is available as a dual circuit switch. Contact closures are available with both circuits closed in the push position, or both circuits closed the pull position, or alternate closure, one closed and one open.

Also available is an option of a single circuit switch for high volume sales. The dual o-ring design protects the contact chamber by isolating it from any moisture or any other contaminant.

Replacement for sealed and unsealed:

- PTO switches
- Park brake switches
- Most push-pull switch applications
- Emergency stop switches

FEATURES

- Moisture and contaminant resistant
- Designed for severe temperatures
- Vibration resistant
- Sliding contacts
- Knob available in a variety of colors
- IP67 sealing available
- UL file E219293

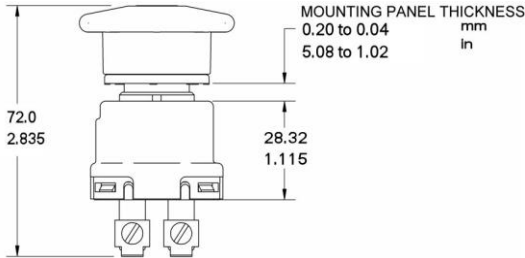
POTENTIAL APPLICATIONS

- Construction
- Agricultural
- Marine
- Material handling
- Machine tools
- Mining
- Military vehicles
- Lawn and garden
- Heavy equipment

ORDER GUIDE

Catalog Listing	Description
87941	2 NO circuits in push
87943	1 NO and 1 NC circuits in push
87944	2 NC circuits in push

DIMENSIONS



SPECIFICATIONS

Maximum design electrical load	20 A @ 12 Vdc to 14 Vdc 10 A @ 24 Vdc
Operating temperature extremes	-40 °C to 100 °C [-40 °F to 212 °F]
Endurance test cycle life at design electrical load	25,000 cycles
Standard electrical connection	Screw terminals

⚠ WARNING

RISK TO LIFE OR PROPERTY

- Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

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Europe +44 (0) 1698 481481
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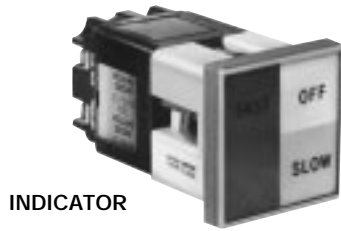
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Honeywell

Multi-Light Oiltight Controls

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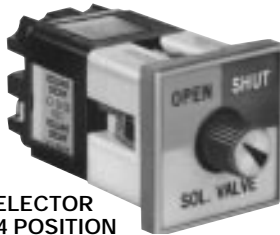
CMC Series



INDICATOR



PUSHBUTTON



SELECTOR
2-3-4 POSITION



SELECTOR-PUSH
2-3-4 POSITION

MULTI-LIGHT OILTIGHT CONTROLS

CMC square, multi-light controls are ideal for process control panels. They are available with selector, pushbutton, and select-or-push actuators, and mechanical or electronic duty contact blocks.

- Indicators, pushbuttons, selectors, and selector-push units
- Mechanical and electronic duty contact blocks
- Contact blocks tandem mount behind operator
- More circuitry control than with any other control by using four plunger adapter kit
- Legend plates with legending in square or diagonal formats
- Bright, lighted displays with good contrast for easy identification
- Square shape is compatible with other panel controls
- Rotary cam-actuated contact blocks
- NEMA 13, oiltight and dusttight
- CSA certified no. LR57326
- UL listed file no. E37138

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Multi-Light Oiltight Controls Indicators and Pushbuttons

CMC Series

- Suitable for use in NEMA 13 enclosures.

Indicator

- Four lighted quadrants
- Two or four transformers, 120 or 240 VAC
- Jumpers available for low voltage applications.
- Resistor boards available for 24V or 48V supply

- Each lamp individually controlled
- Cover plates, color inserts, and legend plates are ordered separately.

Pushbutton

- Actuate up to four 2-plunger contact blocks in any combination
- Lighted and unlighted versions available
- Two or four transformers, 120 or 240 VAC
- Jumpers available for low voltage applications
- Resistor boards available for 24V or 48V supply
- Each lamp individually controlled.
- Cover plates, color inserts, and legend plates are ordered separately



INDICATOR CATALOG LISTING

908AAA--



PUSHBUTTON CATALOG LISTING

909AAA--

Gray Button

909BAA--

Black Button

ORDER GUIDE

Complete the last two blanks of the catalog listing with the terminal number, which is colored in the table at the right.

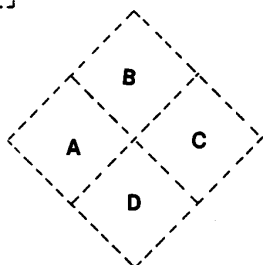
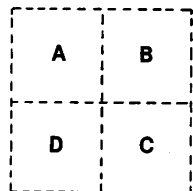
Order incandescent cover plate, color inserts, and legend plate separately from page 12.

Order LED lamps and color inserts separately.

6VAC/DC - Page 14
24VAC/DC - Page 15

Contact blocks may be ordered separately from page 4.

QUADRANT AREAS



908AAA--, 909AAA--, 909BAA--	
67	— Unlighted
FOUR TERMINAL UNITS use with 2 lamps	
95	— 120 VAC transformers (2) and No. 755 lamps in quadrants A & B, nothing in quads C & D
96	— 120 VAC transformers (2) and No. 755 lamps in quadrants C & D, nothing in quads A & B
97	— Line voltage jumpers in quadrants A & B, no lamps, nothing in quads C & D. Can be used with incandescent or LED bulbs.
98	— Line voltage jumpers in quadrants C & D, no lamps, nothing in quads A & B. Can be used with incandescent or LED bulbs.
38	— 120 VAC transformers (2) in quadrants A & B. Quadrants C & D unlighted. For use with 6 volt LED lamps and color inserts. Order from page 14.
FIVE TERMINAL UNITS use with 4 lamps	
01	— 120 VAC transformers (4) and (4) No. 755 lamps
02	— 240 VAC transformers (4) and (4) No. 755 lamps
03	— Line voltage jumpers (4)—Less lamps ¹ . Can be used with incandescent or LED bulbs.
40	— 48 volt resistors (4) and (4) No. 1819 lamps
05	— 24 volt resistors (4) and (4) No. 756 lamps
15	— 120 VAC transformers (4). For use with 6 volt LED lamps and color inserts. Order from page 14.
16	— 240 VAC transformers (4). For use with 6 volt LED lamps and color inserts. Order from page 14.
EIGHT TERMINAL UNITS use with 4 lamps	
51	— 120 VAC transformers (4) and (4) No. 755 lamps
52	— 240 VAC transformers (4) and (4) No. 755 lamps
53	— Line voltage jumpers (4) less lamps ¹ . Can be used with incandescent or LED bulbs.
90	— 48 volt resistors (4) and (4) No. 1819 lamps
50	— 24 volt resistors (4) and (4) No. 756 lamps
55	— 120 VAC transformers (4). For use with 6 volt LED lamps and color inserts. Order from page 14.
56	— 240 VAC transformers (4). For use with 6 volt LED lamps and color inserts. Order from page 14.

¹ See Page 23 for 2-28 volt lamp recommendations.
Contact MICRO SWITCH Branch Office for combinations of lamp voltages in one unit.

Multi-Light Oiltight Controls

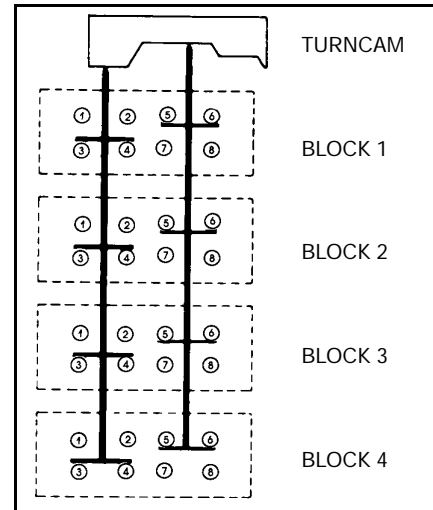
Four Plunger Adapter Kit

CMC Series

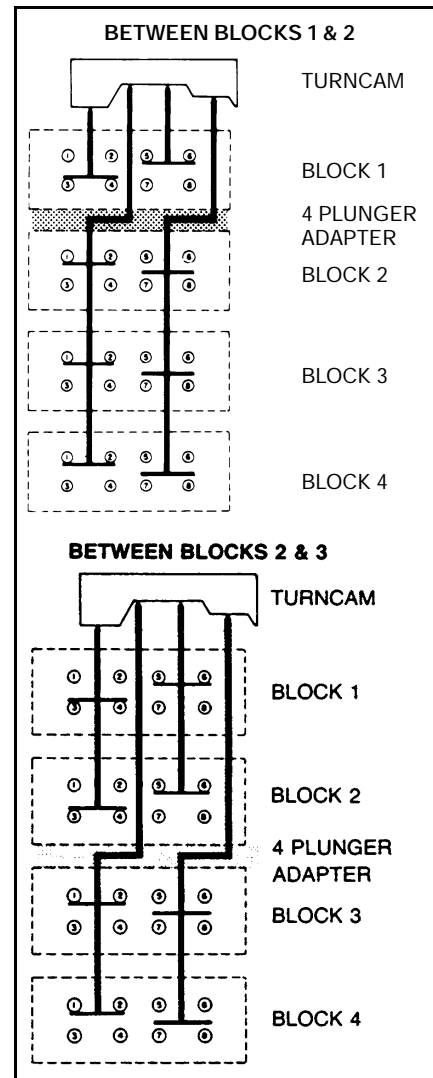
- Exclusive four plunger actuation for selector and selector-push units.
 - Any combination of heavy duty and electronic duty contact blocks (up to four) may be used per operator.
- Catalog Listing
PTCA

CIRCUIT SEQUENCING CONTROL COMPARISON

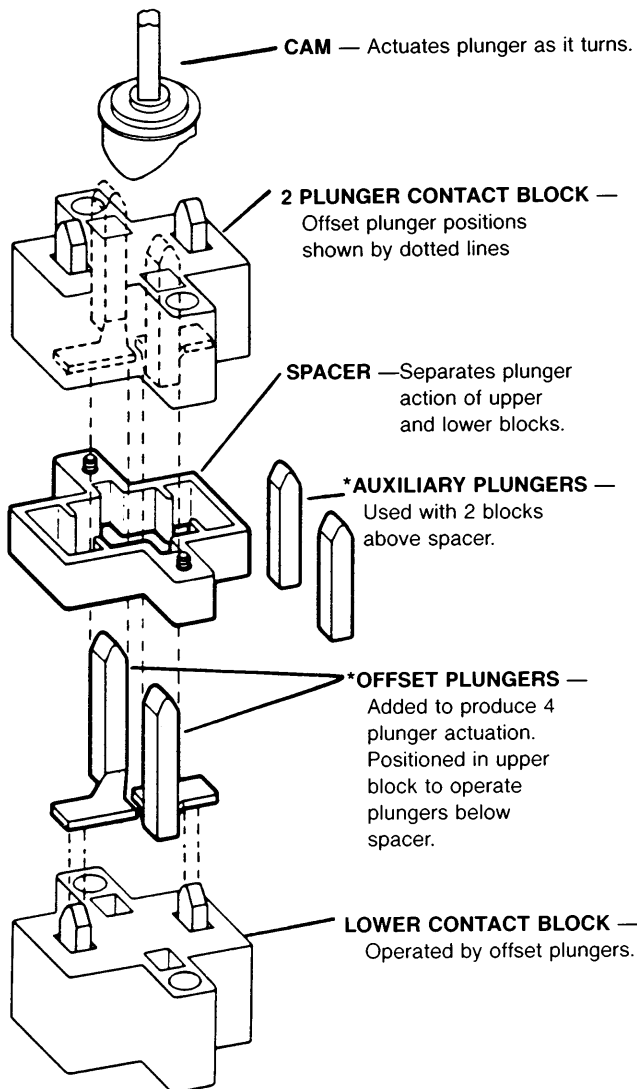
2 PLUNGER ACTUATION



4 PLUNGER ACTUATION

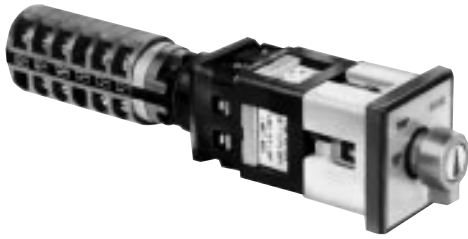


* 4 Plunger Adapter Kit (Catalog Listing PTCA) includes two sets of auxiliary and offset plungers. One set is .200 inch longer than the other set in order to match the variation in 2-circuit and 4-circuit block depth.



Multi-Light Oiltight Controls Rotary Contact Blocks

CMC Series



920/921 CMC ROTARY CAM-ACTUATED CONTACT BLOCKS

- Up to 12 positions available
- Controls up to 24 circuits
- Positive detent between positions
- Mechanical memory stages

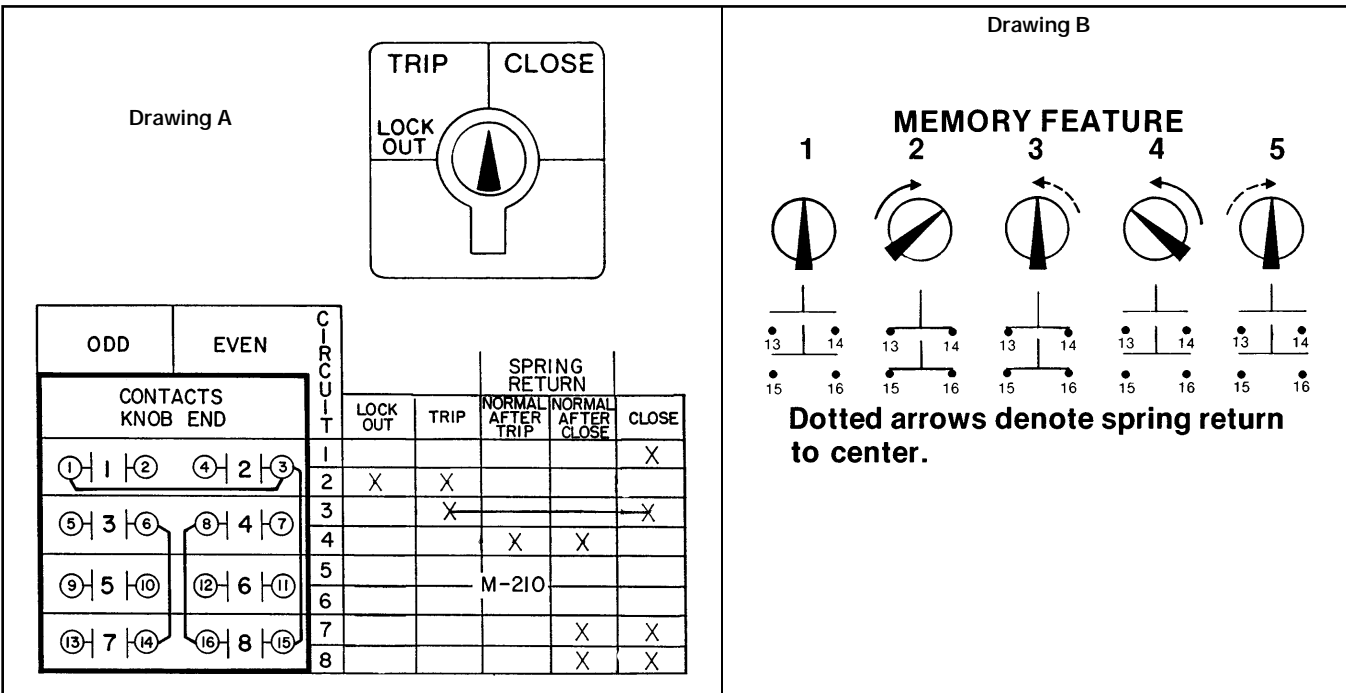
The 920/921 CMC series are highly versatile rotary cam-actuated contact blocks available with CMC selectors. These contact blocks are ideal for applications requiring a large number of contacts actuated simultaneously by one device. They are designed for control circuits in applications such as instrumentation and power generation.

ELECTRICAL INTERRUPTING RATINGS (amperes)

The electrical ratings are 600 VAC, 250 VDC and 20 amperes continuous carry or 180 amperes for three seconds.

MECHANICAL MEMORY

A special cam and slip clutch (M210) can be specified to provide mechanical memory.



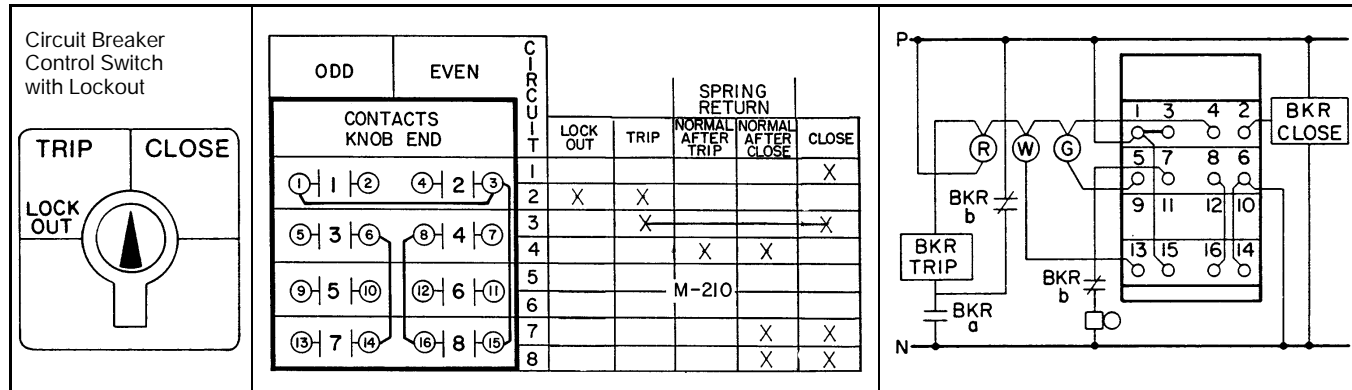
Drawing A represents a three position selector with spring return from both directions. Circuits 7 and 8 - contacts, 13-14 and 15-16 are the slip (mechanical memory) contacts. M210 is the slip clutch. Drawing B is a simplified explanation of how mechanical memory works.

1. In the center position step 1, contacts 13-14 and 15-16 are open. The switch (drawing A) is in the normal after TRIP position.
2. Step 2 shows the contact closures as the knob is rotated clockwise to the CLOSE position, (13-14 and 15-16 close).
3. Step 3 illustrates that the contacts remain closed after the selector knob spring-returns to the center position.
4. In step 4, the knob is rotated counter-clockwise to the TRIP position, opening contacts 13-14 and 15-16.
5. This state is maintained after the knob spring-returns to center, step 5.

Multi-Light Oiltight Controls Rotary Contact Blocks

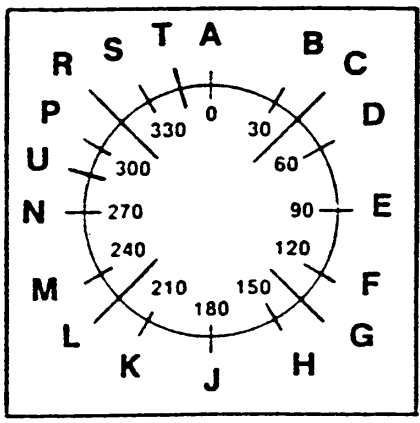
CMC Series

TYPICAL APPLICATION 920 CMC (LOCKOUT)



For identification ONLY
Do not build catalog listings from this information. See next page for ordering information.

Number of Positions	Degrees Between Position	Selector Action	Lamp Service	Start Position Orientation	Switching Stage Type
Selector 920					
A Two Position	A 30°	A Maintained	01	A 0°	Four Digit Number Assigned by Freeport
B Three Position	B 45°	B CW Spring Return	02	B 30°	
C Four Position	C 60°	C CCW Spring Return	05	C 45°	
D Five Position	D 90°	D CW & CCW Spring Return	40	D 60°	
E Six Position	E Various	E CW & CCW Spring Return and Lockout	50	E 90°	
F Seven Position		F CW & CCW Spring Return and Lockout	51	F 120°	
G Eight Position			52	G 135°	
H Nine Position			90	H 150°	
J Ten Position			03	J 180°	
K Eleven Position			53	K 210°	
L Twelve Position			67	L 225°	
			95	M 240°	
			96	N 270°	
			97	P 300°	
			98	R 315°	
				S 330°	
				T 345°	
				U 285°	



Selector-Push 921

Multi-Light Oiltight Controls

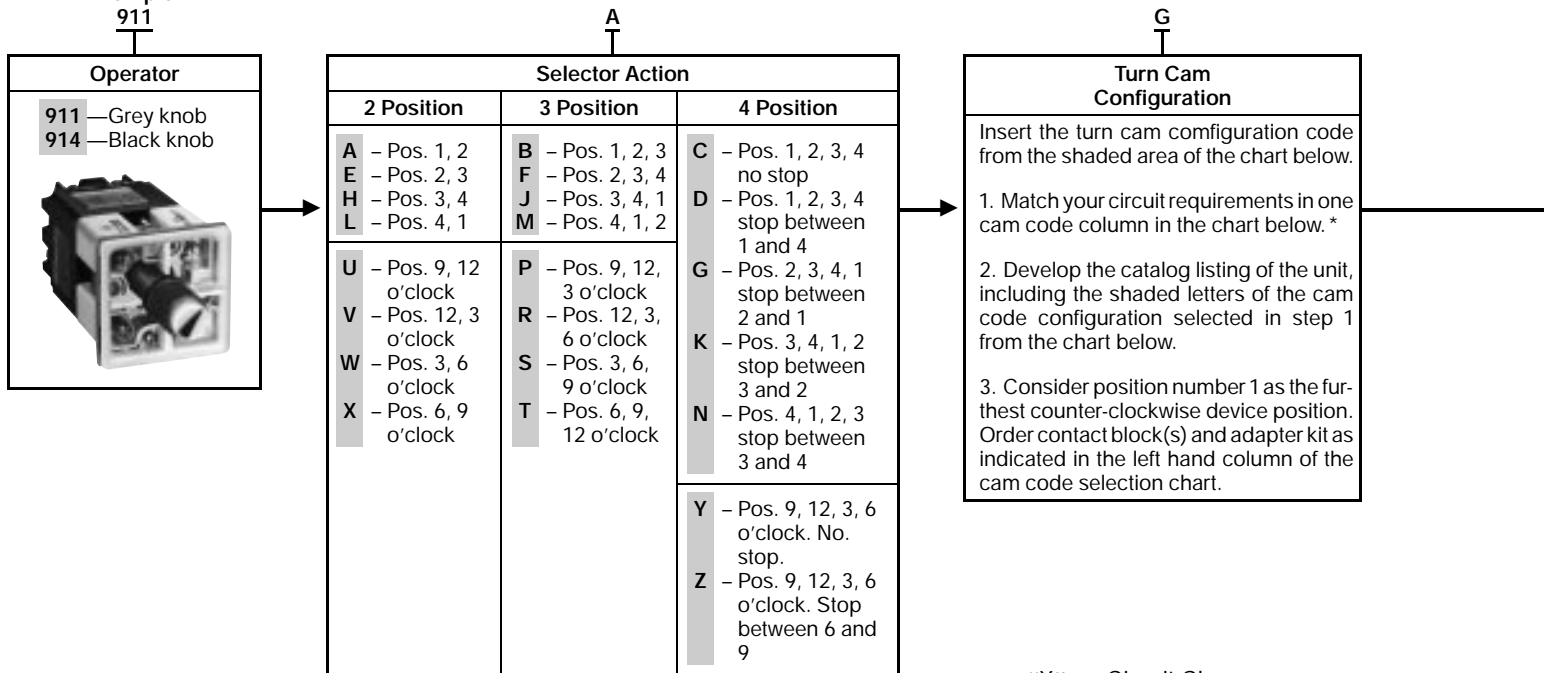
Selector - Push Units

CMC Series

CMC SELECTORS

- Suitable for use in NEMA 13 enclosures.
- Accepts 4 plunger adapter kit

Example:



“X” — Circuit Closure

“O” — Circuit Open

CAM CODE SELECTION CHART *

Contact ^{1,2} block	Number of Positions:		2-Positions					3-Positions				4-Positions			
	Turn Cam:	Configuration:	B	J	G	G	G	R	L	K	G	A	R	L	
		Orientation:	3	1	1	3	1	1	1	1	4	1	1	1	1
Push Cam Code:		YA	TC	BB	FB	TB	FB	MA	ED	MC	MD	BC	VB		
Device Positions:		1 2	1 2	1 2	1 2	1 2	1 2	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3 4	1 2 3 4		
Terminal	Condition														
PTCC 	1-2	Free Depress	O X	X O	O X	X X	O X	X X	X O O	X X O	O X X	X O O	X X X X	X O O O	
			O O	O O	O X	X O	O X	O X	X O O	X X O	O O X	O O O	O X X X	O O O O	
	3-4	Free Depress	O O	O O	X O	O O	X O	O O	O O O	O O O	X O O	O O X	O O O O	O O O O	
			X X	X X	X O	O X	X O	X O	O O X	O O X	X O O	O X X	X O O O	X O O O	
5-6	Free Depress	X O	X O	X X	O X	X X	X X	O O X	O O X	X X O	O X X	X X X X	O O X O		
			O O	X O	X O	O X	O O	X O	O O X	O O X	X O O	O X O	X X O X	O O O O	
7-8	Free Depress	O X	O O	O O	X O	O O	O O	O O O	O O O	O O X	X O O	O O O O	O O O O		
			O X	O X	O X	X O	X X	O X	X O O	X O O	O O X	X O O	O O X O	O O X O	
4-Plunger Adapter Kit ³ PTCA			For circuits below — Use 4 plunger adapter kit and at least 1 block from above												
PTCC 	1-2	Free Depress	—	O X	X O	—	X O	X X	O X O	O X X	X O X	X X O	X X X X	O X O O	
			—	O O	O O	—	O O	O O	O X O	O X X	O O O	X O O	X O X X	O O O O	
	3-4	Free Depress	X O	O O	O X	—	O X	O O	—	—	O X O	O O O	O O O O	O O O O	
			X X	X X	X X	—	X X	X X	—	—	O X O	O O X	O X O O	O X O O	
5-6	Free Depress	X X	O X	—	X O	X X	—	—	X O O	X X X	O O X	X X X X	O O O X		
			O O	O X	—	O O	X O	—	X O O	O X O	O O X	X X X O	O O O O		
7-8	Free Depress	O O	O O	—	O X	O O	—	O O O	O O O	—	O X O	O O O O	O O O O		
			X O	X O	—	X X	O X	—	O X O	O X O	—	X X O	O O O X	O O O X	

Notes:

¹ Order contact blocks separately from page 4. Only PTCC contact blocks are charted. All other contact block alternatives may be substituted for portions of PTCC circuitry.

² Contact block PTCCB, with its location arrow aligned with the operator, provides the circuitry equivalent to 1-2 and 7-8 of the PTCC block. When PTCCB is reversed (turned 180°), so location arrows do not align with operator, the circuitry obtained is equivalent to 3-4 and 5-6 of the PTCC block. PTCCD with arrows aligned, provides same circuit as 7-8 of PTCC block.

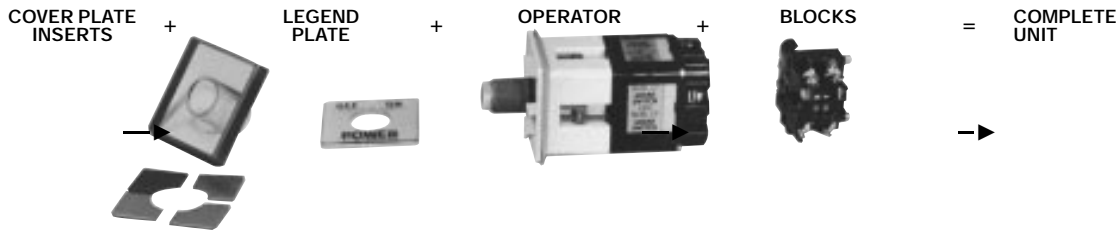
When reversed (arrows not aligned), the circuit obtained is equivalent to 3-4 of PTCC block. PTCCB with arrows aligned, provides same circuit as 1-2 of PTCC block. When reversed (arrows not aligned), the circuit obtained is equivalent to 5-6 of PTCC block.

³ PTCA is explained on page 5.

⁴ Use up to 4 contact blocks with maintained forms and up to 2 with spring return forms.

Multi-Light Oiltight Controls Selector-Push Units

CMC Series

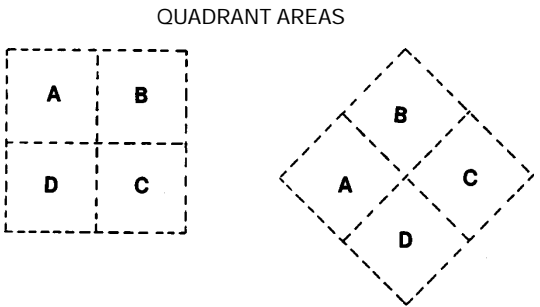
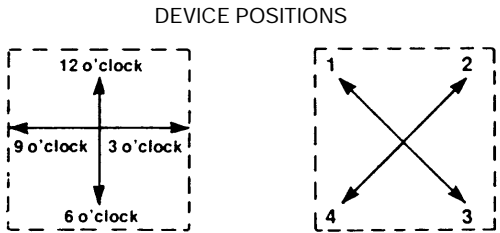


A	Operator Function
A	Maintained
B	Clockwise spring return from left (2 and 3 pos)
C	Counterclockwise spring return from right (2 and 3 pos)
D	Clockwise and counterclockwise spring return to center from left and right (3 pos)
F	Uni-rotational clockwise (4 pos. only, no stop)

01	Lamp Terminals and Service
67	Unlighted 4 Terminal
95	(2) 120 V transformers and (2) No. 755 lamps in quadrants A & B only.
96	(2) 120 V transformers and (2) No. 755 lamps in quadrants C & D only.
97	(2) line voltage jumpers in quadrants A & B. No lamps.
98	(2) line voltage jumpers in quadrants C & D. No lamps.
Line voltage jumper versions can use incandescent or LED lamps.	
LED Lamp Terminals and Service	
4 Terminal	
38	(2) 120 V transformers in quadrants A & B
97	(2) line voltage jumpers in quadrants A & B. No LED.
98	(2) line voltage jumpers in quadrants C & D. No LED.
Order LEDs, color inserts and covers from pages 14-15.	

1	TurnCam Orientation
Insert the cam orientation code from the shaded area of the chart on the facing page.	

BB	Push Cam Code
Insert the push cam code from the shaded area of the chart on the facing page.	
↓	
Order cover plates, color inserts, and legend plates separately from page 12.	



*This chart lists only a few of the unlimited number of the switch versions available. Contact your nearest MICRO SWITCH Branch Office or Authorized Distributor for those not shown.

Definition:
Spring return is the direction the knob is turned by the internal spring force when the operator releases the knob. For example, on a two position clockwise spring return device, the knob is turned from position 2 to position 1 by the operator. When the operator releases the knob, it spring returns to position 2 in a clockwise direction.

Multi-Light Oiltight Controls

CMC Series

Selector Units

CMC SELECTORS

- Suitable for use in NEMA 13 enclosures.
- Accepts 4 plunger adapter kit

Example:

910

Operator

- 910 — Grey knob
- 913 — Black knob



A

Selector Action

2 Positions		3 Positions		4 Positions	
A —Pos. 1, 2	E —Pos. 2, 3	B —Pos. 1, 2, 3	F —Pos. 2, 3, 4	C —Pos. 1, 2, 3, 4	D —Pos. 1, 2, 3, 4
H —Pos. 3, 4	L —Pos. 4, 1	J —Pos. 3, 4, 1	M —Pos. 4, 1, 2	G —Pos. 1, 2, 3, 4 no stop	D —Pos. 1, 2, 3, 4 stop between 1 and 4
U —Pos. 9, 12 o'clock	V —Pos. 12, 3 o'clock	P —Pos. 9, 12, 3 o'clock	R —Pos. 12, 3, 6 o'clock	G —Pos. 2, 3, 4, 1 stop between 2 and 1	K —Pos. 3, 4, 1, 2 stop between 3 and 2
W —Pos. 3, 6 o'clock	X —Pos. 6, 9 o'clock	S —Pos. 3, 6, 9 o'clock	T —Pos. 6, 9, 12 o'clock	N —Pos. 4, 1, 2, 3 stop between 3 and 4	Y —Pos. 9, 12, 3, 6 o'clock. No. stop.
					Z —Pos. 9, 12, 3, 6 o'clock. Stop between 6 and 9

E

Cam

Insert cam code from chart below.

1. Match your circuit requirements in one cam code column in the chart below. *
2. Develop the catalog listing of the unit, including the shaded letters of the cam code configuration selected in step 1 from the chart below.
3. Consider position number 1 as the furthest counter-clockwise device position. Order contact block(s) and adapter kit as indicated in the left hand column of the cam code selection chart.

"X" — Circuit Closure

"O" — Circuit Open

CAM CODE SELECTION CHART *

Turn Cam:	Cam:	2-Pos.		3-Position				4-Position			
		E	E ⁵	D	G	F	H	H	A	F	G
	Orientation:	1	2	1	3	1	4	1	2	2	1
	Device Positions:	1 2	1 2	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
	Terminals										
PTCC 	1-2 (NC) 3-4 (NO) 5-6 (NC) 7-8 (NO)	X O O X X O O X	O X X O O X X O	X O O O O X O O X X O O	X X O O O X X O O X O O	O X O X O O O X O X O O	O X O O X O O O X X O O	X O O O O X O O O O X O O O X O	O O X X O X O O X X O O O X O X	X O X O O O O X X O X O X O O O	O X X X X O O O X X O X O O X O
PTCB 	1-2 (NC) 3-4 (NO)	X O O X	O X X O	X O O X O O	X X O X O O	O X O O O X	O X O X O O	X O O O O O O X	O O X X O O O X	X O X O O X O O	O X X X O O X O
Rev. PTCB 	3-4 (NO) 1-2 (NC)	O X X O	X O O X	O O X O O X	O O X O X X	X O O O X O	O O X O O O	O X O O O O X O	O X O O X X O O	O O O X X O X O	X O O O X X O X
4-Plunger Adapter Kit PTCA ²		For circuits below — Use 4 plunger adapter kit and at least 1 block from above									
PTCC 	1-2 (NC) 3-4 (NO) 5-6 (NC) 7-8 (NO)			O X O O O O O O O O X O	X X X O O O X O X O X O	X O X O X O X O X O O O			X O O X O X O O O X X O X O O O	O X O X X O O O O X O X O O X O	X O X X X O O X X X X O O O O X
PTCB 	1-2 (NC) 3-4 (NO)			O X O O X O	X X X O X O	X O X O O O			X O O X X O O O	O X O X O O X O	X O X X O O O X
Rev. PTCB 	3-4 (NO) 1-2 (NC)				O O O X O X	O X O X O X			O O X O O X X O	X O O O O X O X	O X O O X X X O

Notes:

¹ Order contact blocks separately from page 4. Alternative contact blocks are shown also. When alternative contact blocks are used, their sequencing is the same as their portion of contact block PTCC.

² Adapter kit PTCA requires contact blocks *both* before and after the adapter spacer. Up to two blocks may be added *both* before and after the adapter. PTCA is explained on page 5.

³ Contact block PTCB may be mounted with its location arrow and that of the operator

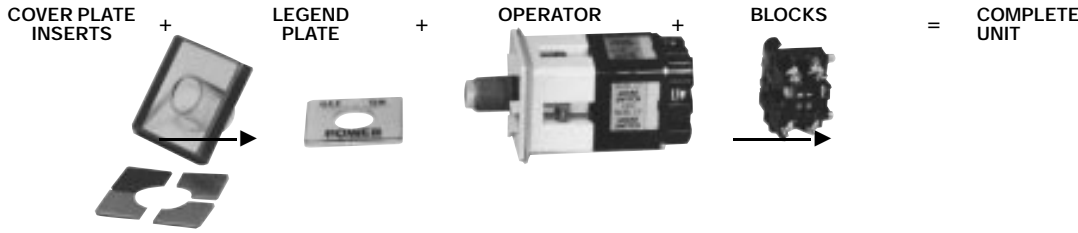
aligned or reversed; i.e., the block may be turned 180° so location arrows do not match.

⁴ Use up to 4 contact blocks with maintained forms and up to 2 with spring return forms.

⁵ For use with 2 position clockwise spring return selector only.

Multi-Light Oiltight Controls Selector Units

CMC Series

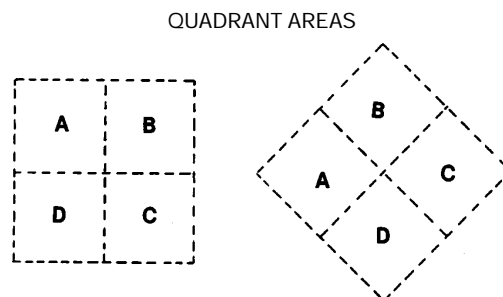
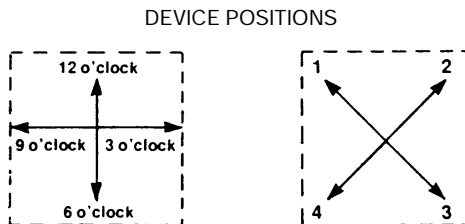
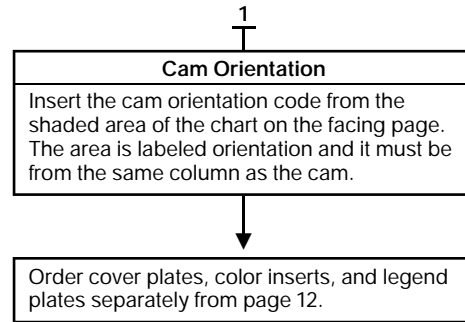


A

Operator ^{3,4} Function
A – Maintained
B – Clockwise spring return from left (2 and 3 pos)
C – Counterclockwise spring return from right (2 and 3 pos)
D – Clockwise and counterclockwise spring return to center from left and right (3 pos)
F – Uni-rotational clockwise (4 pos. only, no stop)

01

Lamp Terminals and Service	
67 – Unlighted	5 Term. 8 Term.
95 – (2) 120 V transformers and (2) No. 755 lamps in quadrants A & B only.	01 51 (4) 120 V trans. and (4) No. 755 lamps
96 – (2) 120 V transformers and (2) No. 755 lamps in quadrants C & D only.	02 52 (4) 240 V trans. and (4) No. 755 lamps
97 – (2) line voltage jumpers in quadrants A & B. No lamps.	05 50 (4) 24 V resistors. (4) No. 756 lamps
98 – (2) line voltage jumpers in quadrants C & D. No lamps.	40 90 (4) 48 V resistors. (4) No. 1819 lamps
Line voltage jumper versions can use incandescent or LED lamps.	
LED Lamp Terminals and Service	
38 – (2) 120 V transformers in quadrants A & B	15 55 (4) 120V transf.
97 – (2) line voltage jumpers in quadrants A & B. No LED.	16 56 (4) 240 V transf.
98 – (2) line voltage jumpers in quadrants C & D. No LED.	03 53 (4) line voltage jumpers. No LED.
Order LEDs, color inserts and covers from pages 14-15.	



* This chart lists only a few of the unlimited number of switch versions available. Contact your nearest MICRO SWITCH Branch Office or Authorized Distributor for those not shown.

Definition:
Spring return is the direction the knob is turned by the internal spring force when the operator releases the knob. For example, on a two position clockwise spring return device, the knob is turned from position 2 to position 1 by the operator. When the operator releases the knob, it spring returns to position 2 in a clockwise direction.

Multi-Light Oiltight Controls

Legend Plate Order Sheet

CMC Series

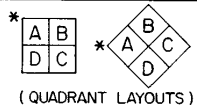
FO-62098-F

COORDINATED MANUAL CONTROL ORDER SHEET for CMC LEGEND PLATES

GUIDE to ARRANGEMENT of LEGENDS and CATALOG LISTINGS
Additional forms available from any MICRO SWITCH Branch Office. Specify FO-62098F

- INSTRUCTIONS:**
1. Extend lines to show QUADRANT(S) DIVISIONS.
 2. Print REQUIRED legends in the diagrams below. (*Diagrams are ACTUAL size.*)
 3. Fill in LETTER SIZE. (*9/64", 13/64", or 5/16"*)
 4. Check lettering (*BLACK or WHITE*) by *QUADRANT.
 5. Fill in CATALOG LISTING and QUANTITY.

CUSTOMER P.O. NO. _____



CUSTOMER _____

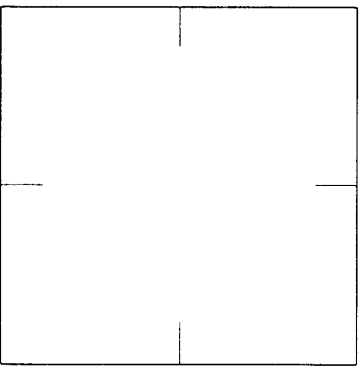
ADDRESS _____

CITY and STATE _____

SHADED AREAS for FREEPORT USE ONLY			
S.W.O. NO.	TR	C	SCHED. DATE
	C ₂	O ₄	
S.O. NO.	ACCOUNT NO.	COMP. DATE	
	126-031		

NOTE: Legends will be CENTERED within *QUADRANT(S) Specified.

INDICATOR DIAGRAMS
907 AUS

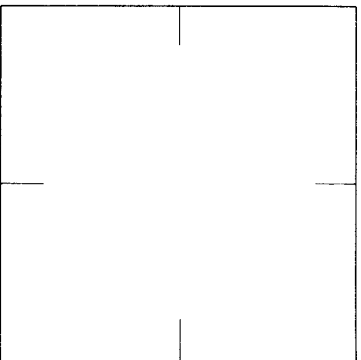
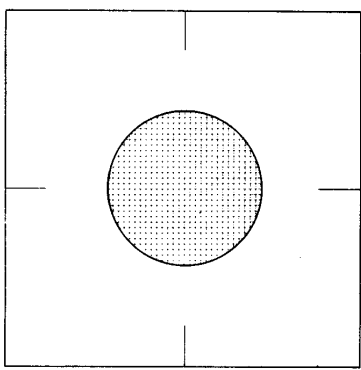


Use One Diagram in EACH Section

*QUADRANT	LETTER SIZE	BLACK	WHITE
A			
B			
C			
D			

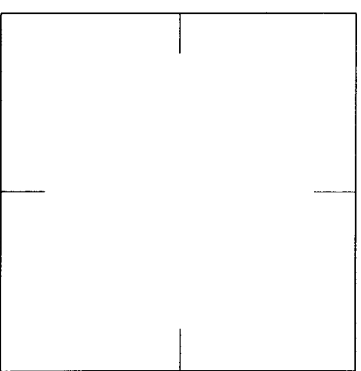
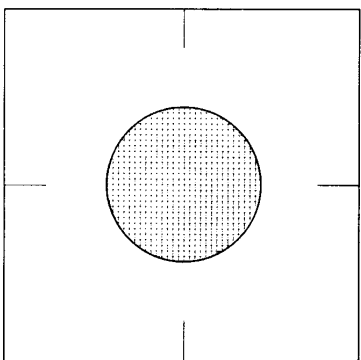
CATALOG LISTING		PRODUCT CODE	
ITEM NO.	LINE NO.	SCHED. NO.	QUANTITY
	6	7	9

OPERATOR DIAGRAMS
907 BUS



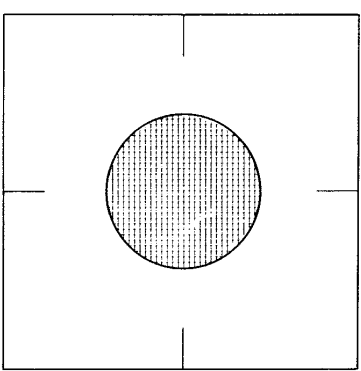
*QUADRANT	LETTER SIZE	BLACK	WHITE
A			
B			
C			
D			

CATALOG LISTING		PRODUCT CODE	
ITEM NO.	LINE NO.	SCHED. NO.	QUANTITY
	6	7	9



*QUADRANT	LETTER SIZE	BLACK	WHITE
A			
B			
C			
D			

CATALOG LISTING		PRODUCT CODE	
ITEM NO.	LINE NO.	SCHED. NO.	QUANTITY
	6	7	9



COMPLETED BY: _____

(Signature) (Date) Page _____ of _____

Multi-Light Oiltight Controls

CMC Series

Legend Plates

Three type sizes are offered in either black or white lettering for custom legends on blank legend plates. A guide to legend area character counting is shown in the chart below. Stay within the limits spelled out in the chart for number of lines and characters.

To order custom legend plates, Form 62098 is provided on page 22. See example of a completed form on page 17.

CATALOG LISTINGS

Indicator	Operator-Indicator
907 AUS	907 BUS

LEGEND STYLE AND SIZES

Sizes available in full capital alphabetic and numeric characters are:

9/64 13/64 5/16
 .141" .203" .313"
 3,57mm **A1** 5,16mm **A1** 7,94mm **A1**

Characters available are:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

. , ' # / () + - " % &

0 1 2 3 4 5 6 7 8 9

1/2 1/4 3/4 1/3 2/3

Additional characters available only in .141 (3,57) and .203 (5,16) sizes are:

* — ° → ∞ " ' 1/6 3/8 5/8 7/8

I II III IV V VI VII VIII IX X

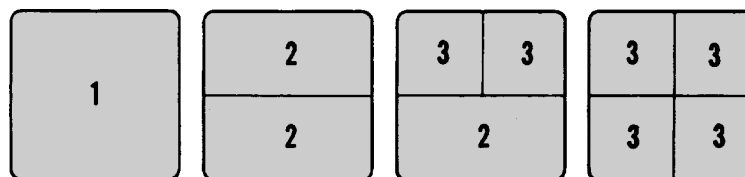
Na Cl H₂O O₂

CUSTOM LEGEND AREAS

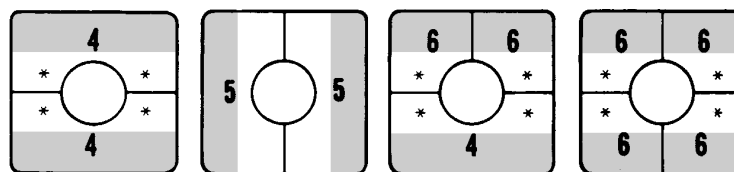
Form Number in Shaded Area	Letter Height	Max. No. of Characters Per Line (Include Spaces)	Max. No. of Lines of Each Shaded Area	Max. Total Characters Per Shaded Area
1	9/64	19	7	133
	13/64	13	6	78
	5/16	8	4	32
2	9/64	19	3	57
	13/64	13	3	39
	5/16	8	2	16
3	9/64	9	3	27
	13/64	6	3	18
	5/16	3	2	6
4	9/64	19	2*	38
	13/64	13	2*	26
	5/16	8	1	8
5	9/64	12	1	12
	13/64	8	1	8
	5/16	5	1	5
6	9/64	9	2*	18
	13/64	6	2*	12
	5/16	3	1	3
7	9/64	9	1	9
		7	2	14
	13/64	6	1	6
	Indicators Only	4	2	8
8	9/64	7	1	7
		5	2	10
13/64	4	1	4	

The shaded areas shown below indicate the selections available for division of the legend display area. After determining the form number, read the letter size, maximum number of characters and lines from the chart on the left.

INDICATORS 907 AUS



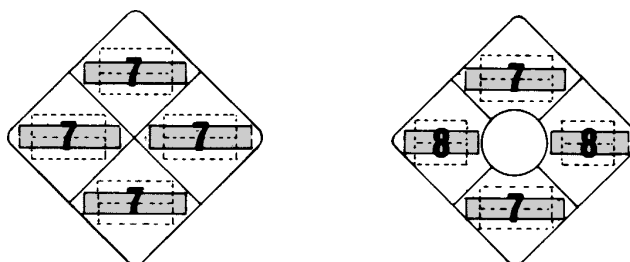
OPERATOR-INDICATORS 907 BUS



INDICATORS 907 AUS

OPERATOR-INDICATORS 907 BUS

DIAGONAL LEGEND PLATES



NOTE: 2 LINE LEGENDS ARE 2 LETTERS SHORTER PER LINE THAN SINGLE LINE LEGENDS

* Legend plate areas 4 and 6 will accept a third line. Maximum number of characters is 5 for 9/64" and 3 for 13/64" where marked.

Multi-Light Oiltight Controls

CMC Series

Legend Order Sheet

Completed Sample

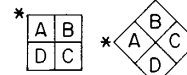
COORDINATED MANUAL CONTROL ORDER SHEET for CMC LEGEND PLATES

GUIDE to ARRANGEMENT of LEGENDS and CATALOG LISTINGS

Additional forms available from any MICRO SWITCH Branch Office. Specify FO-62098F

- INSTRUCTIONS:**
1. Extend lines to show QUADRANT(S) DIVISIONS.
 2. Print REQUIRED legends in the diagrams below. (*Diagrams are ACTUAL size.*)
 3. Fill in LETTER SIZE. (*9/64", 13/64", or 5/16"*)
 4. Check lettering (*BLACK or WHITE*) by *QUADRANT.
 5. Fill in CATALOG LISTING and QUANTITY.

CUSTOMER P.O. NO.



(QUADRANT LAYOUTS)

CUSTOMER **ABC Co.**
 ADDRESS **100 N. 1st St.**
 CITY and STATE **Nowhere, NV 89502**

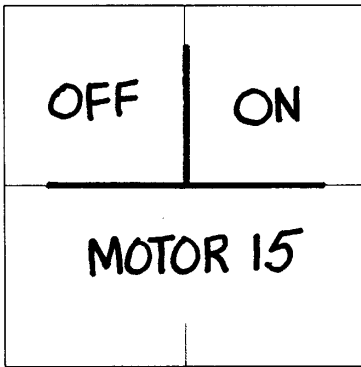
SHADED AREAS for FREEPORT USE ONLY			
S.W.O. NO.	TR	C	SCHED. DATE
	1	C ₂	O ₄
S.O. NO.	ACCOUNT NO.	COMP. DATE	
5	126-031	8	

NOTE: Legends will be CENTERED within *QUADRANT(S) Specified.

INDICATOR DIAGRAMS
907 AUS

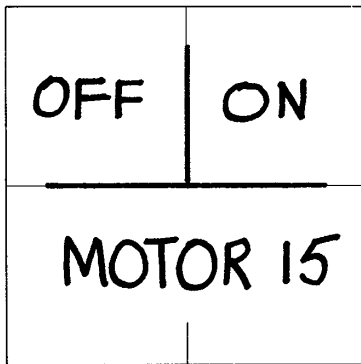
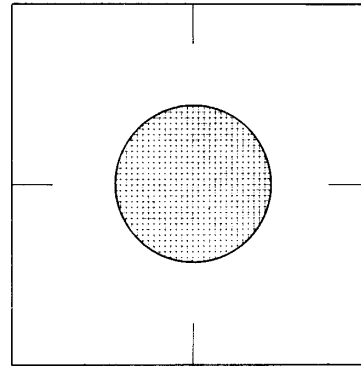
Use One Diagram in EACH Section

OPERATOR DIAGRAMS
907 BUS



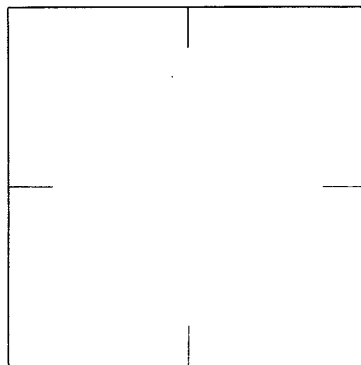
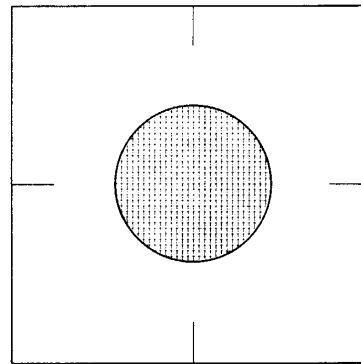
*QUADRANT	LETTER SIZE	BLACK	WHITE
A	13/64		✓
B	13/64		✓
C	13/64	✓	
D	13/64	✓	

CATALOG LISTING		PRODUCT CODE	
907AUS		3	
ITEM NO.	LINE NO.	SCHED. NO.	QUANTITY
	6	7	2



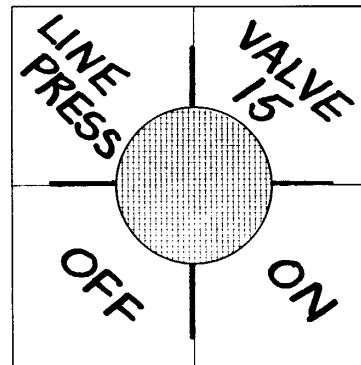
*QUADRANT	LETTER SIZE	BLACK	WHITE
A	5/16		✓
B	5/16		✓
C	5/16	✓	
D	5/16	✓	

CATALOG LISTING		PRODUCT CODE	
907AUS		3	
ITEM NO.	LINE NO.	SCHED. NO.	QUANTITY
	6	7	2



*QUADRANT	LETTER SIZE	BLACK	WHITE
A	9/64		✓
B	9/64		✓
C	9/64		✓
D	9/64		✓

CATALOG LISTING		PRODUCT CODE	
		3	
ITEM NO.	LINE NO.	SCHED. NO.	QUANTITY
	6	7	10



COMPLETED BY:

(Signature)

(Date)

Page ___ of ___

Multi-Light Oiltight Controls Specification Sheet

CMC Series

Custom circuit control for selector and selector-push units

For assistance in determining your circuit requirements for selector and selector-push units, fill out a CMC Specification Sheet (shown here) and submit it to the MICRO SWITCH Application Center, or Fax to (815) 235-6545. Your circuit requirements will be analyzed, and the form will be returned to you filled out.

The completed form will include a catalog listing of the unit that will provide the control you require along with contact block catalog listings. The completed form will also include contact block terminal connections for wiring the circuits you specified. Additional forms (FO-62783-B) are available on request.

Follow these steps to fill out a Specification Sheet: (Refer to the example on this page.)

1. Mark an "X" where a circuit is to be closed under "Device Position." The form may be used for any 2, 3, or 4 position unit. Cross out the unused position columns.

1.1 For selector-push units, mark an "X" where circuit is closed in either (or both) the FREE and DEPRESS condition in each Device Position.

1.2 For selectors, there is no DEPRESS knob function, and the DEPRESS lines should be crossed out.

2. Note under "Circuit" if any circuits are to be controlled with electronic duty contact blocks. Heavy duty contact blocks will be specified unless otherwise noted.

3. Indicate choice of construction details; i.e., 120 or 240 volt transformers, low voltage jumpers, 24 or 48 volt resistors. Check whether 4, 5, or 8 terminal construction is desired, maintained or spring return action, and other control specifications, if applicable.

NOTE: For 125VDC applications, use line voltage jumpers with customer supplied externally mounted dropping resistors. Lamp supply voltage must not exceed 28 volts.

CUSTOMER: ABC Company 100 N. 1st Street Anywhere, USA 89502				TYPE OF CONTROL <input type="checkbox"/> Indicator <input type="checkbox"/> Pushbutton <input type="checkbox"/> Selector <input checked="" type="checkbox"/> Selector-push <input checked="" type="checkbox"/> KNOB <input checked="" type="checkbox"/> Gray <input type="checkbox"/> Black <input type="checkbox"/> Unlighted Unit				LAMP SUPPLY VOLTAGE 120 VAC Trans. <input type="checkbox"/> #755 <input checked="" type="checkbox"/> L.E.D. 240 VAC Trans. <input type="checkbox"/> #755 <input type="checkbox"/> L.E.D. 24 VAC/DC <input type="checkbox"/> #156/Res. <input type="checkbox"/> L.E.D. <input type="checkbox"/> 48 VAC/DC w/resistor & #1319 <input type="checkbox"/> Line voltage jumpers; No lamps or LED's Lamp Terminals <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 8																																																																																																																									
PROJECT:				UNIT OR TAG NO: HS-234-A																																																																																																																													
REMARKS: 1. Fill in type of control, lamp information, position requirements, contact block type, packing instructions and legend plate information. 2. Mark an "X" where a circuit is to be closed under "DEVICE POSITION". Cross out the unused position columns. (Applies to all CMC units except Indicators). 3. For Selector-Push units, mark with an "X" where circuit is closed in either (or both) the FREE and DEPRESS condition in each Device Position. 4. For Selectors there is no DEPRESS function. Cross out the DEPRESS lines. 5. For Pushbuttons, there is just one Device Position. Cross out positions 2, 3, and 4.				2 or 3 Position Units <input type="checkbox"/> Maintained <input type="checkbox"/> Spring return (check one) <input type="checkbox"/> From left (cw) <input type="checkbox"/> From right (ccw) <input checked="" type="checkbox"/> From left and right																																																																																																																													
CONTACT BLOCK TYPE <input checked="" type="checkbox"/> Heavy duty (check one) <input type="checkbox"/> Gold <input checked="" type="checkbox"/> Silver <input type="checkbox"/> Electronic duty (check one) <input type="checkbox"/> Gold <input type="checkbox"/> Silver				PACKING INSTRUCTIONS <input type="checkbox"/> 1. Individual components <input type="checkbox"/> 2. Box and tag only * <input checked="" type="checkbox"/> 3. Assemble, test, box and tag *																																																																																																																													
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">CIRCUIT</th> <th colspan="4">DEVICE POSITION</th> <th rowspan="2">TERMINALS</th> <th rowspan="2">BLOCK</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td>Free</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="2">2</td> <td>Free</td> <td></td> <td>X</td> <td>X</td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td></td> <td></td> <td>X</td> <td></td> <td></td> </tr> <tr> <td rowspan="2">3</td> <td>Free</td> <td></td> <td></td> <td>X</td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td></td> <td></td> <td>X</td> <td></td> <td></td> </tr> <tr> <td rowspan="2">4</td> <td>Free</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		CIRCUIT	DEVICE POSITION				TERMINALS	BLOCK	1	2	3	4	1	Free	X					Depress	X					2	Free		X	X			Depress			X			3	Free			X			Depress			X			4	Free	X	X				Depress	X					<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">CIRCUIT</th> <th colspan="4">DEVICE POSITION</th> <th rowspan="2">TERMINALS</th> <th rowspan="2">BLOCK</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td rowspan="2">5</td> <td>Free</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="2">6</td> <td>Free</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="2">7</td> <td>Free</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="2">8</td> <td>Free</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depress</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		CIRCUIT	DEVICE POSITION				TERMINALS	BLOCK	1	2	3	4	5	Free						Depress						6	Free						Depress						7	Free						Depress						8	Free						Depress					
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LEGEND PLATE (SHOW LEGEND DESIRED) 				<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>**Quadrant</th> <th>Size</th> <th>Black</th> <th>White</th> <th>Insert Color</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1/2"</td> <td>X</td> <td></td> <td>Y</td> </tr> <tr> <td>B</td> <td></td> <td></td> <td>X</td> <td>R</td> </tr> <tr> <td>C</td> <td></td> <td>X</td> <td></td> <td>Y</td> </tr> <tr> <td>D</td> <td></td> <td>X</td> <td></td> <td>W</td> </tr> </tbody> </table>				**Quadrant	Size	Black	White	Insert Color	A	1/2"	X		Y	B			X	R	C		X		Y	D		X		W																																																																																																	
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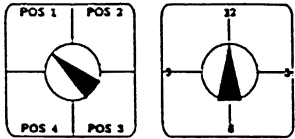
COMPLETED BY: R. M. Olson (SIGNATURE) Page 1 of 1 (DATE)

Multi-Light Oiltight Controls

Specification Sheet

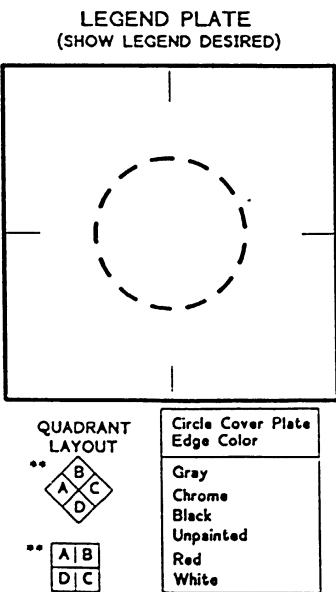
CMC Series

CUSTOMER: PROJECT: UNIT OR TAG NO:	TYPE OF CONTROL <input type="checkbox"/> Indicator <input type="checkbox"/> Pushbutton <input type="checkbox"/> Selector <input type="checkbox"/> Selector-push KNOB <input type="checkbox"/> Gray <input type="checkbox"/> Black <input type="checkbox"/> Unlighted Unit	LAMP SUPPLY VOLTAGE 120 VAC Trans. <input type="checkbox"/> #755 <input type="checkbox"/> L.E.D. 240 VAC Trans. <input type="checkbox"/> #755 <input type="checkbox"/> L.E.D. 24 VAC/DC <input type="checkbox"/> #756/Res. <input type="checkbox"/> L.E.D. <input type="checkbox"/> 48 VAC/DC w/resistor & #1819 <input type="checkbox"/> Line voltage jumpers; No lamps or LED's Lamp Terminals <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 8
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REMARKS: 1. Fill in type of control, lamp information, position requirements, contact block type, packing instructions and legend plate information. 2. Mark an "X" where a circuit is to be closed under "DEVICE POSITION". Cross out the unused position columns. (Applies to all CMC units except Indicators). 3. For Selector-Push units, mark with an "X" where circuit is closed in either (or both) the FREE and DEPRESS condition in each Device Position. 4. For Selectors there is no DEPRESS function. Cross out the DEPRESS lines. 5. For Pushbuttons, there is just one Device Position. Cross out positions 2, 3, and 4.	4 Position Units <input type="checkbox"/> Without Stops <input type="checkbox"/> With Stop between Pos. ____ and Pos. ____ 2 or 3 Position Units <input type="checkbox"/> Maintained <input type="checkbox"/> Spring return (check one) <input type="checkbox"/> From left (cw) <input type="checkbox"/> From right (ccw) <input type="checkbox"/> From left and right Cross out unused device positions  <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">CONTACT BLOCK TYPE</td> <td style="width:50%;">PACKING INSTRUCTIONS</td> </tr> <tr> <td> <input type="checkbox"/> Heavy duty (check one) <input type="checkbox"/> Gold <input type="checkbox"/> Silver <input type="checkbox"/> Electronic duty (check one) <input type="checkbox"/> Gold <input type="checkbox"/> Silver </td> <td> <input type="checkbox"/> 1. Individual components <input type="checkbox"/> 2. Box and tag only * <input type="checkbox"/> 3. Assemble, test, box and tag * </td> </tr> </table>	CONTACT BLOCK TYPE	PACKING INSTRUCTIONS	<input type="checkbox"/> Heavy duty (check one) <input type="checkbox"/> Gold <input type="checkbox"/> Silver <input type="checkbox"/> Electronic duty (check one) <input type="checkbox"/> Gold <input type="checkbox"/> Silver	<input type="checkbox"/> 1. Individual components <input type="checkbox"/> 2. Box and tag only * <input type="checkbox"/> 3. Assemble, test, box and tag *
CONTACT BLOCK TYPE	PACKING INSTRUCTIONS				
<input type="checkbox"/> Heavy duty (check one) <input type="checkbox"/> Gold <input type="checkbox"/> Silver <input type="checkbox"/> Electronic duty (check one) <input type="checkbox"/> Gold <input type="checkbox"/> Silver	<input type="checkbox"/> 1. Individual components <input type="checkbox"/> 2. Box and tag only * <input type="checkbox"/> 3. Assemble, test, box and tag *				

CIRCUIT	DEVICE POSITION				TERMINALS	BLOCK	CIRCUIT	DEVICE POSITION				TERMINALS	BLOCK
	1	2	3	4				1	2	3	4		
1	Free						5	Free					
	Depress							Depress					
2	Free						6	Free					
	Depress							Depress					
3	Free						7	Free					
	Depress							Depress					
4	Free						8	Free					
	Depress							Depress					

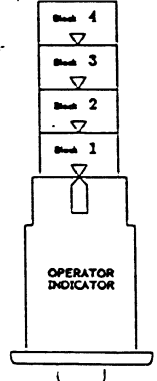
NOTE: P = Parallel Wiring S = Series Wiring



LEGEND NOTE:
Extend lines to show Quadrant(s) Divisions. Legends will be centered within **Quadrant(s) specified

CMC Legend				Insert Color
**Quadrant	Size	Black	White	
A				
B				
C				
D				

COLOR CODE: A - Amber
 B - Blue
 G - Green
 K - Black
 R - Red
 W - White
 Y - Yellow



CATALOG LISTING	PRICE
Operator and/or indicator	
Block 1	
Block 2	
Block 3	
Block 4	
Adapter Kit	
Cover Plate and Inserts	
Legend	
Packaging & Tagging	
TOTAL PRICE *	
CATALOG LISTING *	

S.W.O. NO.	TR	C	SCHED DATE	LINE NO.	PRODUCT CODE
	1	C ₂	O ₄		
S.O. NO.	ACCOUNT NO.	COMP. DATE	ITEM NO.	SCED. NO.	QUANTITY
	126-288				

COMPLETED BY: _____ (SIGNATURE) _____ (DATE) Page ___ of ___

Multi-Light Oiltight Controls

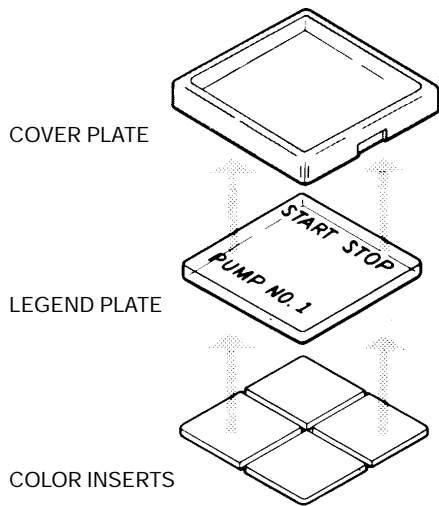
Cover Plates, Color Inserts, and Legend Plates

CMC Series

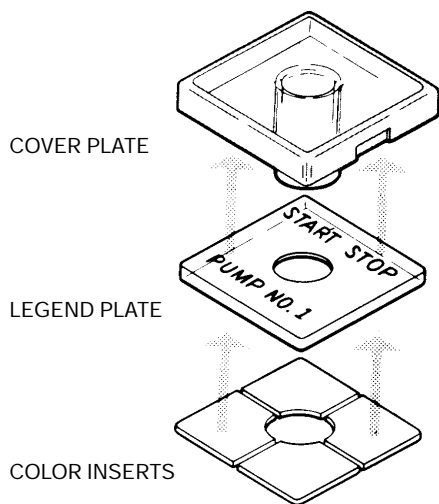
FAST ASSEMBLY LEGEND DISPLAY

The four selected color inserts snap into the legend plate. This sub-assembly then snaps into the cover plate to complete the front-of-panel assembly.

FOR INDICATORS



FOR OPERATOR INDICATORS



COVER PLATES AND COLOR INSERTS

Cover plates and color inserts are offered together in one package under a single catalog listing. The four color inserts can be positioned in any of the four quarters of the total display area.

Any color combination you desire is included in this chart. The chart is arranged in the following order: 4 same colors, 3 + 1 colors, 2 + 2 colors, 2 + 1 + 1 colors, and 1 + 1 + 1 + 1 colors.

The cover plates listed in the tables have a gray painted edge. Plates with edges other than gray may be ordered by substituting any of the following four digits in place of the first four digits in the tables. Example: 906A — gray edge or 906E — black edge. Listings are completed from the next page.

Edge Color	Indicator	Operator-Indicator
Gray	906A__	906B__
Chrome	906C__	906D__
Black	906E__	906F__
Unpainted	906G__	906H__
Red	906J__	906K__
White	906N__	906P__

CMC LEGEND PLATES

Legend plates are transparent plastic parts on which word messages are displayed.

BLANK PLATES

Blank legend plates are available for customers preferring to do their own hot stamping, etching, engraving, or silk screening of legend plates. Drafting mylar or film positives can also be positioned on the legend plate for custom panel appearance.

LEGENDED

Legend plates are offered with lettering positioned horizontally, vertically, or diagonally — in combinations of black and white lettering — in combinations of three different type sizes — and the message the customer specifies. (See character count chart, page 16.) These plates are ordered on Custom Legend Form on page 22.

See completed sample page 17.

LEGEND CONTRAST

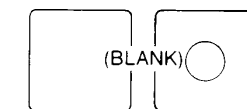
For maximum visibility in both the lighted and unlighted condition, the chart below is recommended as a guide.

Color Snap in Inserts	Legend Lettering	
	White	Black
Amber	X	X
Blue	X	
Green	X	
Red	X	
White		X
Yellow		X

BLANK LEGEND PLATES

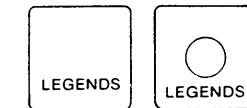
INDICATOR OPERATOR

907AYY100 907BYY100



LEGENDED PLATES

907AUS 907BUS



Multi-Light Oiltight Controls

Gray Cover Plate and Color Insert Color Guide / Incandescent Lamps

CMC Series

COLOR CODE: A—Amber B—Blue G—Green R—Red W—White Y—Yellow K—Black

Cover Plate & Color Inserts For Indicator Units Only	Color Code	Cover Plate & Color Inserts For Operator Indicator Units	Cover Plate & Color Inserts For Indicator Units Only	Color Code	Cover Plate & Color Inserts For Operator Indicator Units
906 AAF 906 AAD 906 AAC 906 AAA 906 AAE	AAAA BBBB GGGG RRRR WWWW	906 BAF 906 BAD 906 BAC 906 BAA 906 BAE	906 AGT 906 AGN 906 ADU 906 AGO 906 AHG	BBWY GGAB GGAR GGAW GGAY	906 BGT 906 BGN 906 BDU 906 BGO 906 BHG
906 AAB 906 AEH 906 AEK 906 AEJ 906 AED	YYYY AAAB AAAG AAAR AAAW	906 BAB 906 BEH 906 BEK 906 BEJ 906 BED	906 AGK 906 ADV 906 AGL 906 ADT 906 ADN	GGBR GGBW GGBY GGRW GGRY	906 BGK 906 BDV 906 BGL 906 BDT 906 BDN
906 AFG 906 AFD 906 AFC 906 AFA 906 AEE	AAAY BBBA BBBG BBBR BBBW	906 BFG 906 BFD 906 BFC 906 BFA 906 BEE	906 AGM 906 BFD 906 AGC 906 AGF 906 AHH	GGWY RRAB RRAG RRAW RRAY	906 BGM 906 BGE 906 BGC 906 BGF 906 BHH
906 AFB 906 AEZ 906 AEX 906 AEG 906 AEY	BBBY GGGA GGGB GGGR GGGW	906 BFB 906 BEZ 906 BEX 906 BEG 906 BEY	906 ADL 906 AGD 906 ADZ 906 AGB 906 ADO	RRBG RRBW RRBY RRGW RRGY	906 BDL 906 BGD 906 BDZ 906 BGB 906 BDO
906 AEW 906 AER 906 AEP 906 AEO 906 AEC	GGGY RRRA RRRB RRRG RRRW	906 BEW 906 BER 906 BEP 906 BEO 906 BEC	906 AGA 906 ADR 906 ADH 906 ADF 906 AHE	RRWY WWAB WWAG WWAR WWAY	906 BGA 906 BDY 906 BDH 906 BDF 906 BHE
906 AEN 906 AEM 906 AEF 906 AEA 906 AEL	RRRY WWWA WWWB WWWG WWWR	906 BEN 906 BEM 906 BEF 906 BEA 906 BEL	906 ADK 906 ADM 906 ADE 906 ADB 906 ADD	WWBG WWBR WWBY WWGR WWGY	906 BDK 906 BDM 906 BDE 906 BDB 906 BDD
906 AEB 906 AFE 906 AEU 906 AET 906 AES	WWWY YYYA YYYP YYYG YYYP	906 BEB 906 BFE 906 BEU 906 BET 906 BES	906 ADA 906 AHC 906 AHB 906 AHA 906 AHD	WWRY YYAB YYAG YYAR YYAW	906 BDA 906 BHC 906 BHB 906 BHA 906 BHD
906 AEV 906 ABN 906 ABM 906 ABL 906 ABP	YYYW AABB AAGG AARR AAWW	906 BEV 906 BBN 906 BBM 906 BBL 906 BBP	906 ADP 906 ADJ 906 AGJ 906 ADC 906 AGH	YYBG YYBR YYBW YYGR YYGW	906 BDP 906 BDJ 906 BGJ 906 BDC 906 BGH
906 AJF 906 ABQ 906 ABH 906 ABC 906 ABK	AAKK AAYY BBGG BBRR BBWW	906 BJF 906 BBQ 906 BBH 906 BBC 906 BBK	906 AGG 906 AKF 906 AKG 906 AKH 906 AKJ	YYRW KKYG KKYB KKYW KKYA	906 BGG 906 BKF 906 BKG 906 BKH 906 BKJ
906 AJD 906 ABF 906 ABB 906 ABJ 906 AJC	BBKK BBYY GGRR GGWW GGKK	906 BJD 906 BBF 906 BBB 906 BBJ 906 BJC	906 AKK 906 AKL 906 AKM 906 AKN 906 AKP	KKGB KKGW KKGA KKBW KKBA	906 BKK 906 BKL 906 BKM 906 BKN 906 BKP
906 ABE 906 ABD 906 AJA 906 ABA 906 AJE	GGYY RRWW RRKK RRYY WWKK	906 BBE 906 BBD 906 BJA 906 BBA 906 BJE	906 AKR 906 AKA 906 AKB 906 AKC 906 AKD	KKWA KKRY KKRG KKRB KKRW	906 BKR 906 BKA 906 BKB 906 BKC 906 BKD
906 ABG 906 AJB 906 AGZ 906 AGX 906 AGY	WWYY YYKK AABG AABR AABW	906 BBG 906 BJB 906 BGZ 906 BGX 906 BGY	906 AKE 906 ACF 906 ACJ 906 ACN 906 ACH	KKRA ABGR ABGW ABGY ABRW	906 BKE 906 BCF 906 BCJ 906 BCN 906 BCH
906 AHL 906 ADG 906 ADW 906 AHK 906 ADX	AABY AAGR AAGW AAGY AARW	906 BHL 906 BDG 906 BDW 906 BHK 906 BDX	906 ACL 906 ACP 906 ACG 906 ACK 906 ACO	ABRY ABWY AGRW AGRY AGWY	906 BCL 906 BCP 906 BCG 906 BCK 906 BCO
906 AHJ 906 AHM 906 AGV 906 AGS 906 AGW	AARY AAWY BBAG BBAR BBAW	906 BHJ 906 BHM 906 BGV 906 BGS 906 BGW	906 ACM 906 ACD 906 ACA 906 ACE 906 ACC 906 ACB	ARWY BGRW BGRY BGWY BRWY GRWY	906 BCM 906 BCD 906 BCA 906 BCE 906 BCC 906 BCB
906 AHF 906 AGR 906 AGU 906 ADS 906 ADR 906 AGP	BBAY BBGR BBGW BBGY BBRW BBRY	906 BHF 906 BGR 906 BGU 906 BDS 906 BDR 906 BGP	Additional variations with black inserts are available.		

Multi-Light Oiltight Controls

LED Cover Plates and Color Inserts

CMC Series

Cover plates, LEDs, and color inserts are offered together in one package under a single catalog listing. The four color inserts can be positioned in any of the four quarters of the total display area.

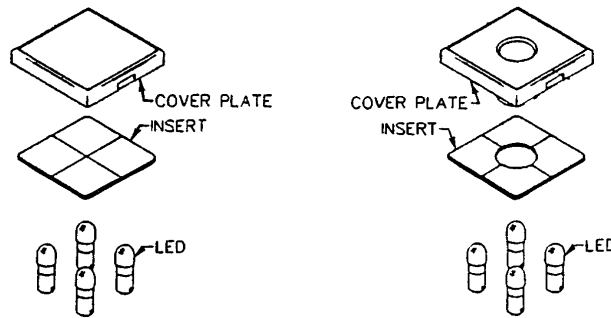
The cover plates listed in the tables have a gray painted edge. Plates with edges other than gray may be ordered by substituting any of the adjacent four digits in place of the first four digits in the tables. Example: 905A — gray edge or 905E — black edge.

Edge Color	Indicator	Operator-Indicator
Gray	905A ----	905B ----
Chrome	905C ----	905D ----
Black	905E ----	905F ----
Unpainted	905G ----	905H ----
Red	905J ----	905K ----
White	905N ----	905P ----

6 VAC/VDC LEDs, GRAY COVER PLATE AND COLOR INSERT ORDER GUIDE

COLOR CODE: G—Green R—Red W—White Y—Yellow K—Black

Cover Plate & Color Inserts For Indicator Units Only	Color Code	Cover Plate & Color Inserts For Operator Indicator Units	Cover Plate & Color Inserts For Indicator Units Only	Color Code	Cover Plate & Color Inserts For Operator Indicator Units
905 AAA1	RRRR	905 BAA1	905 AJA1	RRKK	905 BJA1
905 AAB1	YYYY	905 BAB1	905 AJB1	YYKK	905 BJB1
905 AAC1	GGGG	905 BAC1	905 AJC1	GGKK	905 BJC1
905 ABA1	RRYY	905 BBA1	905 AKA1	RYKK	905 BKA1
905 ABB1	RRGG	905 BBB1	905 AKB1	RGKK	905 BKB1
905 ABD1	RRWW	905 BBO1	905 AKD1	RKKW	905 BKD1
905 ABE1	YYGG	905 BBE1	905 AKE1	YGKK	905 BKE1
905 ABG1	YYWW	905 BBG1	905 AKH1	RKKW	905 BKH1
905 ABJ1	GGWW	905 BBJ1	905 AKL1	GKKW	905 BKL1
905 ACB1	RGYW	905 BCB1	905 ALH1	RGWK	905 BLH1
905 ADA1	RYWW	905 BDA1	905 ALN1	RGYK	905 BLN1
905 ADB1	RGWW	905 BDB1	905 ALQ1	YKWW	905 BLQ1
905 ADC1	RYYG	905 BDC1			
905 ADD1	YGWW	905 BDD1			
905 ADN1	RYGG	905 BDN1			
905 ADO1	RRYG	905 BDO1			
905 ADT1	RGGW	905 BDT1			
905 AEA1	GWWW	905 BEA1			
905 AEB1	YWWW	905 BEB1			
905 AEC1	RRRR	905 BEC1			
905 AEG1	RGGG	905 BEG1			
905 AEL1	RWWW	905 BEL1			
905 AEN1	YRRR	905 BEN1			
905 AEO1	GRRR	905 BEO1			
905 AES1	RYYY	905 BES1			
905 AET1	GYYY	905 BET1			
905 AEV1	YYYY	905 BEV1			
905 AEW1	YGGG	905 BEW1			
905 AEY1	GGGW	905 BEY1			
905 AFK1	GGGK	905 BFK1			
905 AFL1	RKKK	905 BFL1			
905 AGA1	RRYW	905 BGA1			
905 AGB1	RRGW	905 BGB1			
905 AGG1	RYYW	905 BGG1			
905 AGH1	GYYW	905 BGH1			
905 AGM1	YGGW	905 BGM1			
905 AHN1	YYGK	905 BHN1			
905 AHO1	YGGK	905 BHO1			
905 AHP1	GGWK	905 BHP1			
905 AHQ1	RWWK	905 BHQ1			
905 AHS1	GWWK	905 BHS1			
905 AHT1	RGGK	905 BHT1			
905 AHY1	YYWK	905 BHY1			



Above listings include gray cover plate, 4 color inserts and one to four 6 VAC/DC LEDs for all lighted quadrants. (R,G,Y). Black (K) and White (W) color inserts are normally not lighted so LEDs are not included.

Multi-Light Oiltight Controls

LED Cover Plates and Color Inserts

CMC Series

Cover plates, LEDs, and color inserts are offered together in one package under a single catalog listing. The four color inserts can be positioned in any of the four quarters of the total display area.

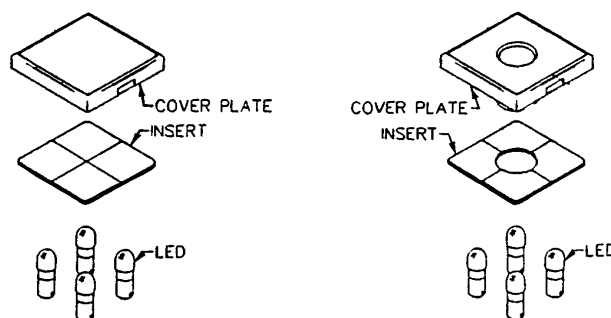
The cover plates listed in the tables have a gray painted edge. Plates with edges other than gray may be ordered by substituting any of the adjacent four digits in place of the first four digits in the tables. Example: 905A — gray edge or 905E — black edge.

Edge Color	Indicator	Operator-Indicator
Gray	905A ---	905B ---
Chrome	905C ---	905D ---
Black	905E ---	905F ---
Unpainted	905G ---	905H ---
Red	905J ---	905K ---
White	905N ---	905P ---

24 VAC/VDC LEDs, GRAY COVER PLATE AND COLOR INSERT ORDER GUIDE

COLOR CODE: G—Green R—Red W—White Y—Yellow K—Black

Cover Plate & Color Inserts For Indicator Units Only	Color Code	Cover Plate & Color Inserts For Operator Indicator Units	Cover Plate & Color Inserts For Indicator Units Only	Color Code	Cover Plate & Color Inserts For Operator Indicator Units
905 AAA2	RRRR	905 BAA2	905 AJA2	RRKK	905 BJA2
905 AAB2	YYYY	905 BAB2	905 AJB2	YYKK	905 BJB2
905 AAC2	GGGG	905 BAC2	905 AJC2	GGKK	905 BJC2
905 ABA2	RRYY	905 BBA2	905 AKA2	RYKK	905 BKA2
905 ABB2	RRGG	905 BBB2	905 AKB2	RGKK	905 BKB2
905 ABD2	RRWW	905 BBD2	905 AKD2	RKKW	905 BKD2
905 ABE2	YYGG	905 BBE2	905 AKE2	YGKK	905 BKE2
905 ABG2	YYWW	905 BBG2	905 AKH2	RKKW	905 BKH2
905 ABJ2	GGWW	905 BBJ2	905 AKL2	GKKW	905 BKL2
905 ACB2	RGYW	905 BCB2	905 ALH2	RGWK	905 BLH2
905 ADA2	RYWW	905 BDA2	905 ALN2	RGYK	905 BLN2
905 ADB2	RGWW	905 BDB2	905 ALQ2	YKWW	905 BLQ2
905 ADC2	RYYG	905 BDC2			
905 ADD2	YGWW	905 BDD2			
905 ADN2	RYGG	905 BDN2			
905 ADO2	RRYG	905 BDO2			
905 ADT2	RGGW	905 BDT2			
905 AEA2	GWWW	905 BEA2			
905 AEB2	YWWW	905 BEB2			
905 AEC2	RRRW	905 BEC2			
905 AEG2	RGGG	905 BEG2			
905 AEL2	RWWW	905 BEL2			
905 AEN2	YRRR	905 BEN2			
905 AEO2	GRRR	905 BEO2			
905 AES2	RYYY	905 BES2			
905 AET2	GYYY	905 BET2			
905 AEV2	YYYY	905 BEV2			
905 AEW2	YGGG	905 BEW2			
905 AEY2	GGGW	905 BEY2			
905 AFK2	GGGK	905 BFK2			
905 AFL2	RKKK	905 BFL2			
905 AGA2	RRYW	905 BGA2			
905 AGB2	RRGW	905 BGB2			
905 AGG2	RYYW	905 BGG2			
905 AGH2	GYYW	905 BGH2			
905 AGM2	YGGW	905 BGM2			
905 AHN2	YYGK	905 BHN2			
905 AHO2	YGGK	905 BHO2			
905 AHP2	GGWK	905 BHP2			
905 AHQ2	RWWK	905 BHQ2			
905 AHS2	GWWK	905 BHS2			
905 AHT2	RGGK	905 BHT2			
905 AHY2	YYWK	905 BHY2			

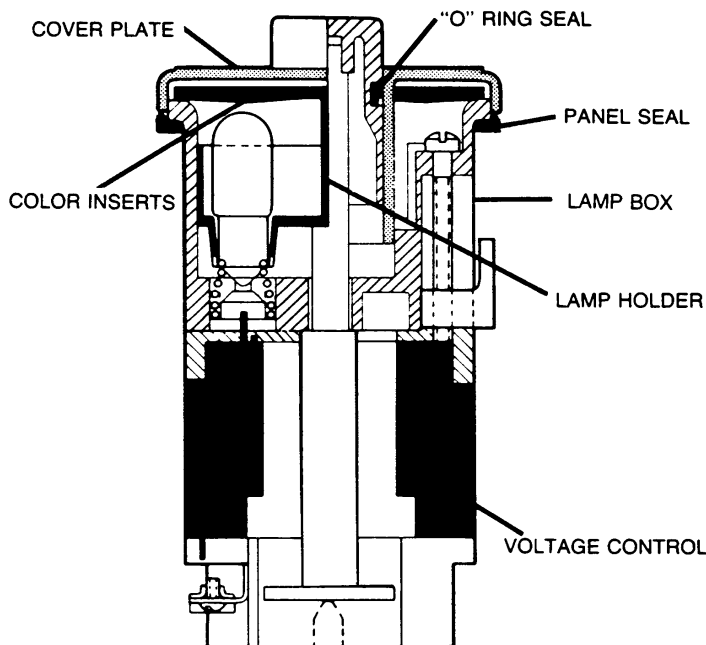


Above listings include gray cover plate, 4 color inserts and one to four 24 VAC/DC LEDs for all lighted quadrants. (R,G,Y). Black (K) and White (W) color inserts are normally not lighted so LEDs are not included.

Multi-Light Oiltight Controls Replacement Parts

CMC Series

Cover Plates		
Indicators	Color	Operator-Indicators
986 AAB 01	Gray	986 AAB 02
986 AAB 03	Black	986 AAB 04
986 AAB 05	Unpainted	986 AAB 06
986 AAB 09	Red	986 AAB 10
986 AAB 13	White	986 AAB 14
986 AAB 07	Chrome	986 AAB 08
Bulk Packed Cover Plates for Indicators Cover plates for 20 CMC indicators are offered.		Bulk Packed Cover Plates for Operator-Indicators Plates for 40 CMC operator-indicators are offered.
Specify in multiples of 20		Specify in multiples of 40
986 AAB 01-BP		986 AAB 02-BP
986 AAB 03-BP		986 AAB 04-BP
986 AAB 05-BP		986 AAB 06-BP
986 AAB 09-BP		986 AAB 10-BP
986 AAB 13-BP		986 AAB 14-BP
986 AAB 07-BP		986 AAB 08-BP



Individual Color Inserts for Incandescent		
Each insert covers 1/4 of total display — four required per CMC unit.		
Indicators	Color	Operator-Indicators
986 AAA 01	Red	986 AAA 02
986 AAA 03	Yellow	986 AAA 04
986 AAA 05	Green	986 AAA 06
986 AAA 07	Blue	986 AAA 08
986 AAA 09	White	986 AAA 10
986 AAA 11	Amber	986 AAA 12
986 AAA 13	Black ³	986 AAA 14
Bulk Packed for Indicators Individual color inserts (one color) for 5 CMC indicators are offered.		Bulk Packed for Operator-Indicators Color inserts (one color) for 10 CMC operator-indicators are offered.
Specify in multiples of 20		Specify in multiples of 40
986 AAA---BP		986 AAA---BP
Insert number of color above.		

"O" Ring Seal
For operator-indicators only
986 BAA 04

Voltage Control For Lamp
Individual Units
986 BAA 01
120 VAC transformer
986 BAA 02
240 VAC transformer
986 BAA 07
Low voltage jumper
986 BAA 08
48 volt resistor
986 BAA 14
24V resistor

Panel Seal
For all units
986 BAA 03

Lamp Holder	
908 Indicator Only	909 thru 914 Operator-Indicators
986 BAA 05	986 BAA 06

Lamp Box Without Lamp Hardware		
910 Selector Series	911 Selector-Push Series	908 Indicators
986 BAA 24	986 BAA 25	986 BAA 27

Individual Color Inserts for LEDs		
Indicators	Color	Operator-Indicators
985AAA01	Red	985AAA02
985AAA03	Yellow	985AAA04
985AAA05	Green	985AAA06
986AAA09	White ²	986AAA10
986AAA13	Black ³	986AAA14

Knobs ¹		
Replacement Knob Packet For	910 Series Gray Knob	913 Series Black Knob
Selector, Positions 1-2-3-4	986BAA15	986BAA20
Selector, Positions 9-12-3-6 o'clock	986BAA17	986BAA22
Replacement Knob Packet For	911 Series Gray Knob	914 Series Black Knob
Selector-push, Position 1-2-3-4	986BAA16	986BAA21
Selector-push, Positions 9-12-3-6 o'clock	986BAA18	986BAA23

REPLACEMENT LAMPS

Industry No. Description	Voltage	Catalog Listing
755	6	PTZ40
756	12	PTZ66
1819	24	PTZ67
LED, Red	6VAC/DC	PTZ69
LED, Green	6VAC/DC	PTZ70
LED, Yellow	6VAC/DC	PTZ68
LED, Red	24VAC/DC	PTZ78
LED, Green	24VAC/DC	PTZ79
LED, Yellow	24VAC/DC	PTZ71

Notes: 1, Knob packets include knob, shaft, and O-ring seal.
 2, White inserts not recommended for illumination by LEDs.
 3, Black inserts not suitable for illumination.

Multi-Light Oiltight Controls Contact Blocks

CMC Series

- PTC heavy duty and electronic duty contact blocks
- Tandem mounting in any combination up to four contact blocks per operator. (Two blocks on spring return devices.)
- Exclusive four plunger adapter kit may be used with selector and selector-push units for greater circuit flexibility.

HEAVY DUTY UL/CSA Listed
Heavy duty contact blocks contain fine silver, butting-type contacts. Terminals are angled 30° for easy screwdriver access to terminal screws. Screws contain self-lifting pressure plates for easy wiring. Holds bare wires of 12 to 16 gauge, either

singly or two wires of same or adjacent size. Crimp on spade or ring lugs can be used. Base of contact block has marked pad for pencil identification of the control from back of panel.

TWO CIRCUIT BLOCKS ORDER GUIDE

Butting Contacts		Silver Catalog Listing	Gold Plated Catalog Listing
Description	Symbol		
1 NC-1 NO		PTCB	PTCT
1 NO		PTCD	
1 NC		PTCE	
1 NO-1 NO		PTCF	
1 NC-1 NC		PTCG	
For AC use only. For use with 909 pushbuttons.	Overlapping LONC-ECNO	PTCJ	
For other applications contact MICRO SWITCH.	Sequencing ECNO-NO	PTCK	

LO = late opening

EC = early closing

FOUR CIRCUIT BLOCKS ORDER GUIDE

Butting Contacts		Silver Catalog Listing	Gold Plated Catalog Listing
Description	Symbol		
2NC-2NO		PTCC	PTCW
1 NC 1 NO		PTCH	
1 NC 1 NO		PTCU	

ELECTRICAL RATINGS

Continuous Current 10 Amps. Carry	AC Volts 35% Power Factor				DC Volts Inductive Load	
	120	240	480	600	125	250
Normal Inrush Current in Amps.	60	30	15	12	—	—
Normal Break Current in Amps.	6	3	1.5	1.2	2.2	0.55

ELECTRONIC DUTY

Electronic duty contact blocks contain sliding contacts for reliable operation on electrical loads where thermal cleaning action is not present. These blocks are offered with silver contacts for low energy applications or gold contacts for solid state millivolt and milliamp dry circuits. Terminals are combination .187 x .021 inch quick connect plated for soldering.

SILVER



GOLD



Sliding Contacts		Silver Catalog Listing	Gold Catalog Listing
Description	Symbol		
4NC-4NO		PTCL	PTCP
2NC 2NO		PTCM	PTCR
2NC (Right half 2NO of 2 plunger version.)		PTCN	PTCS

ELECTRICAL RATINGS

Standard Duty Sliding Silver Contacts				
Continuous Current 5 Amps. Carry	AC Volts 35% Power Factor		DC Volts Inductive Load	
	120	220	125	250
Normal Inrush Current in Amps.	30	15	—	—
Normal Break in Amps.	3	1.5	1.1	.5

Gold Contacts	
Maximum Volts	Maximum Resistive Loads in Amps.
28 VDC	1 Amp. Resistive
125 VAC	.5 Amp Resistive
Initial contact resistance—.006 ohm average	

Multi-Light Oiltight Controls Accessories

CMC Series

Not all of the accessories listed here are available from MICRO SWITCH. Be sure to order from the suggested manufacturer for each accessory.

COLOR FILTERS FOR LAMPS

For use over type lamps as furnished with CMC transformer units. Projects color indicated when used with white color inserts and high ambient light level lamps shown at right.

Manufacturer	Color Lamp Filters		
APM, Englewood, N.J.	Amber 1813/8 A-2	Red 1813/8 R-4	Green 1813/8 G-1

T-3¼ LAMP INFORMATION

Lamp Type	Voltage	Current Amps	Life (Hrs)	Ambient Light Level	
				Medium 5-25 FT—C	High 24 FT—C and Up
1850	5.0	.09	1,500	X	
756	14.0	.08	15,000	X	
1819	28.0	.04	2,500	X	
1847	6.3	.15	5,000		X
47	6.3	.15	3,000		X
755	6.3	.15	20,000		X

LAMP INFORMATION

120 VAC and 240 VAC transformer units are equipped with four T-3 1/4 #755 lamps. The #755 lamp has a 6.3 volt rating and is readily obtainable from all industrial or automotive supply companies. These same units will accommodate the #1847 lamp. Replacement #755 lamps can be ordered as PTZ40.

24 volt or 48 volt resistor units are supplied with lamps. 48 volt units are equipped with GE #1819 lamps rated at 28 volts. 24 volt units are equipped with #756 lamps rated at 14 volts. Replacement #756 lamps can be ordered as PTZ66 and #1819 lamps can be ordered at PTZ67.

CMC units containing line voltage jumpers are not supplied with lamps. These units are designed for use with any 5 through 28 volt lamp listed.

If a lamp other than those listed is used, the lamp must be limited to 1 watt per quadrant.

T-3¼ LED INFORMATION

LED Color	Voltage V AC/DC	Current Amps (Nominal)	Luminous Intensity (MCD)
White/Yellow	6	.06	75
White/Yellow	24	.02	75
Green	6	.06	75
Green	24	.02	75
Red	6	.06	85
Red	24	.02	85

MCD - Millicandle

QUICK CONNECTORS

Available from suppliers shown (not sold by MICRO SWITCH)

FOR ELECTRONIC DUTY CONTACT BLOCKS (Either silver or gold contacts)

Manufacturer	Range of Wire Size	Straight—No Insulation	Flag
AMP	20-16	42452-1 or 42452-2	42486-1 or 42800-1
AMP	18-14	62016-2	

ENCLOSURES FOR CMC

Numerous panel manufacturers build cabinets, panelboards or enclosures for use with CMC. Your local MICRO SWITCH Branch Office or Authorized Distributor can assist you with information on local availability of enclosures.

PANEL PUNCH FOR CMC

A 2" (50,8mm) square panel punch (Greenlee Model 731M) for CMC is manufactured by Greenlee Tool Co., Rockford, Illinois. Use in conjunction with a Greenlee No. 7646 hydraulic punch driver.



HOLE PLUG

Contains Oiltight Seal
2.25" (57,2mm) + 2.25" (57,2mm)
986CAA01 Gray

SWITCH GUARD

Guard consists of cover plate and transparent cover. Switch cannot be operated when cover guard is closed helping prevent accidental operation. Guard can be used on 909, 910 and 911 series operators. Extends 1.52 in. (38,5 mm) from panel.

Catalog Listing 986DAA01

Multi-Light Oiltight Controls

Mounting Dimensions

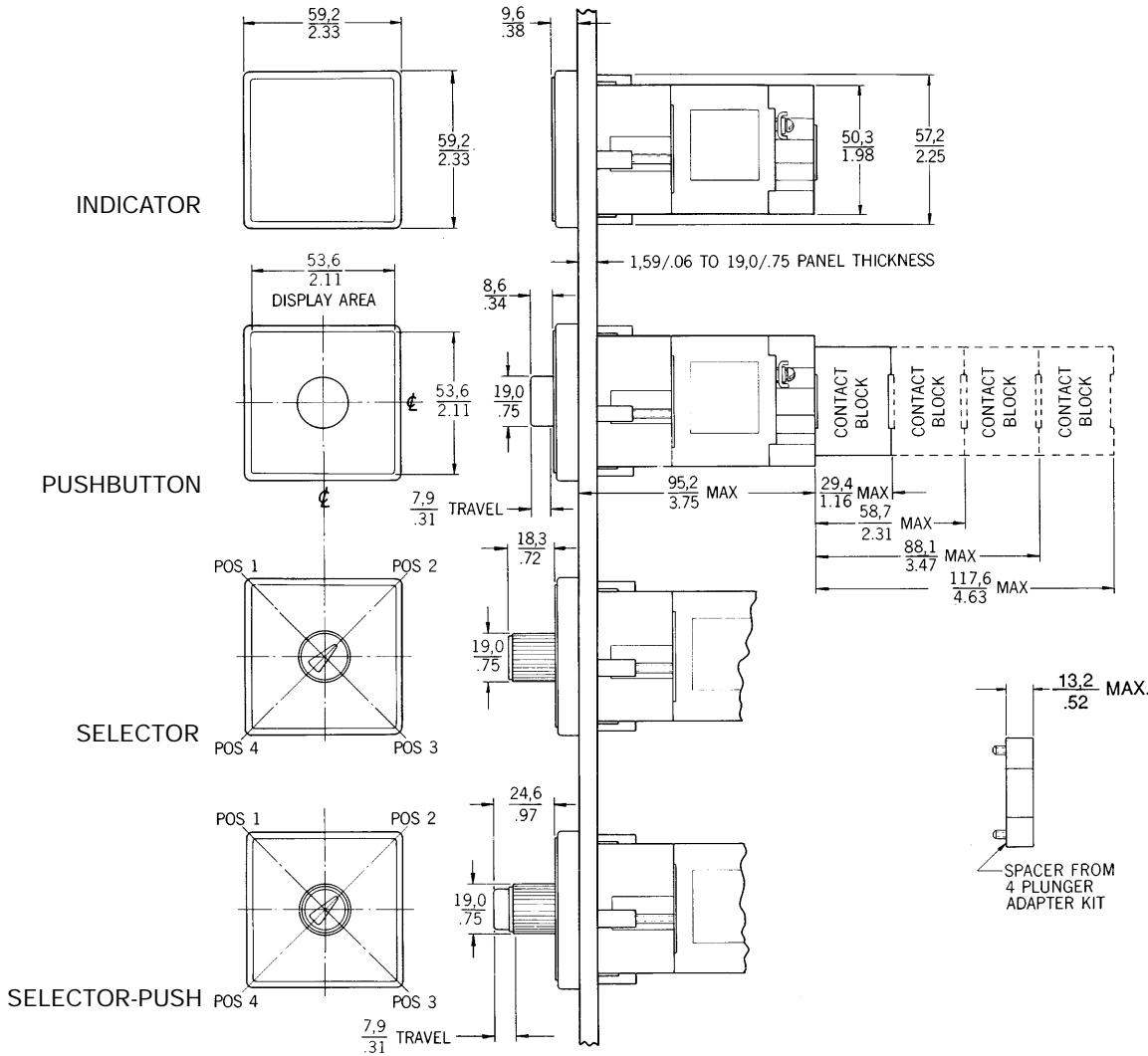
CMC Series

Note: The location arrow on the contact block must be lined up with the arrow on the operator, except as noted for the PTCB block on the ordering pages.

CMC WEIGHT

Indicators and operator-indicators (includes cover plate, legend plate, and color inserts). With transformers — 14 oz. max.

Without transformers — 7½ oz. max.
Contact blocks — 2 oz. each.
4-Plunger Adapter Kit — 1 oz.



PANEL CUTOUT RECOMMENDATIONS

