

- PUSHBUTTON SWITCHES**
- Large Selection of Types and Styles
  - Wiping, Butt, and Snap Action Contacts
  - SPST, SPDT, DPDT Circuitry and 4PST Joystick Action
  - Space Saving Miniature Sizes
  - Bushing or Bezel Mounting
  - RoHS Compliant

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Pushbutton Switches

Ratings, operating environments and switch selection are discussed in detail on pages E-3 thru E-5. This information is applicable to pushbutton switches as well as rotary and DIP switches.

Pushbutton switches are selected not only by their ratings, but also by their contact type. While nearly all rotary switches and DIP switches have wiping contacts, pushbutton switches may have either wiping or butt contacts (see internal views below).

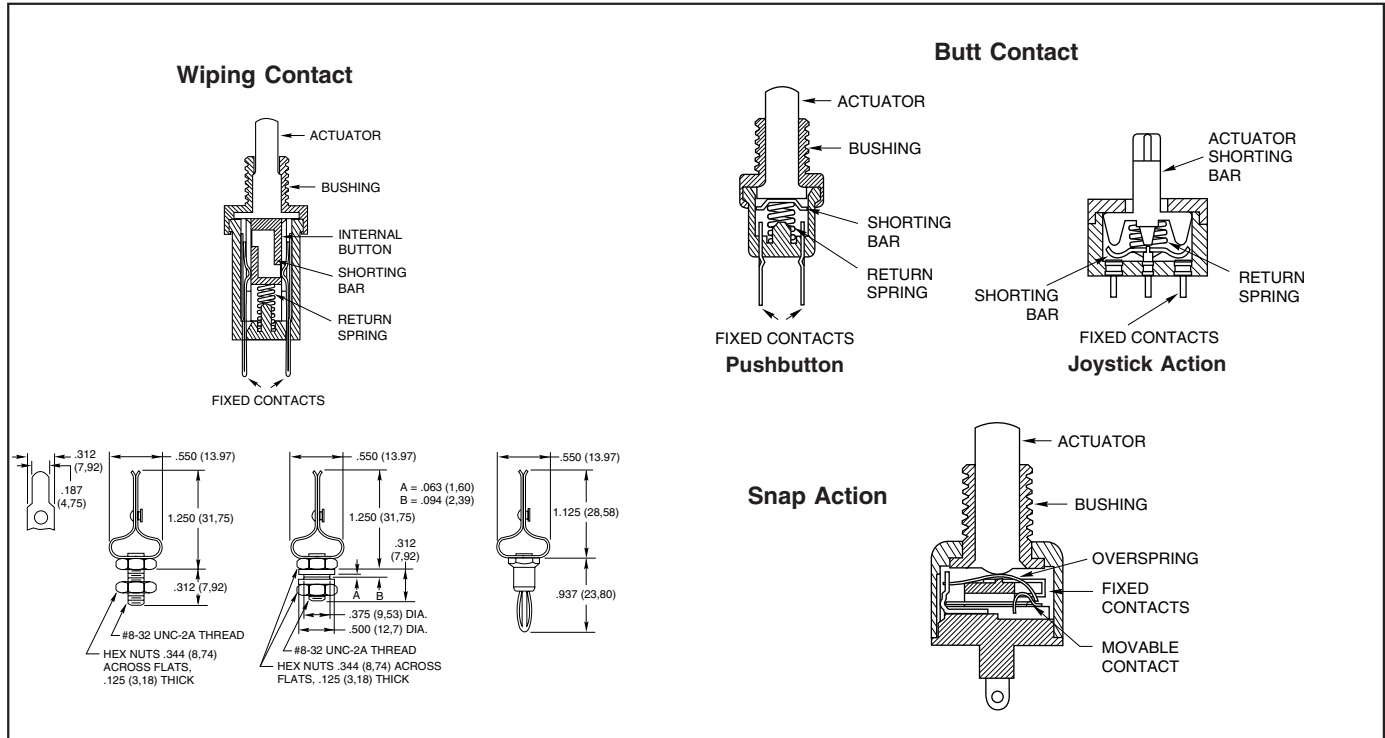
**Wiping Contacts** are self-cleaning and usually provide a low resistance in circuits where contact resistance is critical. However, the wiping action creates mechanical wear and conductive wear products.

**Butt Contacts** have less wear than wiping contacts and therefore, have a longer life. They are also smaller. Butt contacts are not self-cleaning, so their contact resistance can vary from operation to operation.

**Snap Action** switches are basically butt contact switches with a spring mechanism which provides the make and break. The mechanism controls both the operating point and the rate of operation, but adds to the wear of the switch.

The rapid rate of make and break means that these switches are appropriate for high current loads. They usually have a slight wiping action and contact surfaces made of precious metals to minimize their disadvantages.

**INTERNAL VIEWS OF PUSHBUTTON SWITCHES**



Pushbutton Switches

**SWITCH TERMINOLOGY**

**Actuator:** The part of the switch to which an external force is applied to operate the switch.

**Alternate Action (Push-Push) Switch:** A switch in which the operable position is maintained after the first actuation, and then disengaged with the second operation.

**Break-Before-Make Switch (BBM):** A double throw switch in which the moving contact breaks the connection with the first circuit before making contact with the second; also called non-shorting switch.

**Double Throw Switch:** A switch which has a normally open as well as a normally closed circuit per pole.

**Joystick Action Switch:** (From Joystick, the control for an airplane). A lever switch which operates with momentary action in 4 directions, and is disengaged in the upright position.

**Make-Before-Break Switch (MBB):** A double throw switch in which the contacts makes connection with the second circuit before breaking contact with the first; also called shorting switch.

**Maintained Contact Switch:** A switch in which the actuator remains in a position until it is actuated to another position where it also remains until actuated. Example: Push-Pull Switch.

**Momentary Contact Switch:** A switch in which the shorting bar returns from its operated position to its normal or free position when the actuating force is removed.

**Operating Position or Point:** The position of the actuator when the desired electrical action (make or break of contact) occurs.

**N.C., Normally Closed:** Switch in which the circuit is closed without actuation (with actuator in the "normal" position).

**N.O., Normally Open:** Switch in which the circuit is open without actuation (with actuator in the "normal" position).

**Overtravel:** The distance or angle between the operating position and the extreme position to which the actuator may be moved.

**Pole:** An electrically isolated circuit within a switch; a common terminal and all the selected terminals to which it connects.

**Pretravel:** The distance or angle through which the actuator moves from its free position to its electrical operating position.

**Single Throw Switch:** A switch which has only one normally open or one normally closed circuit per pole.

**Throw:** See Single Throw and Double Throw.

Circuitry*	Rating (Amps at 115 Vac Res.)	Operations At Rating	Maximum Width*** inch (mm)	Features	Series	Page	
<b>BUTT CONTACT</b>							
SPST	N.O. or N.C.	5	6,000	3/8 (9,53)	UL Listed	30	E-17
	N.O. or N.C.	1	1,000,000	3/8 (9,53)	Momentary, Terminal Seal, (Wire Leads Optnl.)	30	E-17
	N.O.	1	500,000	3/8 (9,53)	Overtravel, Terminal Seal, (Wire Leads Optnl.)	30	E-19
	N.O.	1	200,000	11/16 (17,46)	Positive Feel, Overtravel, Terminal Seal, (Wire Leads Optional)	30	E-19
	On or Off	1	100,000	11/16 (17,46)	Push/Pull Action (Maintained)	30	E-19
	N.O. or N.C.	1	250,000	1/2 (12,7)	Watertight, Terminal Seal, (Wire Leads Optnl.)	30	E-18
	N.O.	1	1,000,000	11/16 (17,46)	Square & Round Bezels	30	E-26
	N.O. or N.C.	1	1,000,000	1+ (25,4)	Square Bezel Panel Mount	30	E-26
	N.O.	1	200,000	11/16 (17,46)	Pos. Feel, Overtravel, Square & Round Bezels	30	E-26
	N.O.	1	200,000	11/16 (17,46)	Pos. Feel, Overtravel, Sq. Bezel Panel Mount	30	E-26
	N.O.	.020**	80,000	5/16+ (8,13)	Miniature, Surface Mount	38	E-5
	N.O.	.020**	80,000	5/16+ (8,13)	Miniature, Horizontal PC Mount	38	E-7
	N.O.	.020**	80,000	5/16+ (8,13)	Miniature, Vertical to PC Mount	38	E-8
	N.O. or N.C.	.250	100,000	1/4 (6,35)	Sealed Plunger, Stackable with LEDs	32	E-9
	N.O.	.500	1,000,000	1/4 (6,35)	Miniature	39	E-11
	N.O.	.500	500,000	1/2 (12,7)	Overtravel, Miniature Limit Switch, (Wire Leads Optional)	39	E-14
	N.O.	.500	100,000	1/2 (12,7)	Overtravel, Miniature, (Wire Leads Optional)	39	E-12
	N.O.	.500	250,000	5/16 (7,94)	Watertight Seal, Miniature, (Wire Leads Optional)	39	E-14
	N.C.	.250	250,000	1/4 (6,35)	Miniature (Wire Leads Optional)	39	E-15
	N.C.	.250	100,000	5/16 (7,94)	Watertight Seal, Miniature, (Wire Leads Optnl.)	39	E-15
	N.C.	.250	100,000	1/2 (12,7)	Actuator Seal, Miniature Limit Switch (Wire Leads Optional)	39	E-14
	N.O.	.150**	1,000,000	1/4 (6,35)	PC Mount, Miniature, Sealed	39	E-11
	N.O.	.150**	1,000,000	1/4 (6,35)	PC Mount, Miniature, Right Angle, Cap Seal	39	E-12
	N.O.	.150**	100,000	1/4 (6,35)	PC Mount, Miniature, Overtravel	39	E-12
	N.O.	.020, .150**	1,000,000	3/8 (9,53)	Economical Contact Plating	30	E-16
	N.O.	.020, .150**	1,000,000	3/8 (9,53)	Econ. Plating, Square Bezel Panel Mount	30	E-26
	N.O.	.020, .150**	1,000,000	1/4 (6,35)	Economical Contact Plating	39	E-14
	N.O.	.020, .150**	100,000	1/2 (12,7)	Actuator Seal, Overtravel, Miniature Limit Switch, (Wire Leads Optional)	39	E-14
SPDT	BBM	.250	100,000	1/4 (6,35)	SPST AND SPDT, Stackable w/LEDs	32	E-9
	BBM	.250	500,000	1/2 (12,7)	PC Mount, 2 Circuits, Right Angle, Total Seal	39	E-11
	BBM	.020**	80,000	5/16 (8,13)	Miniature, Surface Mount	38	E-5

\* BBM is Break-Before-Make (Non-Shorting). MBB is Make-Before-Break (Shorting).

**WIPING CONTACT**

SPST	N.O. or N.C.	3	6,000	13/16 (20,6)	Decorator Line	4000/10	E-31
	N.O. or N.C.	1	100,000	13/16 (20,6)	Momentary Action & Positive Feel Types	4000/10	E-31
	N.O.	.250	100,000	1/2 (12,7)	Momentary Action & Terminal Seal Types	23	E-30
	N.O.	.4VA	40,000	.177 (4,5)	Process Sealed, Subminiature	49	E-32
SPDT	BBM or MBB	.250	250,000	7/16 (11,11)	Momentary Action	46	E-21
	BBM or MBB	.250	250,000	1+ (25,4+)	Square Bezel Panel Mount	46	E-26
	BBM or MBB	.250	100,000	1/2 (12,7)	Watertight Seal	46	E-23
	BBM	.250	250,000	11/16 (17,46)	Square & Round Bezels	46	E-26
	BBM	.250	250,000	11/16 (17,46)	Alternate Action, Square & Round Bezels	46	E-26
	BBM	.250	250,000	1+ (25,4+)	Alternate Action, Square Bezel Panel Mount	46	E-26
DPDT	N.O.	.4VA	40,000	.177 (4,5)	Process Sealed, Subminiature	49	E-32
	BBM or MBB	.250	100,000	5/8 (15,88)	Momentary Action	46	E-22
	BBM	.250	250,000	13/16 (20,6)	Environmental Seal/Wire Leads	46	E-23
	BBM or MBB	.250	100,000	11/16 (17,46)	Watertight Seal	46	E-23
	BBM	.250	250,000	11/16 (17,46)	Square & Round Bezel & Positive Feel Types	46	E-26
	BBM	.250	250,000	11/16 (17,46)	Alternate Action, Square & Round Bezels	46	E-26
BBM or MBB	.250	250,000	1+ (25,4+)	Alternate Action, Square Bezel Panel Mount	46	E-26	

**JOYSTICK BUTT CONTACT**

4PST	BBM	.250	500,000	7/8 (22,23)	4-Way Action, 3 Actuator Choices	04	E-21
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**SNAP ACTION CONTACT**

SPST	N.O. or N.C.	1, 3	25,000	7/8 (22,23)	SPST, 1 and 3 Amp	4000/10	E-31
SPDT	BBM	5, 10	25,000	7/8 (22,23)	Audible Click	2000/7	E-33

\*\* Rated for 28 Vdc and/or 5 Vdc (.150 A) and 20 Vdc (.020 A).

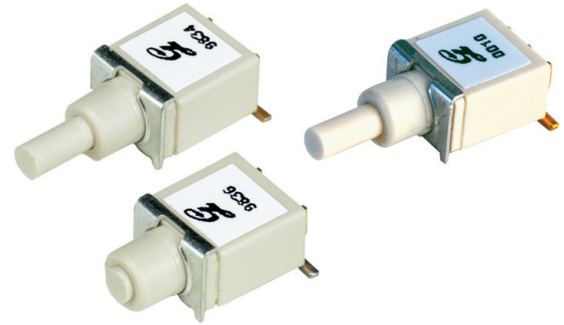
\*\*\* Maximum width behind panel or above PC board rounded to next highest 1/16" (1,59 mm).

Pushbutton Switches

## SERIES 38BM AND 38BC Sub-Miniature Surface Mount

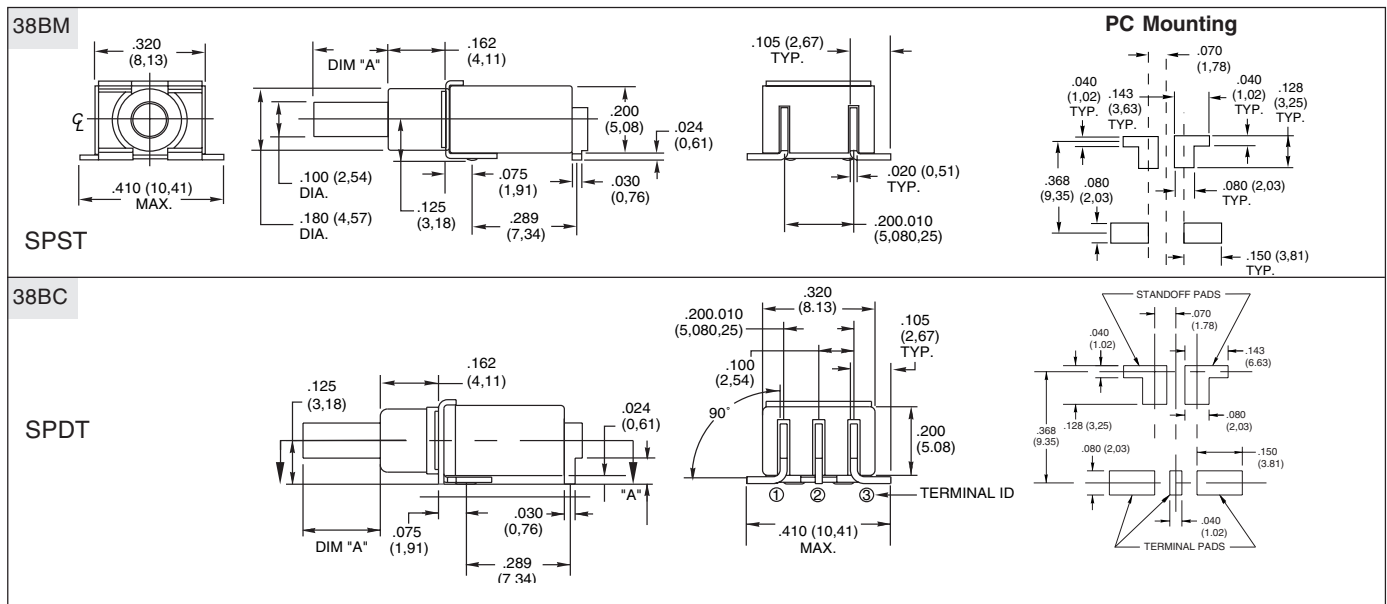
### FEATURES

- Surface Mount Process Compatible
- Sealed Construction
- SPST and SPDT, Momentary Contact
- Extended or Flush Plunger
- Drop-In Replacement for Industry Standard



### SPECIFICATIONS

#### DIMENSIONS In inches (and millimeters)



#### Rating Criteria

**Operating Life:** 80,000 make-and-break cycles at full load

**Contact Rating (resistive load):**

*Gold Contacts:* 0.4 VA maximum at 20 Vac or Vdc maximum

*Silver Contacts:* I.O. Amps maximum at 120 Vac or 28 Vdc

**Contact Resistance:** Below 20 milliohms typical initial at 2-4 Vdc, 100 mA

**Insulation Resistance:** 1000 megaohms min.  
**Voltage Breakdown:** 1000 Vrms minimum at sea level

**Operating Temperature:** -30°C to +85°C

**Solderability:** Per MIL-STD-202F, Method 208D, or EIA RS-186E Method 9 (1 hour steam aging)

#### Materials and Finishes

**Base and Cover:** Thermoplastic (UL 94V-0)

**Plunger:** Thermoplastic (UL 94V-0), with standard internal o-ring seal

**Terminals:** Copper alloy, gold plate over nickel plate

**Spring:** Plated Music Wire

**Contact System:** Copper alloy, gold or silver plate (as specified) over nickel plate

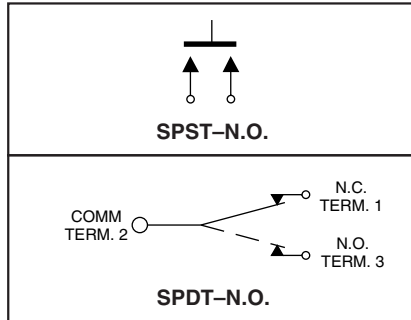
**Switch Support:** Brass, tin-plated

**Available from your local Grayhill Distributor.**

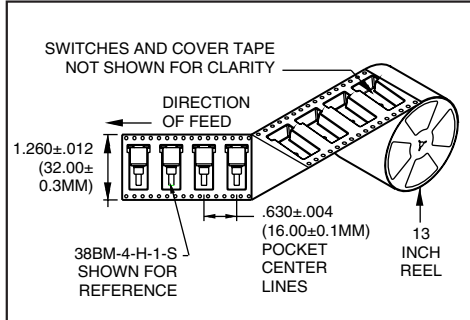
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

**SERIES 38BM AND 38BC**  
Sub-Miniature Surface Mount

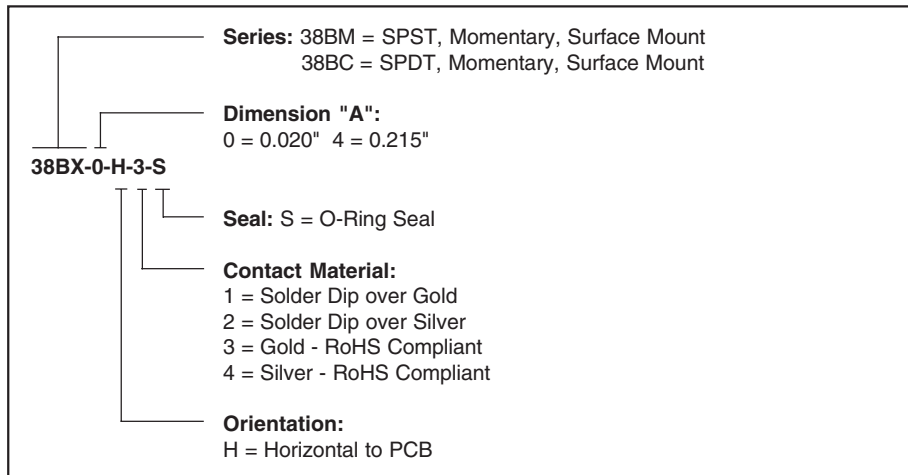
**CIRCUITRY**



**TAPE AND REEL PACKAGING**



**ORDERING INFORMATION**

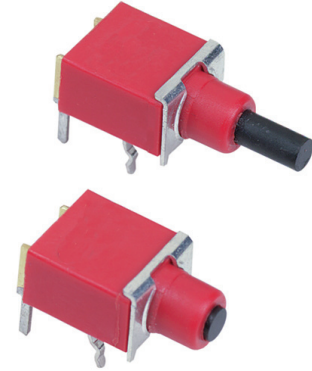


Pushbutton Switches

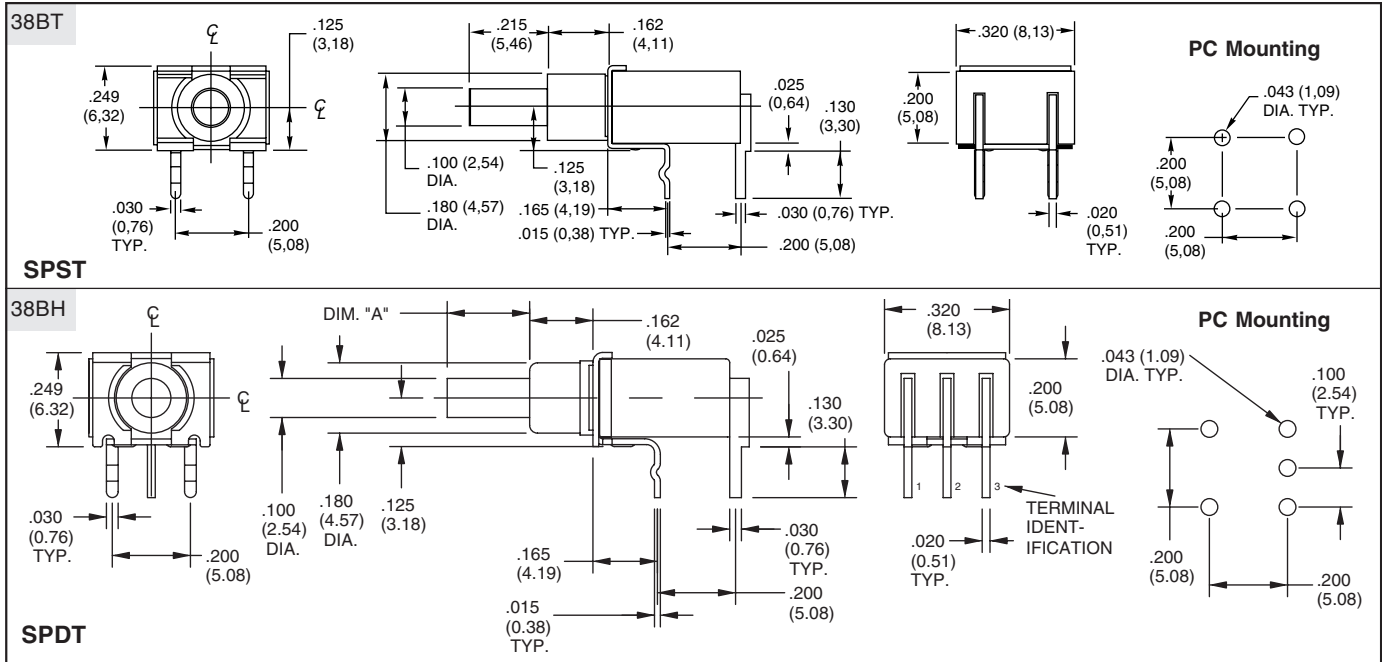
## SERIES 38BT and 38BH Sub-Miniature Horizontal PC Mount

### FEATURES

- Drop-In Replacement for Industry Standard
- Sealed Plunger Option
- Printed Circuit Board Mount
- SPST and SPDT, Momentary Contact



### DIMENSIONS In inches (and millimeters)



### SPECIFICATIONS

#### Rating Criteria

**Operating Life:** 80,000 make-and-break cycles at full load

#### Contact Rating (resistive load):

**Gold Contacts:** 0.4 VA maximum at 20 Vac or Vdc maximum

**Silver Contacts:** 1.0 Amp maximum at 120 Vac or 28 Vdc

**Contact Resistance:** Below 20 milliohms typical initial at 2-4 Vdc, 100 mA

**Insulation Resistance:** 1000 megaohms minimum

**Voltage Breakdown:** 1000 Vrms minimum at sea level

**Operating Temperature:** -30°C. to +85°C.

**Solderability:** Per MIL-STD-202F, Method 208D, or EIA RS-186E Method 9 (1 hour steam aging)

#### Materials and Finishes

**Base and Cover:** Thermoplastic (UL 94V-0)  
**Plunger:** Thermoplastic (UL 94V-0), (S versions include an internal o-ring seal)

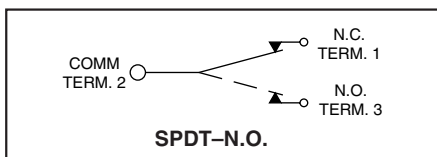
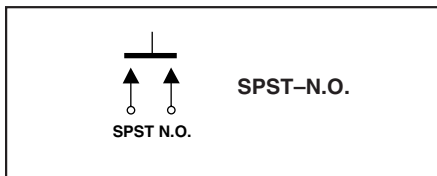
**Terminals:** Copper alloy, gold or silver plate (as specified) over nickel plate

**Spring:** Plated Music Wire

**Contact System:** Copper alloy, gold or silver plate (as specified) over nickel plate

**Switch Support:** Brass, tin-plated

### CIRCUITRY



### ORDERING INFORMATION

**38BX-4-H-3-N**

**Series:** 38BT = SPST, Momentary, Thru Hole  
38BH = SPDT, Momentary, Thru Hole

**Dimension A:** 0 = 0.020" 4 = 0.215"

**Seal:** S = O-Ring Seal, N = No Seal

**Contact Material:** 1 = Solder Dip over Gold  
2 = Solder Dip over Silver  
3 = Gold - RoHS Compliant  
4 = Silver - RoHS Compliant

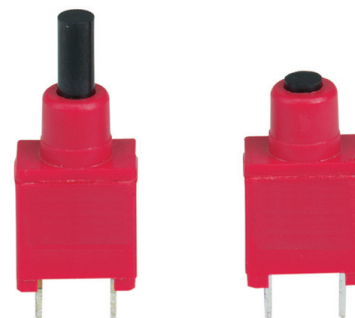
**Orientation:** H = Horizontal to PCB

Available from your local Grayhill Distributor For prices and discounts, contact a local Sales Office, an authorized local distributor, or Grayhill.

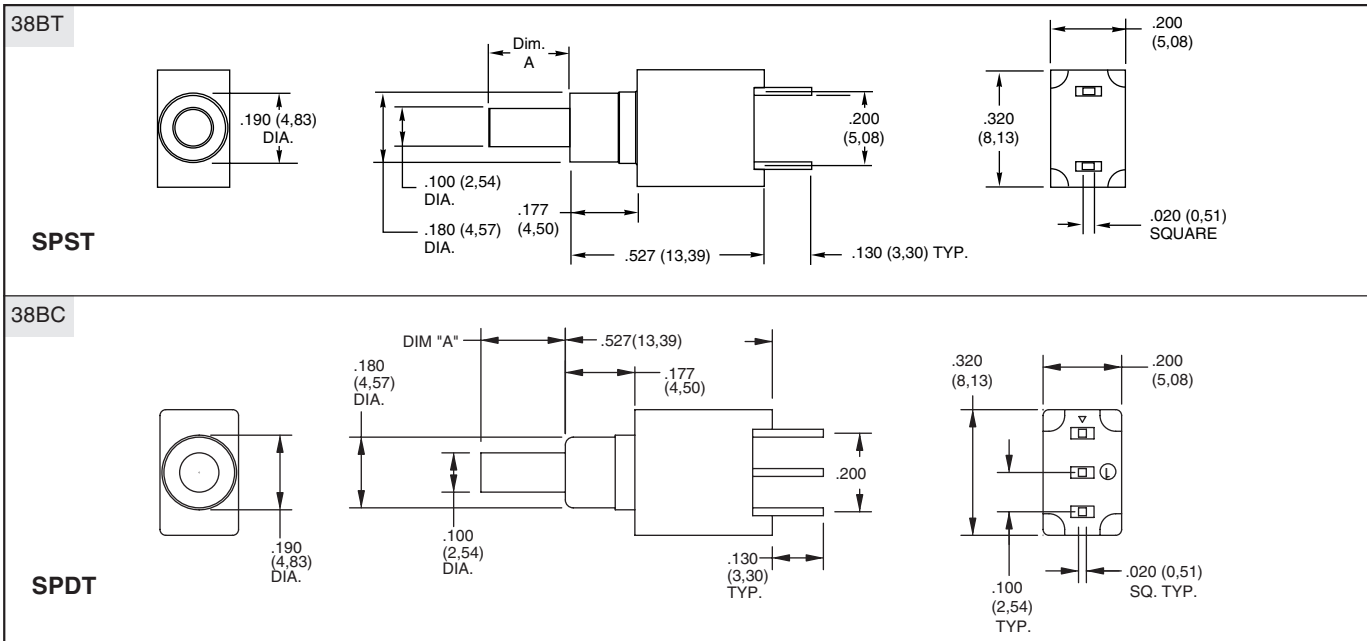
**SERIES 38BT and 38BC**  
Sub-Miniature Vertical PC Mount

**FEATURES**

- Actuates at Right Angle to Printed Circuit Board
- Drop-In Replacement for Industry Standard
- SPST and SPDT, Momentary Contact
- Sealed Plunger Option



**DIMENSIONS** In inches (and millimeters)



Unless otherwise indicated, tolerances are ± .010 (0,25)

**SPECIFICATIONS**

**Electrical Ratings**

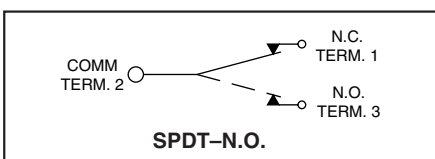
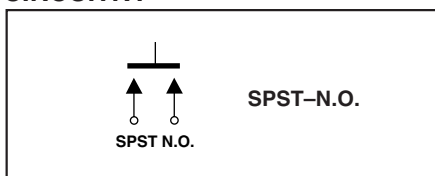
**Operating Life:** 80,000 make-and-break cycles at full load  
**Contact Rating (resistive load):**  
*Gold Contacts:* 0.4 VA maximum at 20 Vac or Vdc  
*Silver Contacts:* 1.0 Amp maximum at 120 Vac or 28 Vdc  
**Contact Resistance:** Below 20 milliohms typical initial at 2-4 Vdc, 100 mA, for both silver and gold-plated contacts

**Insulation Resistance:** 1000 megaohms minimum  
**Voltage Breakdown:** 1000 Vrms minimum at sea level  
**Operating Temperature:** -30°C. to +85°C.  
**Solderability:** Per MIL-STD-202F, Method 208D, or EIA RS-186E, Method 9 (1 hour steam aging)

**Materials and Finishes**

**Base and Cover:** Thermoplastic (UL 94V-0)  
**Plunger:** Thermoplastic (UL 94V-0), (S versions include an internal o-ring seal)  
**Terminals:** Copper alloy, gold or silver plate (as specified) over nickel plate  
**Spring:** Plated music wire  
**Contact System:** Copper alloy, gold or silver plate (as specified) over nickel plate

**CIRCUITRY**



**ORDERING INFORMATION**

**Series:** 38BT = SPST, Momentary, Thru-Hole  
 38BC = SPDT, Momentary, Thru-Hole  
**Dimension A:** 0 = 0.020" 4 = 0.215"  
**Seal:** S = O-Ring Seal, N = No Seal  
**Contact Material:** 1 = Solder Dip over Gold  
 2 = Solder Dip over Silver  
 3 = Gold - RoHS Compliant  
 4 = Silver - RoHS Compliant  
**Orientation:** V = Vertical to PCB

Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

Pushbutton Switches



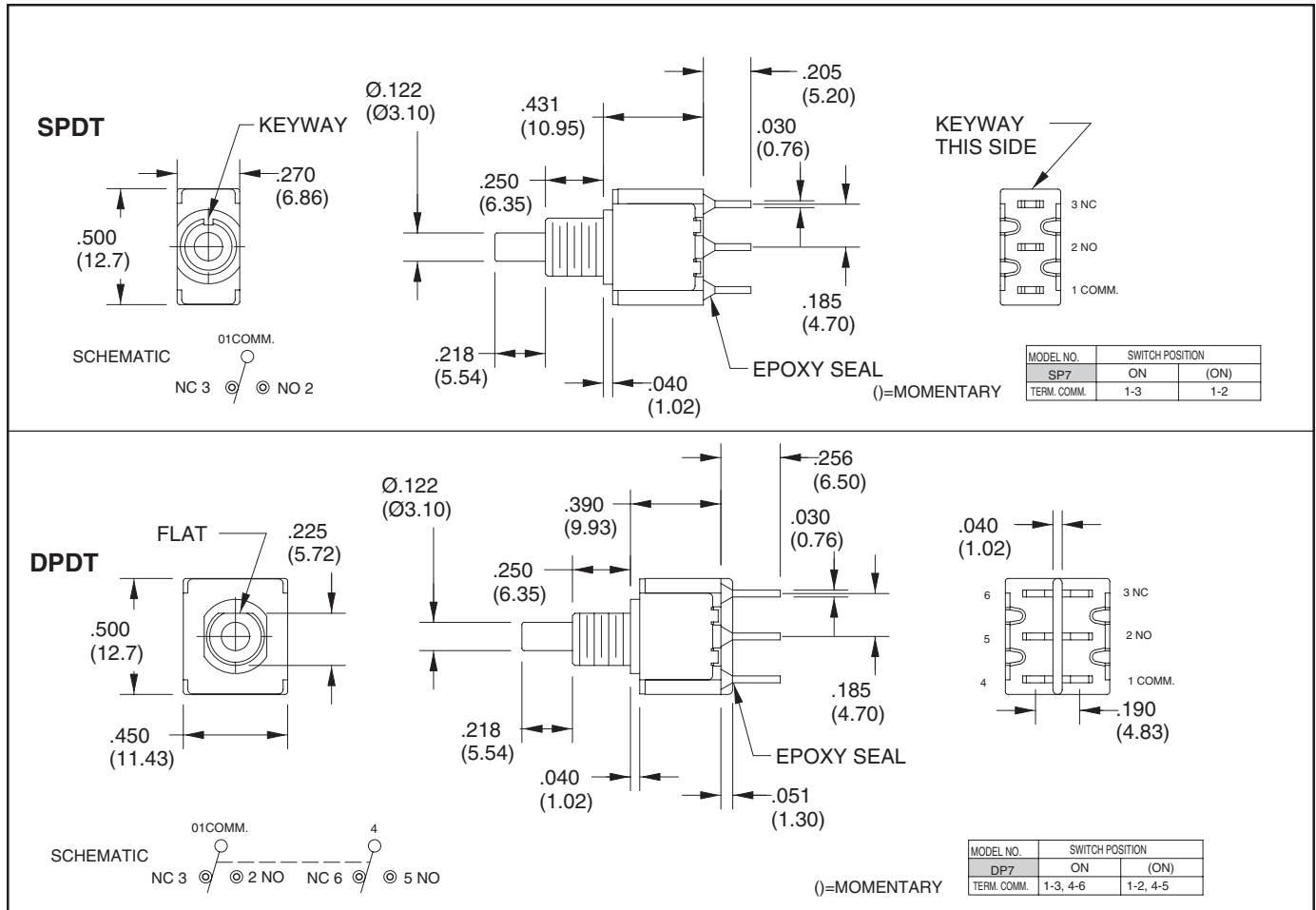
## SERIES 38C Miniature Pushbutton Switches

### FEATURES

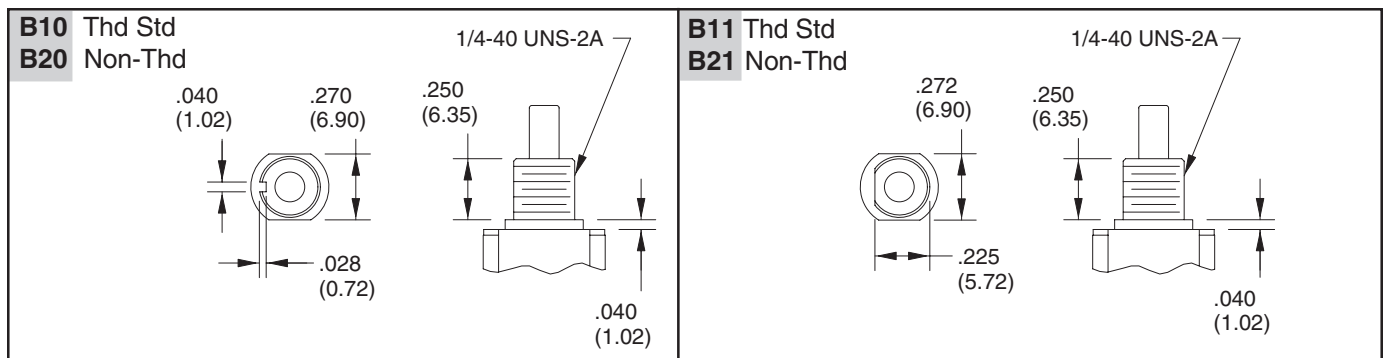
- SPDT and DPDT Circuitry
- Choice of Bushings, and Terminations
- Caps and Frames Available
- UL Recognized



### DIMENSIONS IN INCHES (AND MILLIMETERS)



### BUSHING OPTIONS IN INCHES (AND MILLIMETERS)

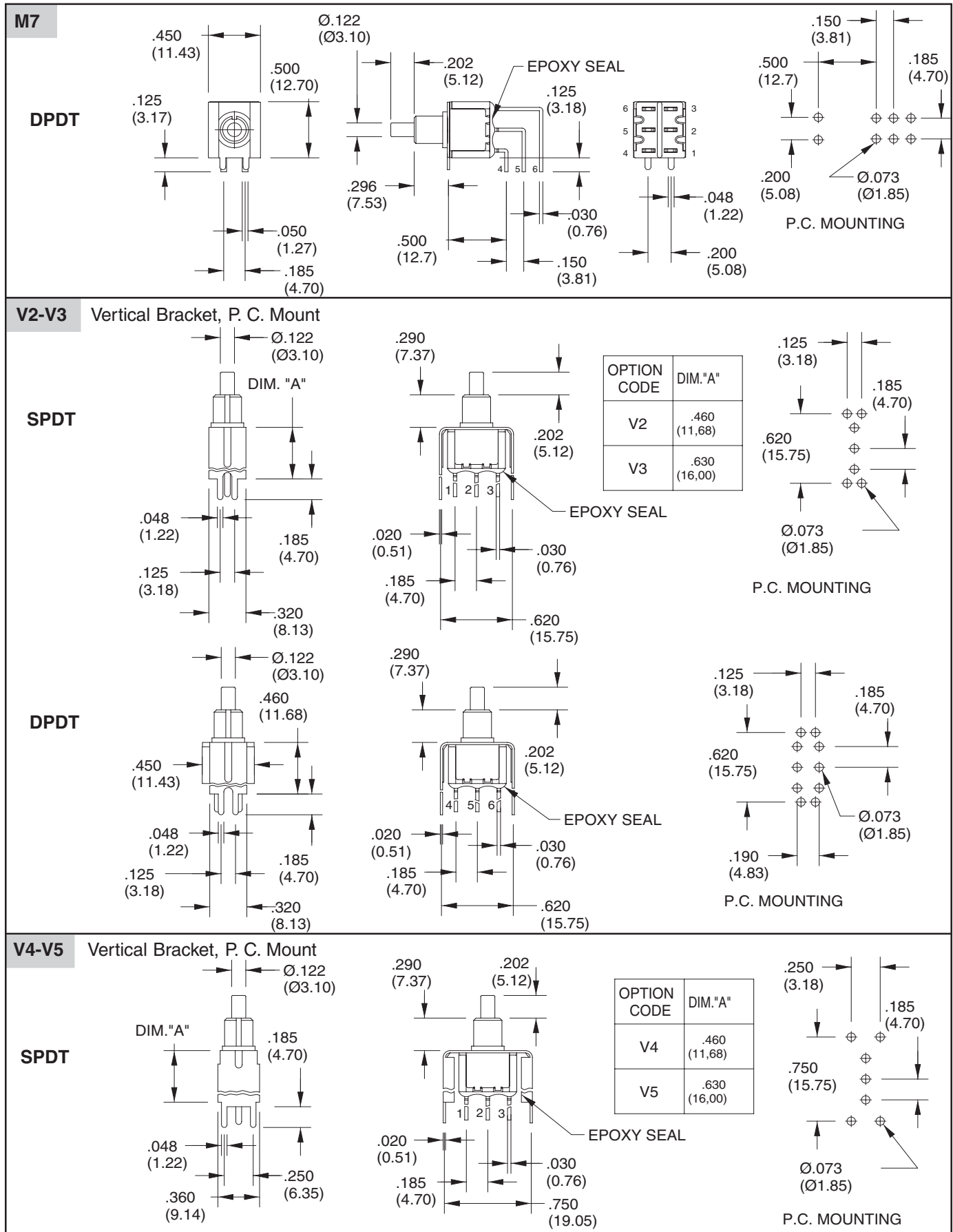


**TERMINATION OPTIONS** IN INCHES (AND MILLIMETERS)

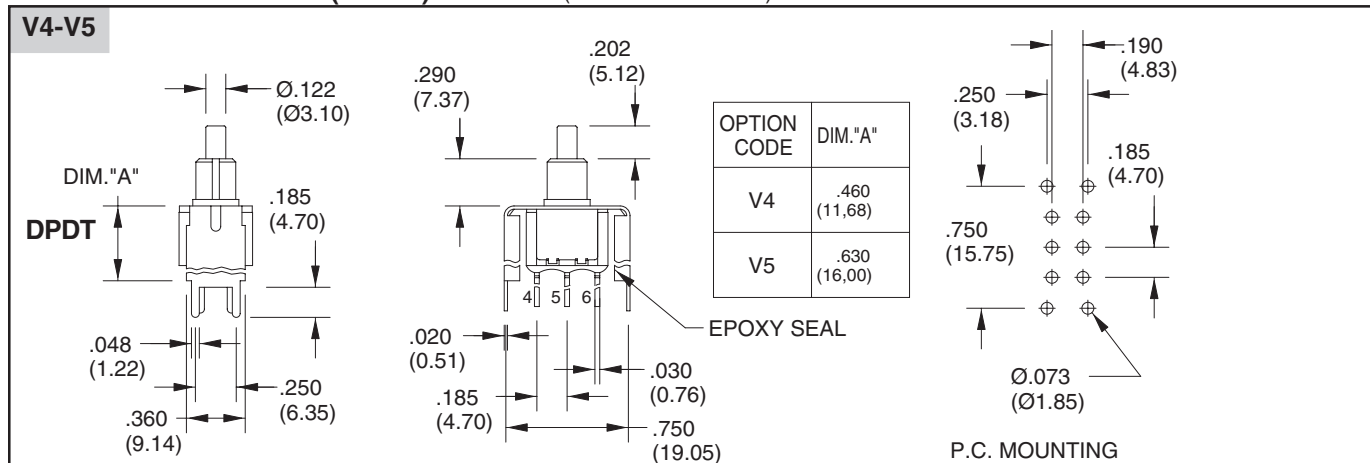
<p><b>M1 Solder Lug (Std)</b></p> <p>THK. .030 (0.76)</p>	<p><b>M2 P. C. Mount</b></p> <p>THK. .030 (0.76)</p>	<p><b>M3 P. C. Mount, Quick Connect</b></p> <p>.030 (0.76) THK.</p>	<p><b>WX Wire Wrap</b></p> <table border="1"> <thead> <tr> <th>OPTION CODE</th> <th>DIM. "A"</th> </tr> </thead> <tbody> <tr> <td>W1</td> <td>.750(19.05)</td> </tr> <tr> <td>W2</td> <td>.964(24.48)</td> </tr> <tr> <td>W3</td> <td>.425(10.80)</td> </tr> <tr> <td>W4</td> <td>1.062(26.97)</td> </tr> </tbody> </table>	OPTION CODE	DIM. "A"	W1	.750(19.05)	W2	.964(24.48)	W3	.425(10.80)	W4	1.062(26.97)
OPTION CODE	DIM. "A"												
W1	.750(19.05)												
W2	.964(24.48)												
W3	.425(10.80)												
W4	1.062(26.97)												
<p><b>M6 Right Angle P. C. Mount, Horizontal</b></p>													
<p><b>SPDT</b></p> <p><b>DPDT</b></p>			<p><b>P.C. MOUNTING</b></p> <p><b>P.C. MOUNTING</b></p>										
<p><b>M7 Right Angle P.C. Mount, Vertical</b></p>													
<p><b>SPDT</b></p>			<p><b>P.C. MOUNTING</b></p> <p><b>P.C. MOUNTING</b></p>										

Pushbutton Switches

## TERMINATION OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)

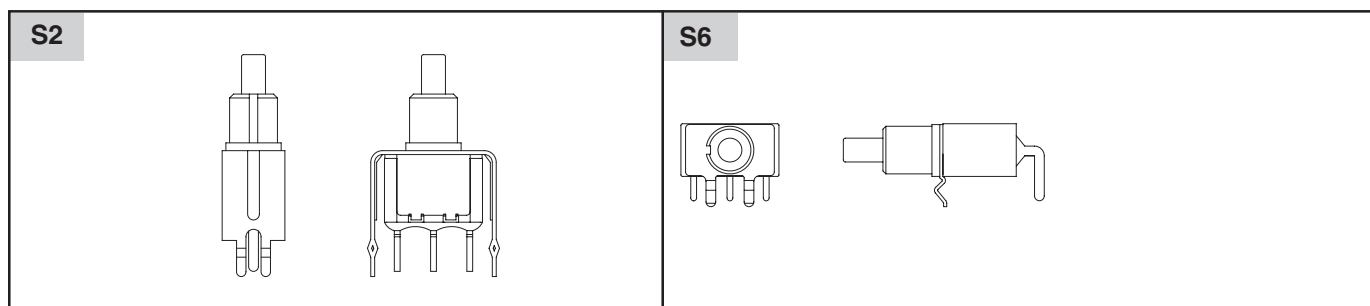


**TERMINATION OPTIONS (CONT.)** IN INCHES (AND MILLIMETERS)

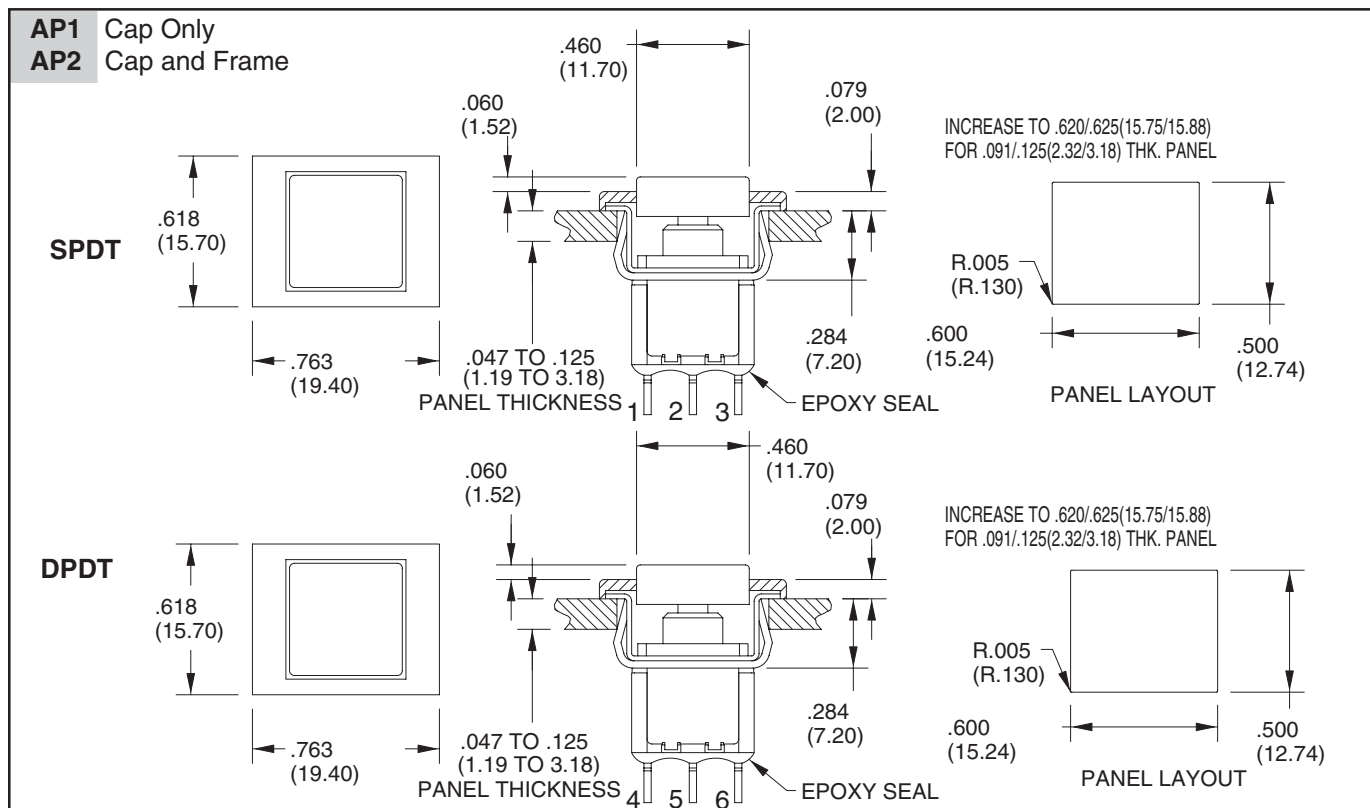


**Snap-in Termination Options**

(Snap-in termination options have the same PC layout as M2, M6 and M7 options)

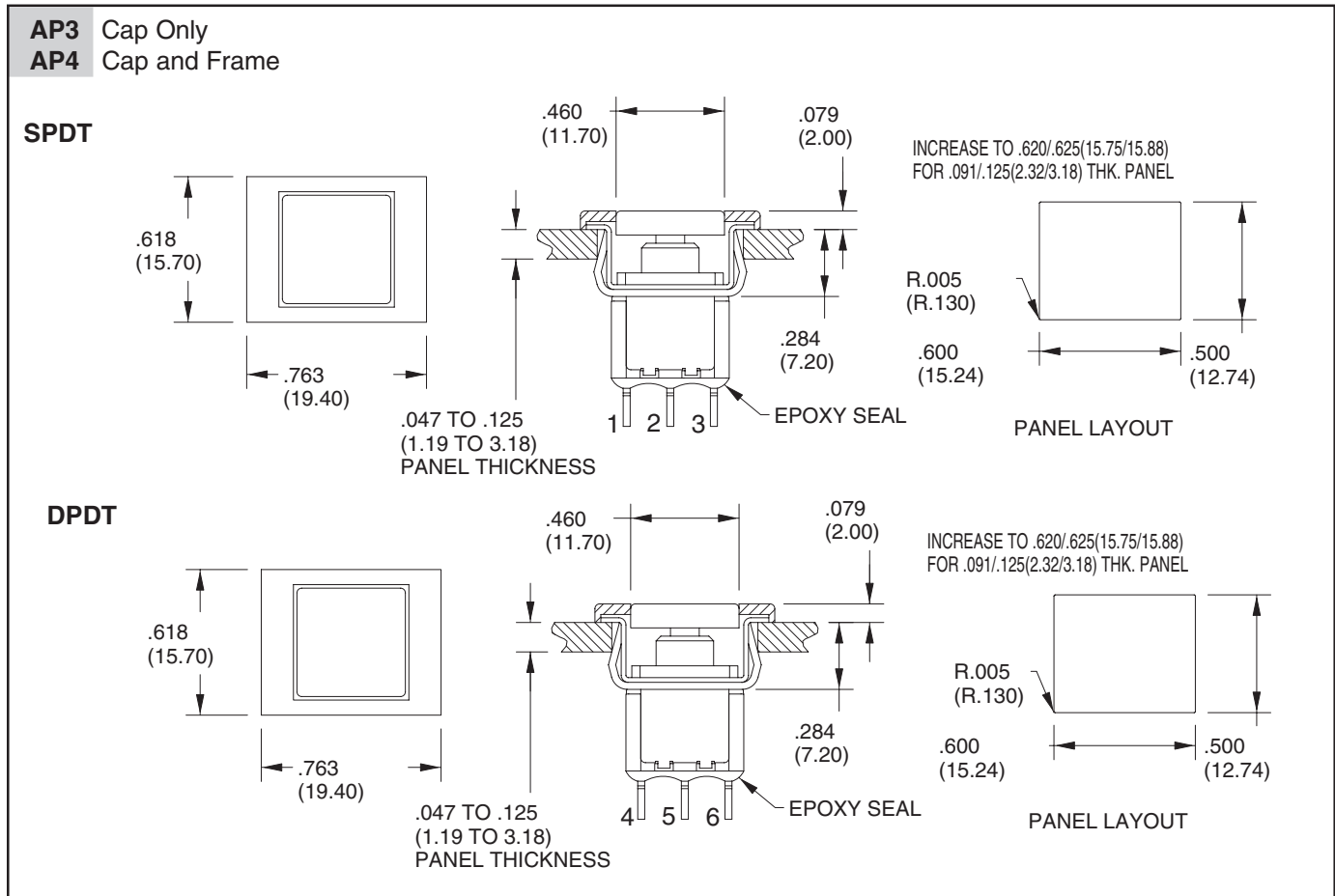


**BUSHING OPTIONS** IN INCHES (AND MILLIMETERS)  
FOR PANEL MOUNTING



Pushbutton Switches

## BUSHING OPTIONS IN INCHES (AND MILLIMETERS) FOR PANEL MOUNTING



### SPECIFICATIONS

#### RATINGS

**Contact Rating:** Q & G option - 3A with resistive load @ 125 VAC or 28 VDC; 1.5A with resistive load @ 250 VAC. R option - 0.4 VA max @ 20 Vmax (AC or DC)

**Electrical Life:** 50,000 make-and-break cycles at full load

**Travel:** .050 ± .010

**Contact Resistance:** 20 milliohms max. initial @ 2-4 VDC, 100 mA

**Insulation Resistance:** 1,000 megaohms minimum

**Dielectric Strength:** 1,000 V RMS @ sea level

**Operating Temperature:** -30°C to 85°C

#### MATERIALS

**Case:** Diallyl phthalate (DAP) (UL94V-0)

**Plunger:** Glass filled nylon or glass filled polyester

**Bushing:** Brass, nickel plated

**Housing:** Stainless steel

**Terminal/Switch Support:** Brass, electrotin plated

**Terminal Seal:** Epoxy

### ORDERING INFORMATION

SERIES	MODEL NO.	PLUNGER	BUSHING	TERMINATION	CONTACT	SEAL
<b>38C</b>	<b>SP7</b>		<b>B10</b>	<b>M1</b>	<b>Q</b>	<b>T</b>
38C = Miniature Pushbutton Switches	Options: SP7, DP7 (see models for switching positions)	Options: Blank=std as shown in dwg 0 = 0.0 (Flush) 1 = .205 (5.02) 2 = .079 (2.00)	Options: AP1, AP2, AP3, AP4, B10, B11, B21, B21 (see bushing options)	Options: M1, M2, M3, M6, M7, S2, S6, V2, V3, V4, V5, W1, W2, W3, W4 (see termination options)	R = Copper alloy, gold plate over nickel plate.  Q = Copper alloy, silver plated  G=Gold plate over silver plate	T = Lead Free and RoHS Compliant

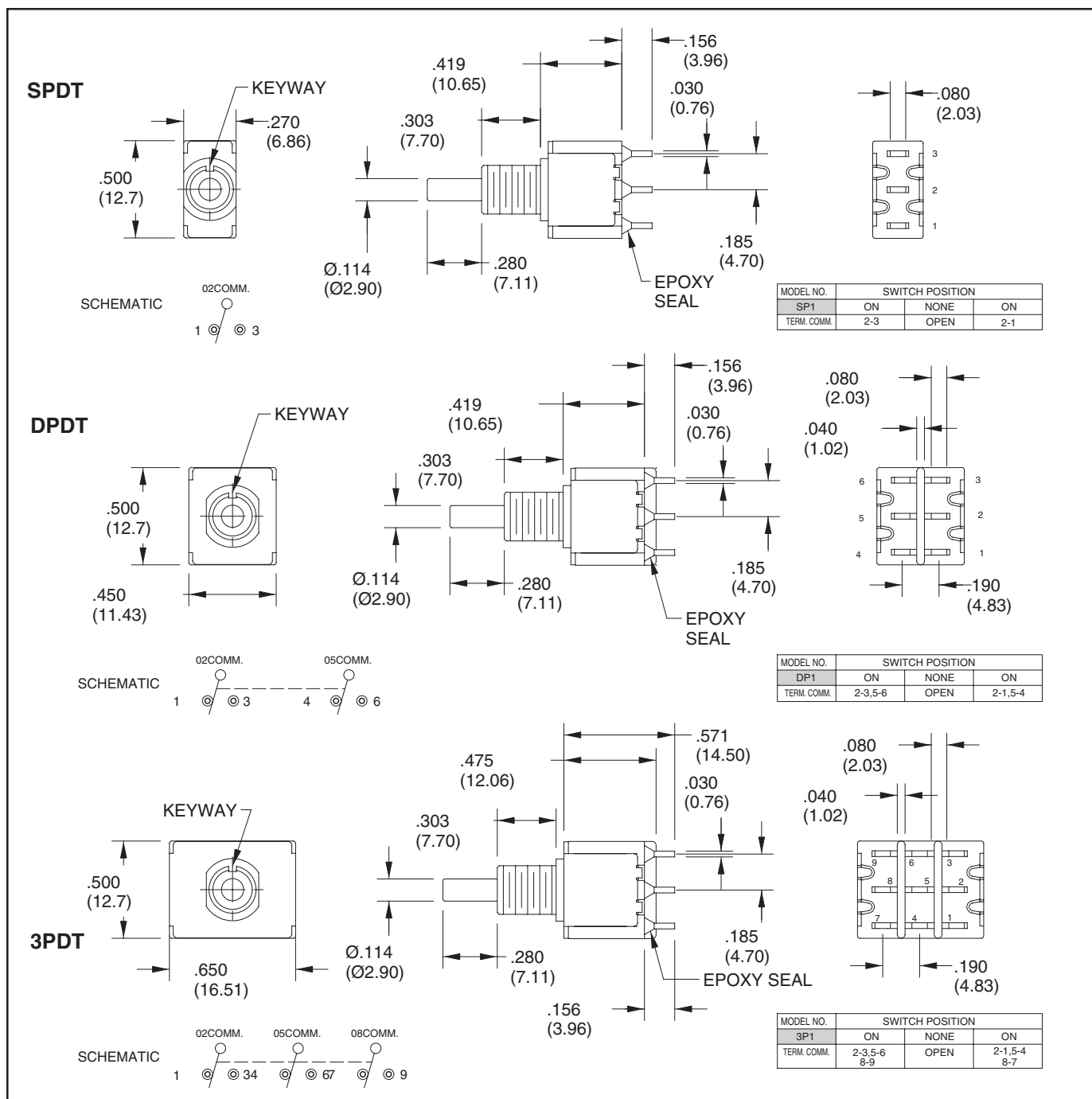
**SERIES 38D**  
Alternate Action  
Pushbutton Switches

**FEATURES**

- SPDT, DPDT, 3PDT, 4PDT Circuitry
- Choice of Plunger Length, Bushings, and Terminations
- UL Recognized

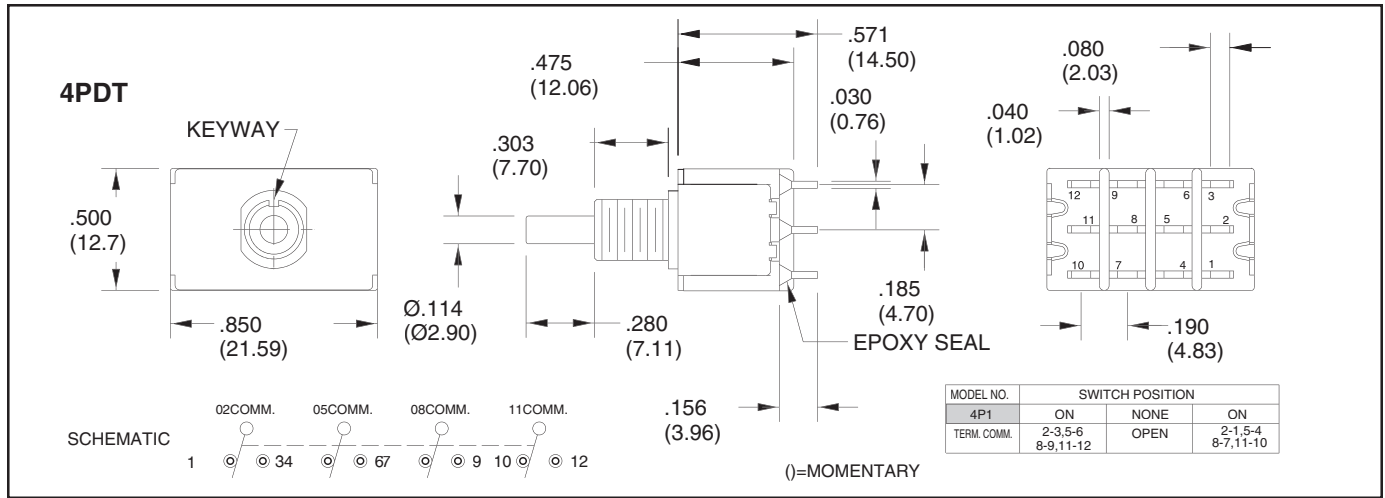


**MODELS** IN INCHES (AND MILLIMETERS)

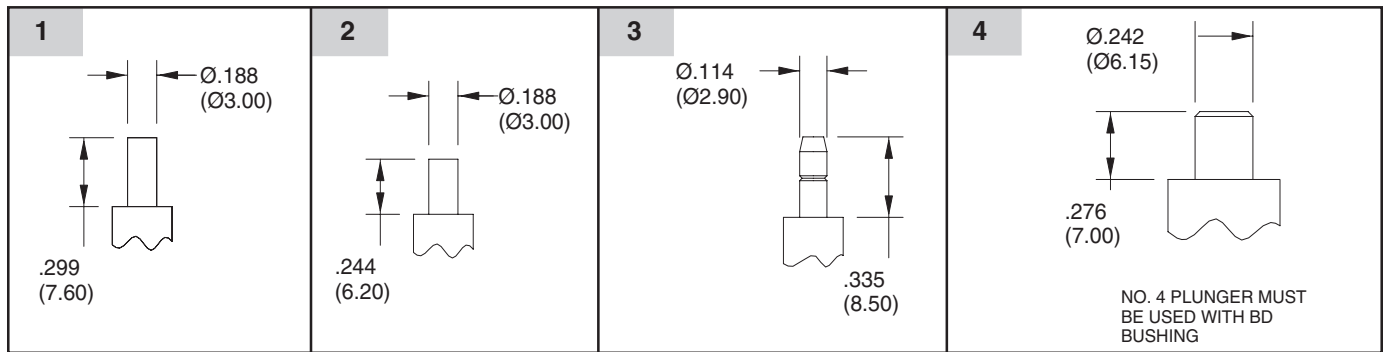


Pushbutton Switches

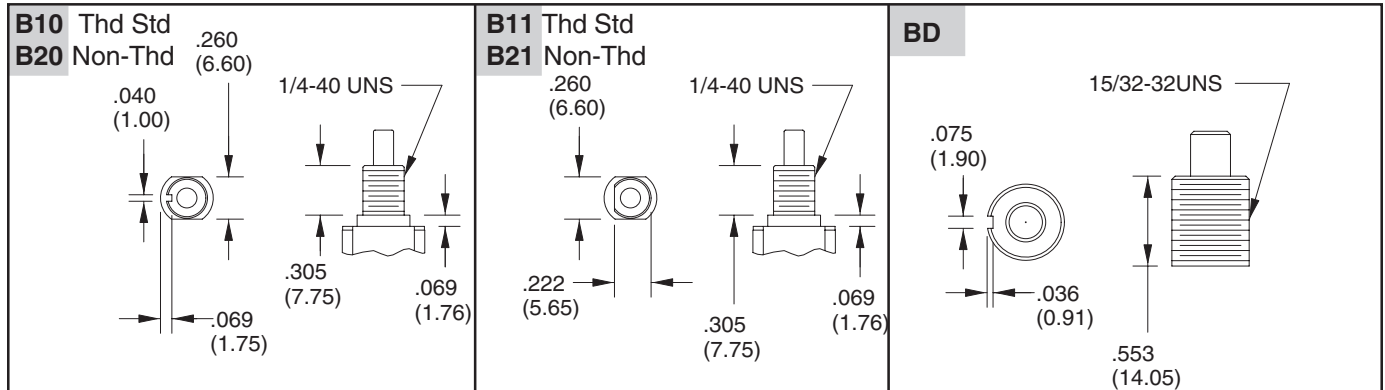
## TERMINATION OPTIONS IN INCHES (AND MILLIMETERS)



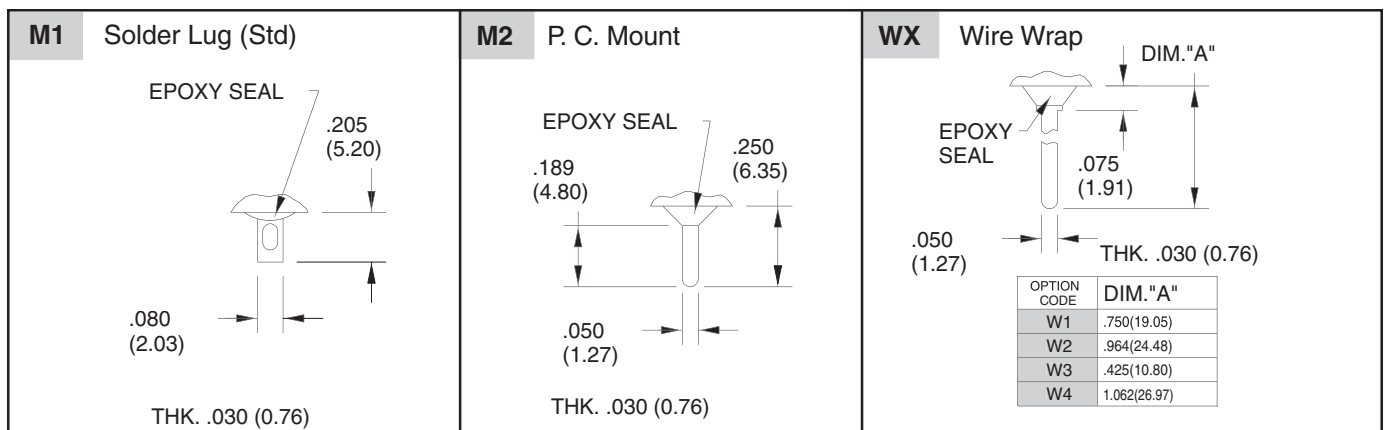
## PLUNGER OPTIONS IN INCHES (AND MILLIMETERS)



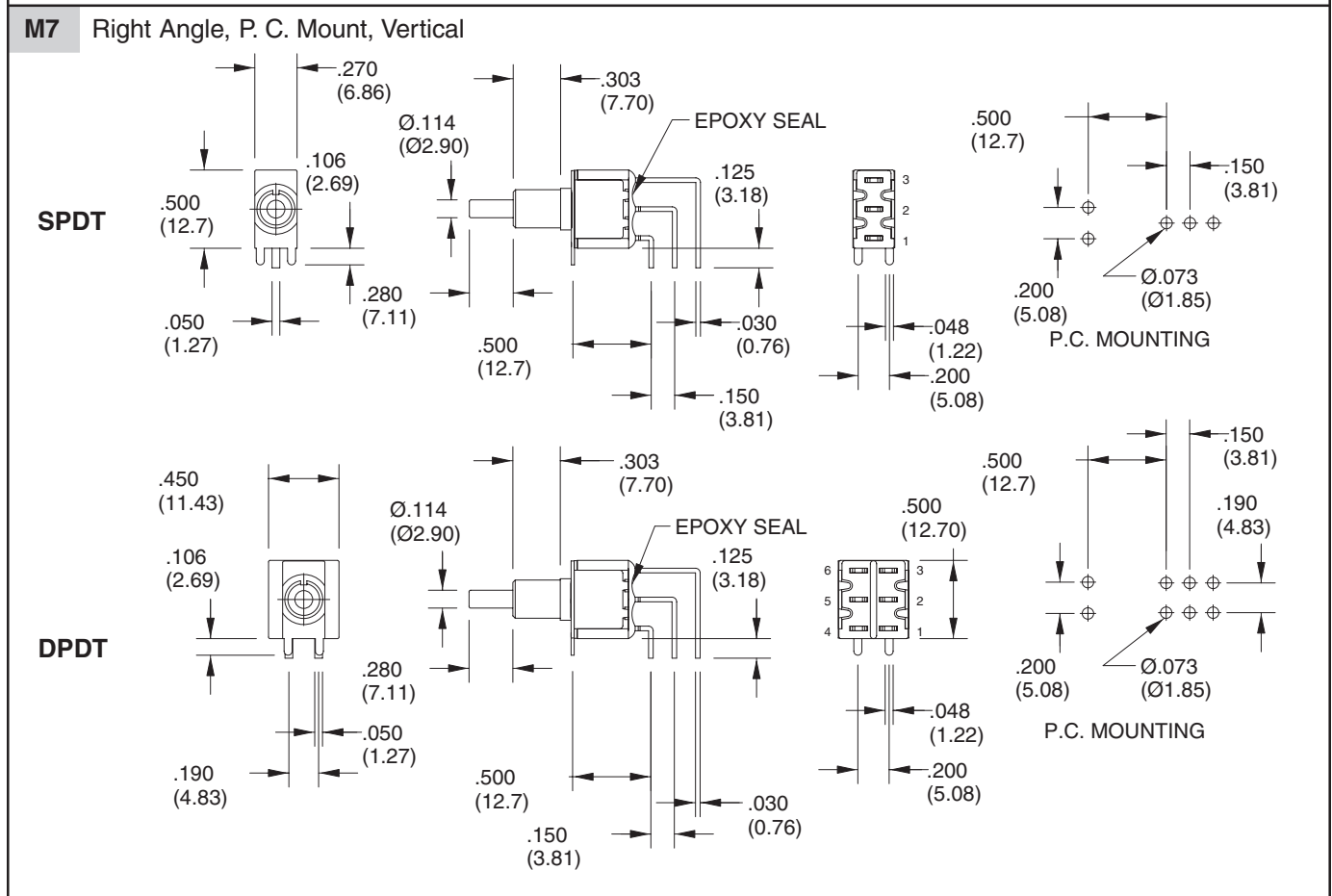
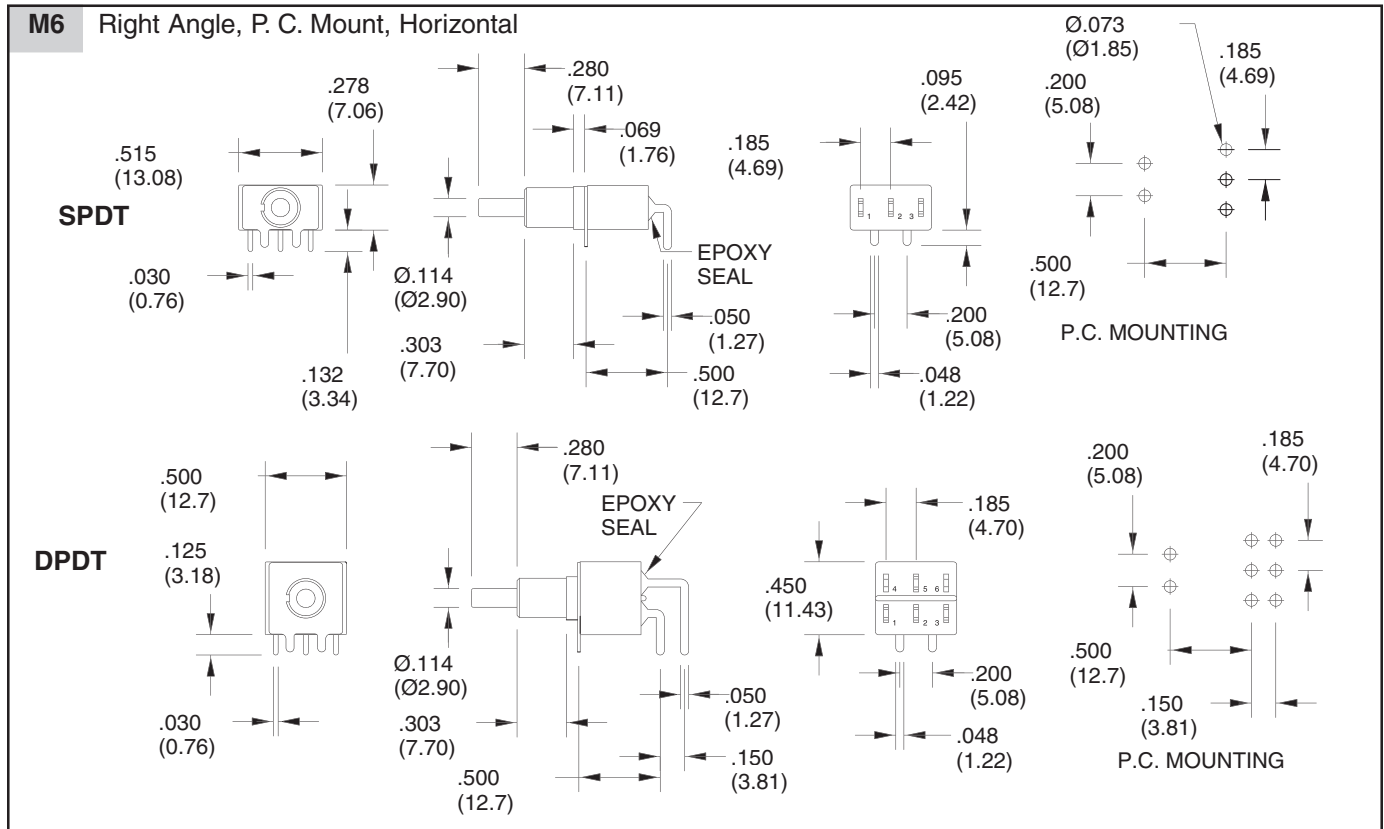
## BUSHING OPTIONS IN INCHES (AND MILLIMETERS)



## TERMINATION OPTIONS IN INCHES (AND MILLIMETERS)



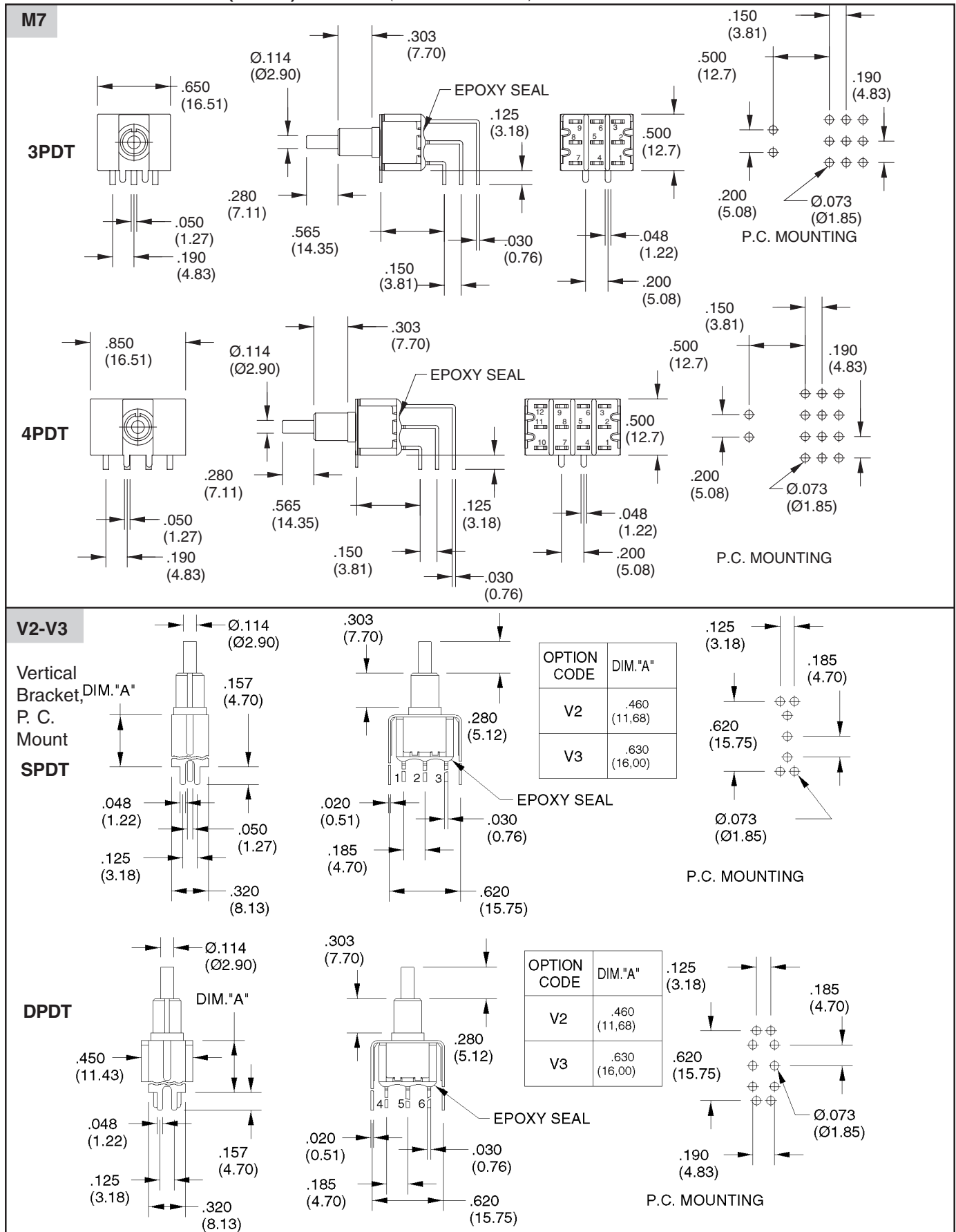
**TERMINATION OPTIONS (CONT.)** IN INCHES (AND MILLIMETERS)



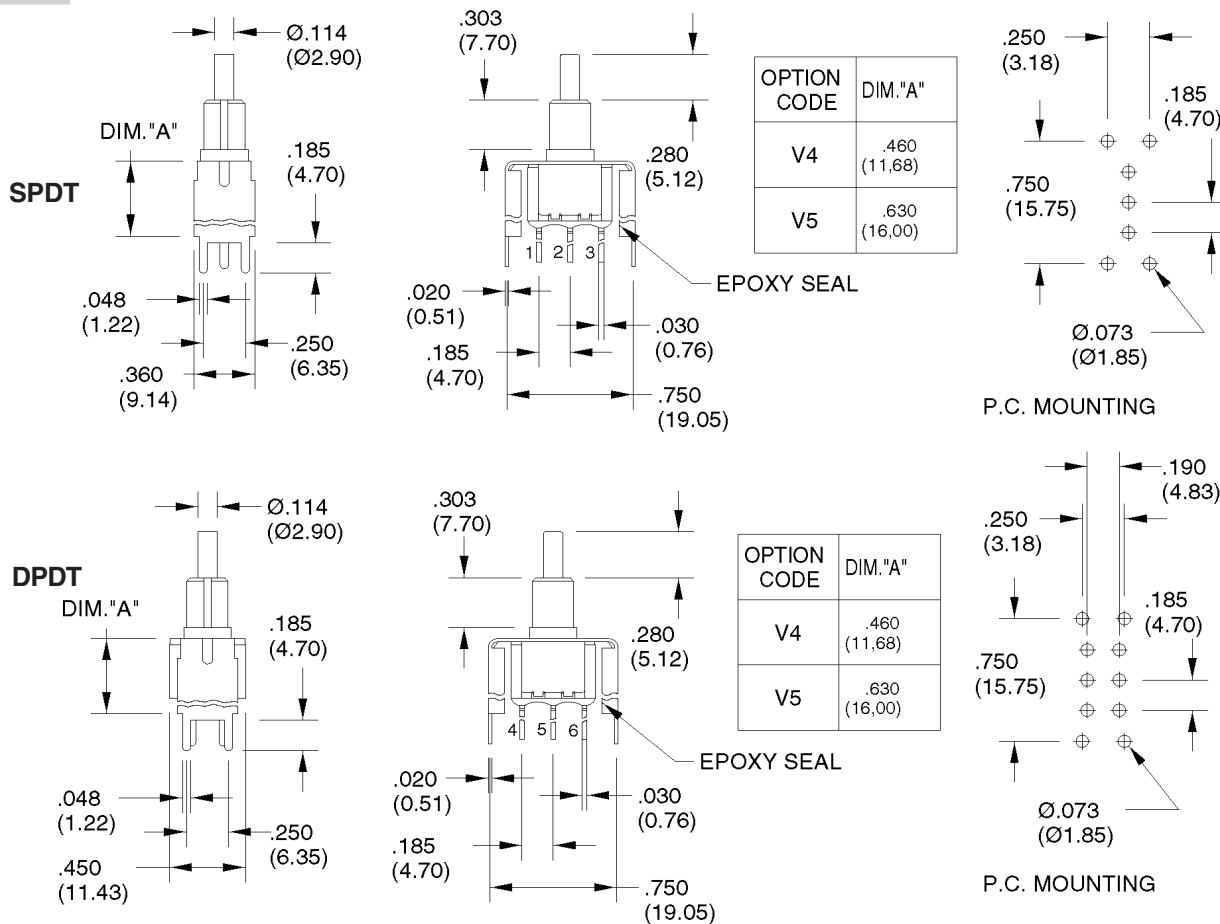
Pushbutton Switches



## TERMINATION OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)



**V4-V5 Vertical Bracket, P. C. Mount**



Pushbutton Switches

**SPECIFICATIONS**

**RATINGS**

**Contact Rating:** Q & G option - 6A @ 125 VAC or 28 VDC or 28 VDC; 3A @ 250 VAC. R option - 0.4 VA max @ 20 Vmax (AC or DC)  
**Electrical Life:** 50,000 make-and-break cycles at full load

**Contact Resistance:** 10 milliohms max. initial @ 2-4 VDC, 100 mA  
**Insulation Resistance:** 1,000 megaohms minimum  
**Dielectric Strength:** 1,500 V RMS @ sea level  
**Operating Temperature:** -30°C to 85°C

**MATERIALS**

**Case:** Diallyl phthalate (DAP) (UL94V-0)  
**Plunger:** Glass filled nylon or glass filled polyester  
**Bushing:** Zinc, nickel plated  
**Housing:** Stainless steel  
**Terminal Seal:** Epoxy

**ORDERING INFORMATION**

SERIES	MODEL NO.	PLUNGER	BUSHING	TERMINATION	CONTACT	SEAL
<b>38D</b>	<b>SP1</b>	<b>1</b>	<b>B10</b>	<b>M1</b>	<b>Q</b>	<b>T</b>
38D = Alternate Action Pushbutton Switches	Options: SP1, DP1, 3P1, 4P1 (see models for switching positions)	Options: 1, 2, 3, 4 (see plunger options)	Options: B10, B11, B20, B21, BD (see bushing options)	Options: M1, M2, M6, M7, S2, S6 V2, V3, V4, V5, W1, W2, W3, W4 (see termination options)	R = Copper alloy, gold plate over nickel plate.  Q = Copper alloy, silver plated  G=Gold plate over silver plate	T = Lead Free and RoHS Compliant

## SERIES 38E

### Sealed Snap Action Miniature Pushbutton Switches

#### FEATURES

- SPDT and DPDT Circuitry
- Choice of Bushings, and Terminations
- UL Recognized
- IP-68 Degree of Protection
- RoHS Compliant



#### MODELS IN INCHES (AND MILLIMETERS)

#### SPDT

MODEL NO.	SWITCH POSITION	
WSP7	ON	(ON)
TERM. COMB.	1-3	1-2

()=MOMENTARY

#### DPDT

MODEL NO.	SWITCH POSITION	
WDP7	ON	(ON)
TERM. COMB.	1-3, 4-6	1-2, 4-5

()=MOMENTARY

#### PLUNGER OPTIONS IN INCHES (AND MILLIMETERS)

OPTION CODE	DIM. "A"
1	.173(4.40)
2	.220(5.60)
3	.087(2.20)

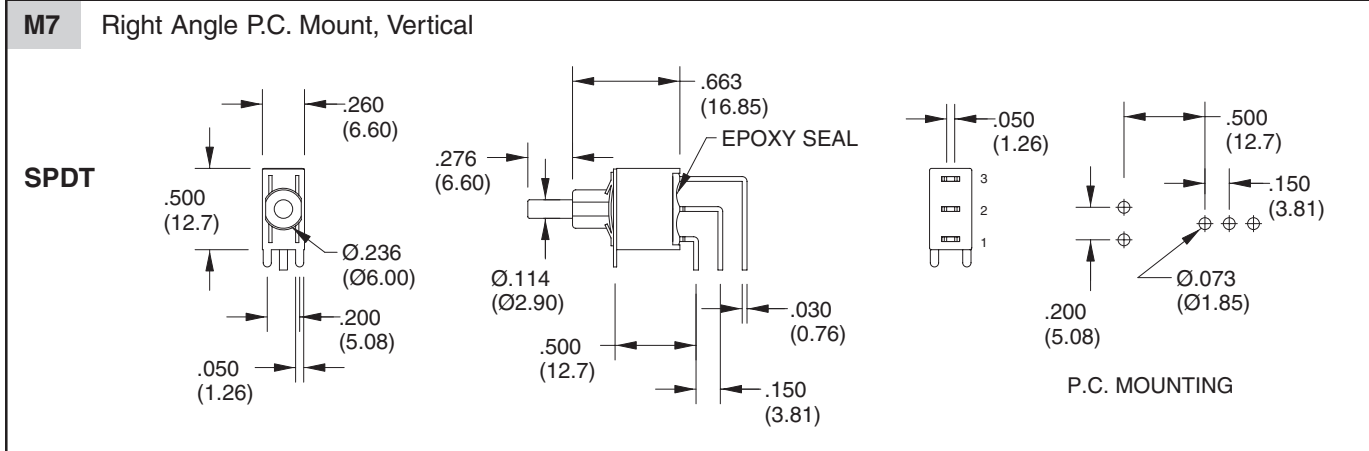
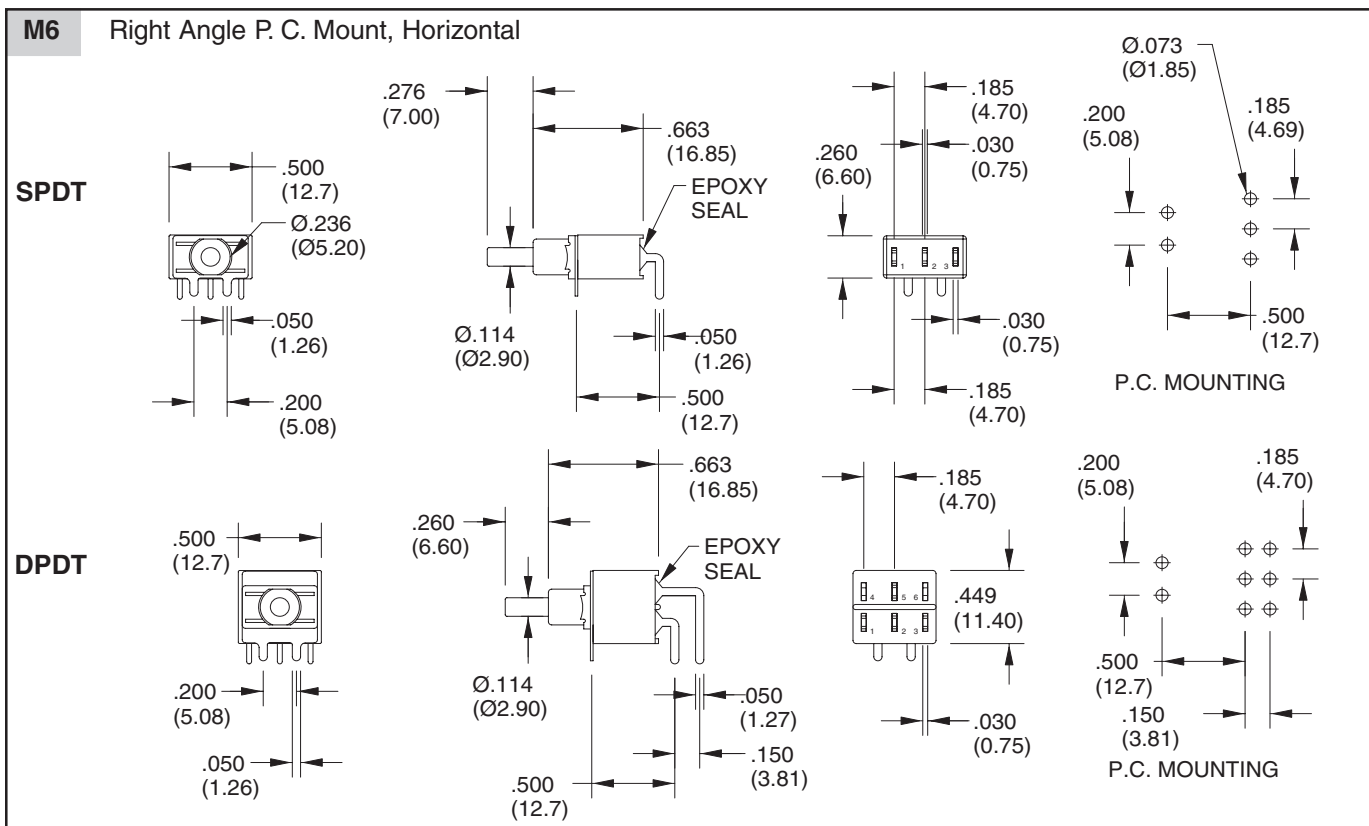
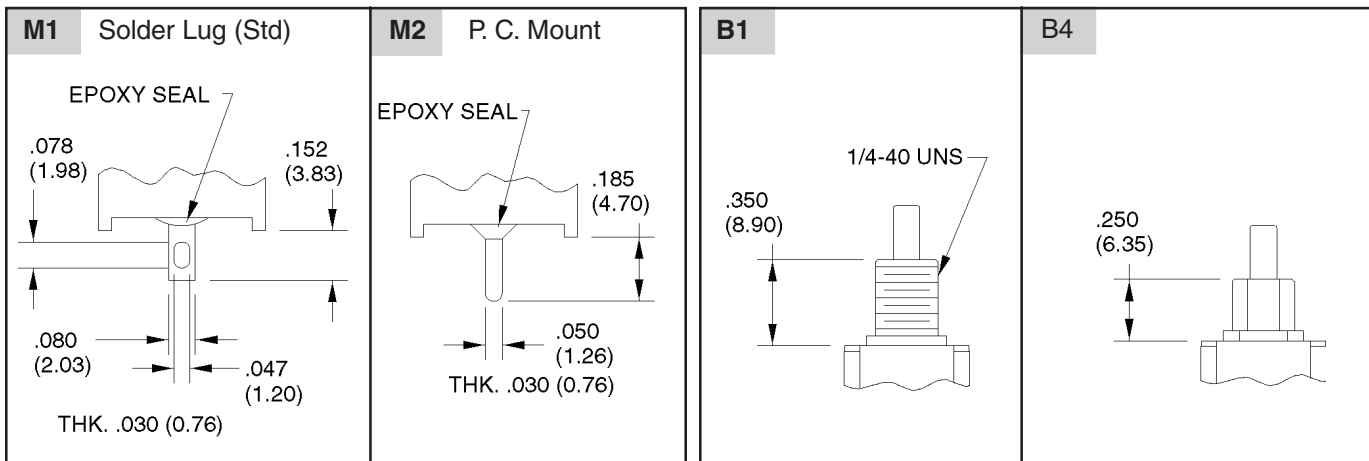
**FOR B1 BUSHING**

OPTION CODE	DIM. "A"
1	.276(7.00)
2	.327(8.30)
3	.193(4.90)

**FOR B4 BUSHING**

**BUSHING OPTIONS** IN INCHES (AND MILLIMETERS)

**TERMINATION OPTIONS** IN INCHES (AND MILLIMETERS)

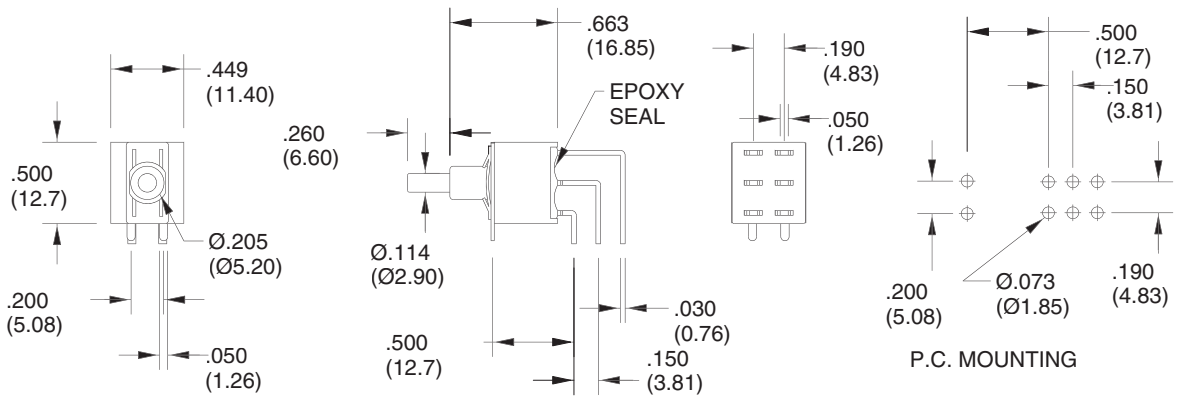


Pushbutton Switches

TERMINATION OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)

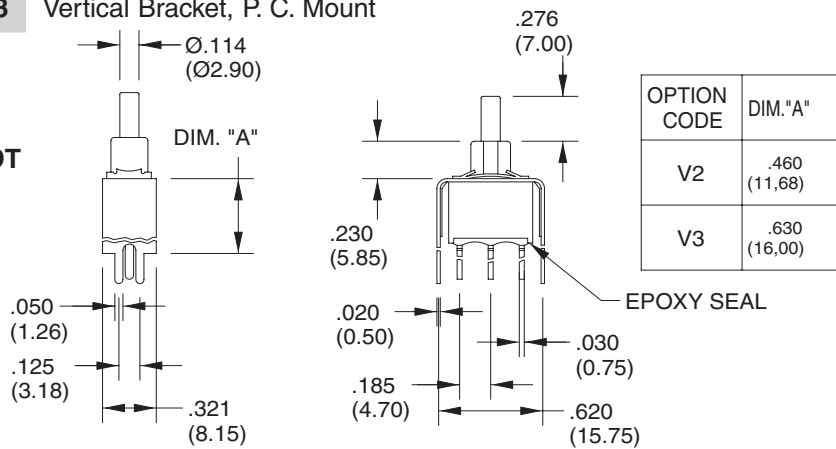
M7

DPDT

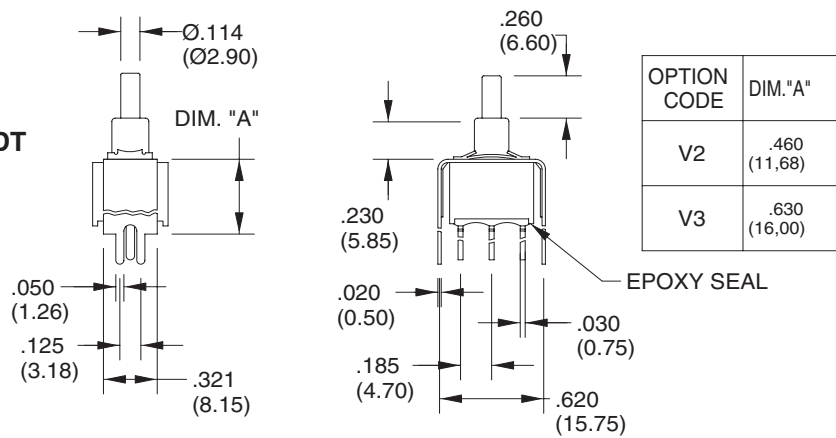


V2-V3 Vertical Bracket, P. C. Mount

SPDT

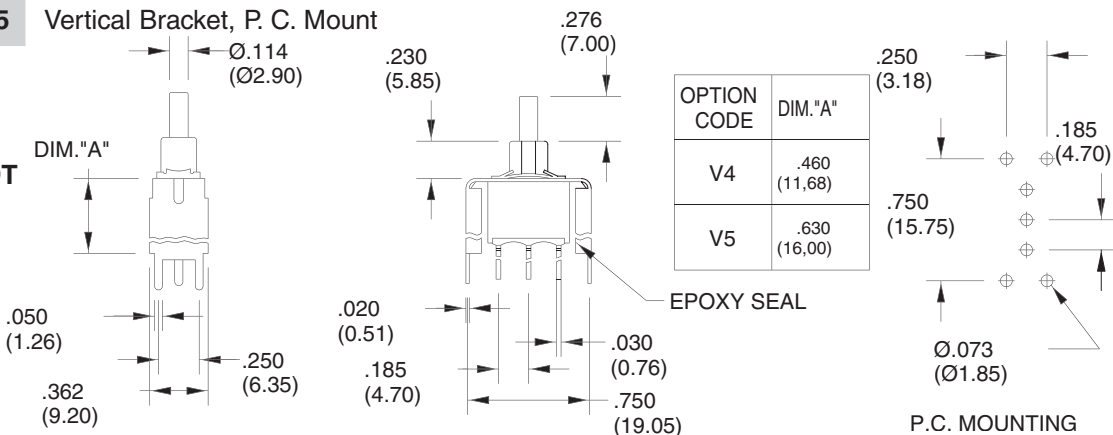


DPDT

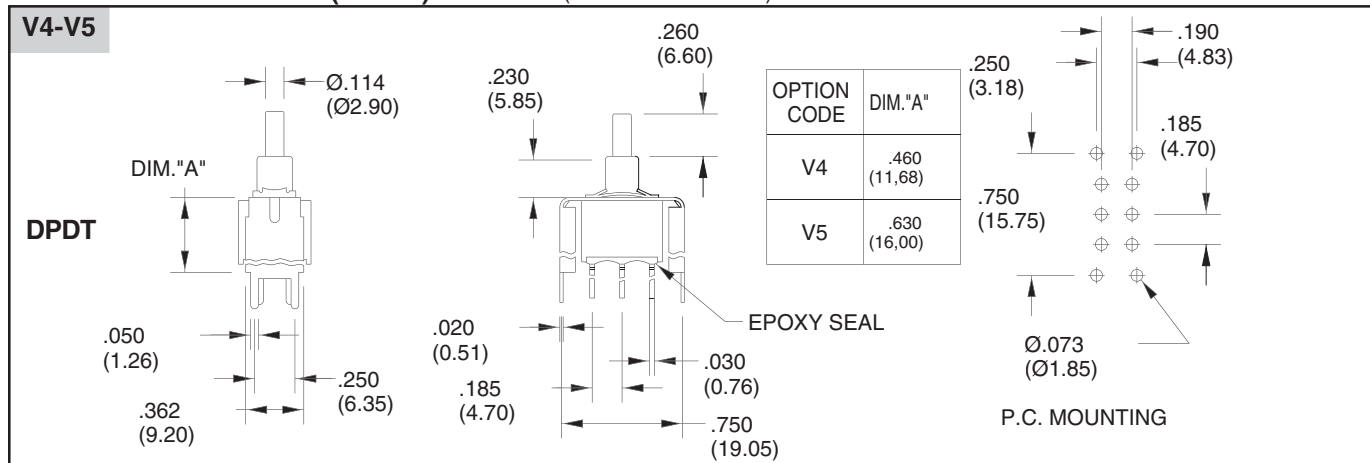


V4-V5 Vertical Bracket, P. C. Mount

SPDT

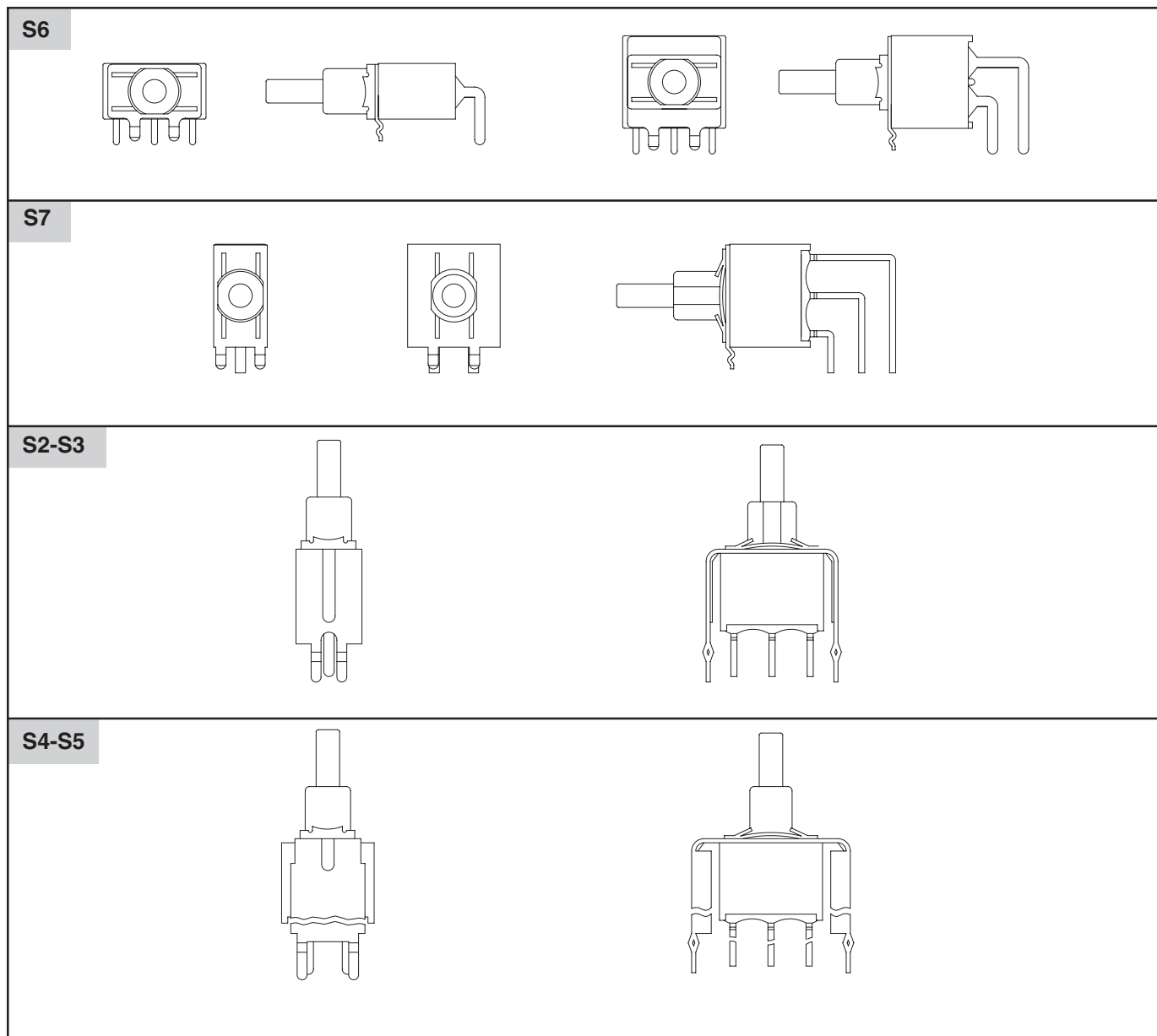


**TERMINATION OPTIONS (CONT.)** IN INCHES (AND MILLIMETERS)



**Snap-in Termination Options**

(Snap-in termination options have the same PC layout as M2, M6 and M7 options)



Pushbutton Switches

**SPECIFICATIONS**

**RATINGS**

**Contact Rating:** Q & G option - 1A with resistive load @ 125 VAC or 28 VDC.  
 R option - 0.4 VA max @ 20 Vmax (AC or DC)  
**Electrical Life:** 50,000 make-and-break cycles at full load  
**Travel:** .040 ± .010

**Contact Resistance:** 10 milliohms max. initial @ 2-4 VDC, 100 mA  
**Insulation Resistance:** 1,000 megaohms minimum  
**Dielectric Strength:** 1,500 V RMS @ sea level  
**Operating Temperature:** -30°C to 85°C

**MATERIALS**

**Case:** Glass filled Nylon 6/6 (UL94V-0)  
**Plunger:** Glass filled nylon or glass filled polyester  
**Bushing:** Brass, nickel plated  
**Housing:** Stainless steel  
**Terminal/Switch Support:** Brass or steel, electrotin plated  
**Terminal Seal:** Epoxy

**ORDERING INFORMATION**

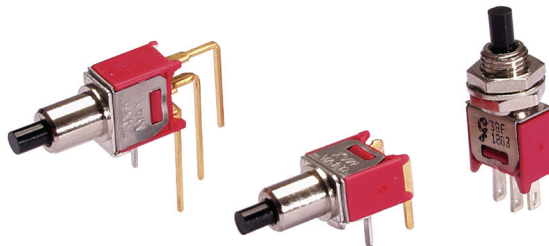
SERIES	MODEL NO.	PLUNGER	BUSHING	TERMINATION	CONTACT	SEAL
<b>38E</b>	<b>WSP7</b>	<b>1</b>	<b>B1</b>	<b>M1</b>	<b>Q</b>	<b>T</b>
38E = Sealed Snap Action Pushbutton Switches	Options: WSP7, WDP7 (see models for switching positions)	Options: 1, 2, 3 (see plunger options)	Options: B1, B4 (see bushing options)	Options: M1, M2, M6, M7, S2, S3, S4, S5, S6, S7 V2, V3, V4, V5, (see termination options)	R = Copper alloy, gold plate over nickel plate.  Q = Copper alloy, silver plated  G=Gold plate over silver plate	T = Lead Free and RoHS Compliant

Pushbutton Switches

**SERIES 38F**  
Sub-Miniature  
Pushbutton Switches

**FEATURES**

- Save Space and Weight
- SPDT and DPDT Circuitry
- Choice of Actuators, Bushings, and Terminations
- UL Recognized



**MODELS** IN INCHES (AND MILLIMETERS)

**SPST**

FLAT  
Ø.240 (Ø6.10)  
.173 (4.39)  
.155 (3.94)  
10-48UNS  
.200 (5.08)  
Ø.100 (Ø2.54)  
.214 (5.45)  
.020 (0.51)  
.110 (2.79)  
.282 (7.18)  
.321 (8.16)  
.059 (1.52)

SCHEMATIC

MODEL NO.	SWITCH POSITION	
SP9	OFF	(ON)

( )=MOMENTARY

**SPDT**

FLAT  
Ø.240 (Ø6.10)  
.173 (4.39)  
.155 (3.94)  
10-48UNS  
.200 (5.08)  
Ø.100 (Ø2.54)  
.214 (5.45)  
.020 (0.51)  
.160 (4.06)  
.110 (2.79)  
.282 (7.18)  
.321 (8.16)  
.059 (1.52)

SCHEMATIC

N.C.1  
2COMM.  
3 N.O.

MODEL NO.	SWITCH POSITION	
SP8	ON	(ON)
TERM. COMM.	2-1	2-3

( )=MOMENTARY

**BUSHING OPTIONS** IN INCHES (AND MILLIMETERS)

**B5**

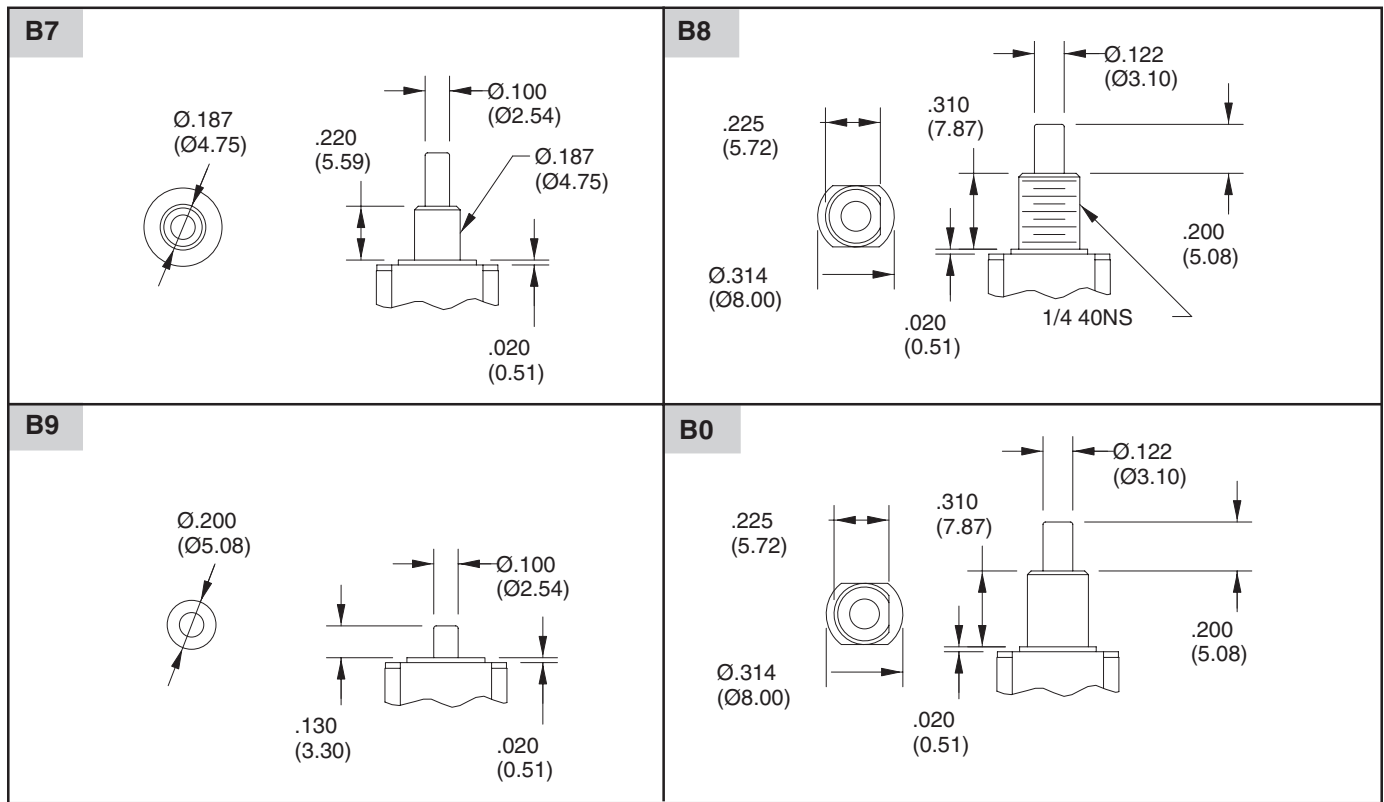
Ø.100 (Ø2.54)  
.220 (5.59)  
10-48 UNS  
.173 (4.39)  
.020 (0.51)

**B6**

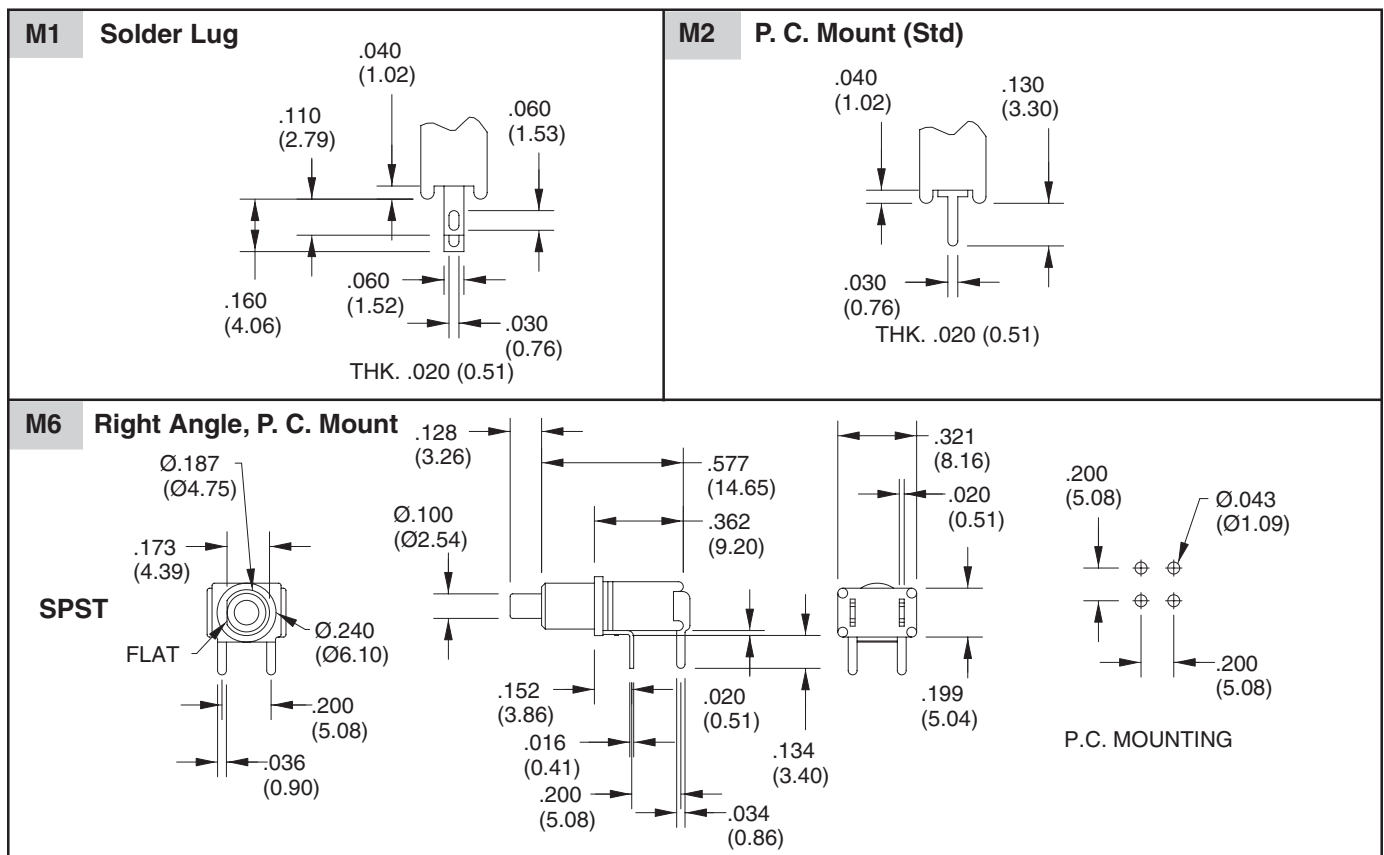
Ø.100 (Ø2.54)  
.220 (5.59)  
Ø.187 (Ø4.75)  
.173 (4.39)  
.020 (0.51)



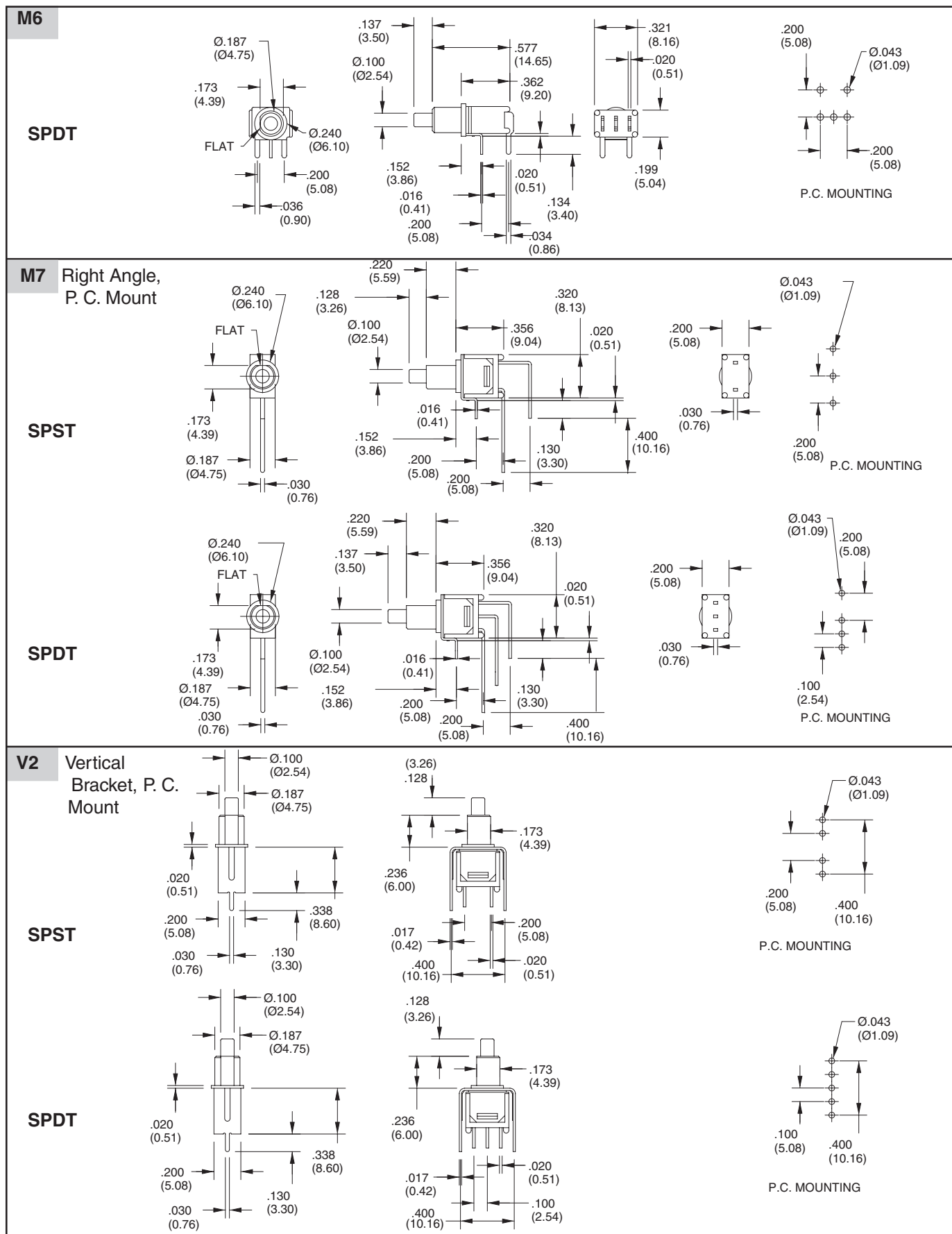
## BUSHING OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)



## TERMINATION OPTIONS IN INCHES (AND MILLIMETERS)



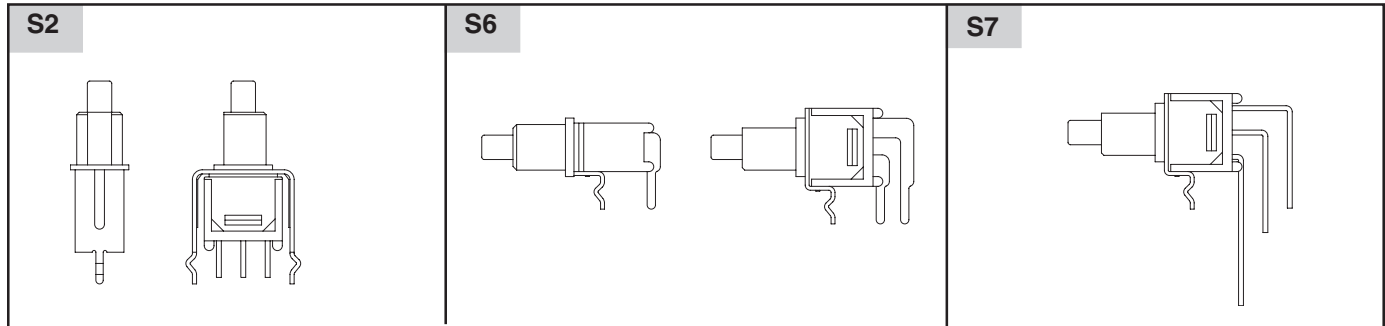
TERMINATION OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)



Pushbutton Switches

## Snap-in Termination Options

(Snap-in termination options have the same PC layout as M2, M6 and M7 options)



## SPECIFICATIONS

### RATINGS

**Contact Rating:** Q & G option - 1A with resistive load @ 125 VAC or 28 VDC; R option - 0.4 VA max @ 20 Vmax (AC or DC)

**Electrical Life:** 30,000 make-and-break cycles at full load

**Travel:** .030 ± .010

**Contact Resistance:** 20 milliohms max. initial @ 2-4 VDC, 100 mA

**Insulation Resistance:** 1,000 megaohms minimum

**Dielectric Strength:** 1,000 V RMS @ sea level

**Operating Temperature:** -30°C to 85°C

### MATERIALS

**Case:** Diallyl phthalate (DAP) (UL94V-0)

**Plunger:** Polyester

**Bushing:** Brass, nickel plated

**Housing:** Stainless steel

**Terminal/Switch Support:** Brass, electroplated

**Terminal Seal:** Epoxy

## ORDERING INFORMATION

SERIES	MODEL NO.	BUSHING	TERMINATION	CONTACT	SEAL
<b>38F</b>	<b>SP8</b>	<b>B5</b>	<b>M1</b>	<b>Q</b>	<b>T</b>
38F = Sub-Miniature Pushbutton Switches	Options: SP8, SP9 (see models for switching positions)	Options: B5, B6, B7, B8, B9, B0 (see bushing options)	Options: M1, M2, M6, M7, V2, S2, S6, S7 (see termination options)	R = Copper alloy, gold plate over nickel plate. Q = Copper alloy, silver plated G=Gold plate over silver plate	T = Lead Free and RoHS Compliant

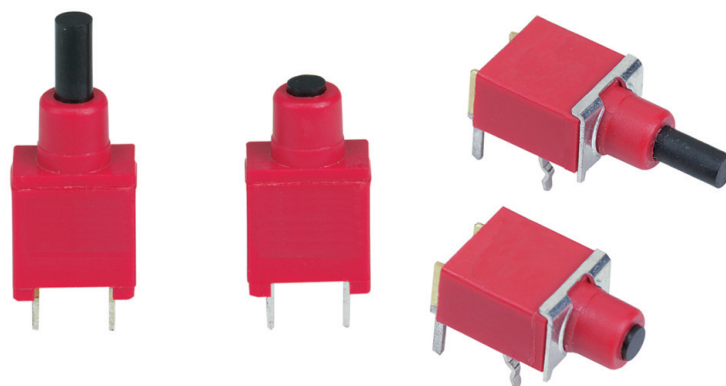
**Example Part Number: 38FSP8B5M1QE**

Available from your local Grayhill Component Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

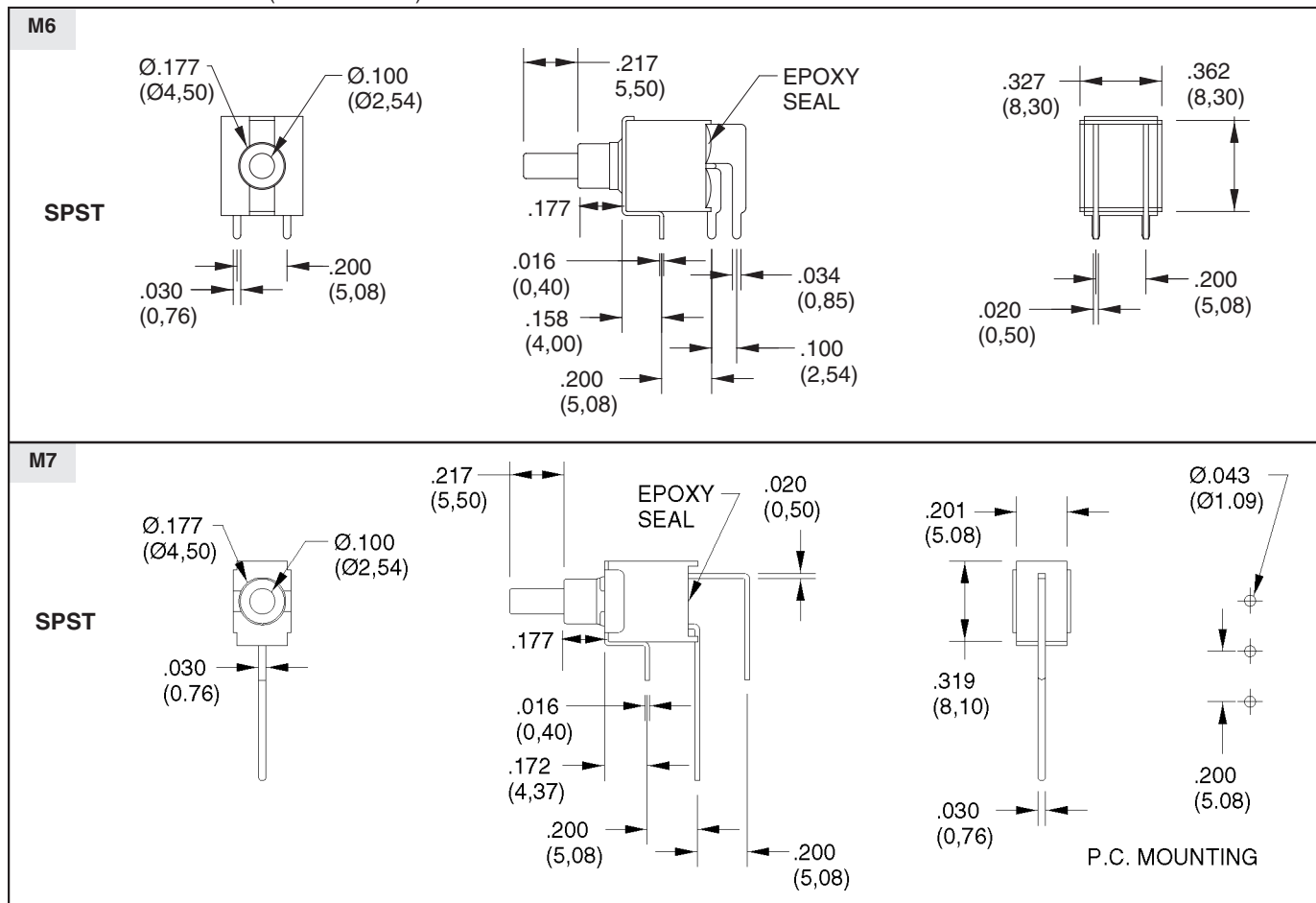
**SERIES 38G**  
**Sealed Subminiature**  
**Pushbutton Switches**

**FEATURES**

- Drop-In Replacement for Industry Standard
- Choice of Terminations
- Printed Circuit Board Mount
- SPST, DPST and SPDT Momentary Contact
- Sealed Per IP67



**DIMENSIONS** In inches (and millimeters)



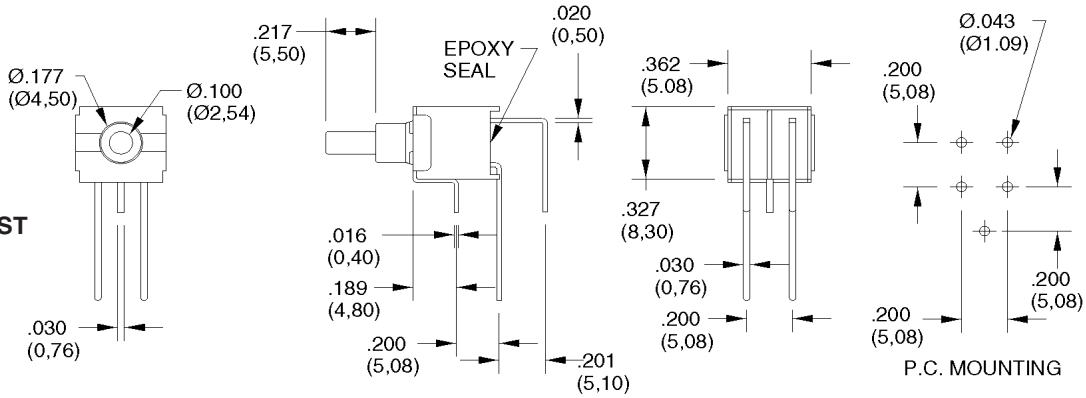
Pushbutton Switches

**SERIES 38G**

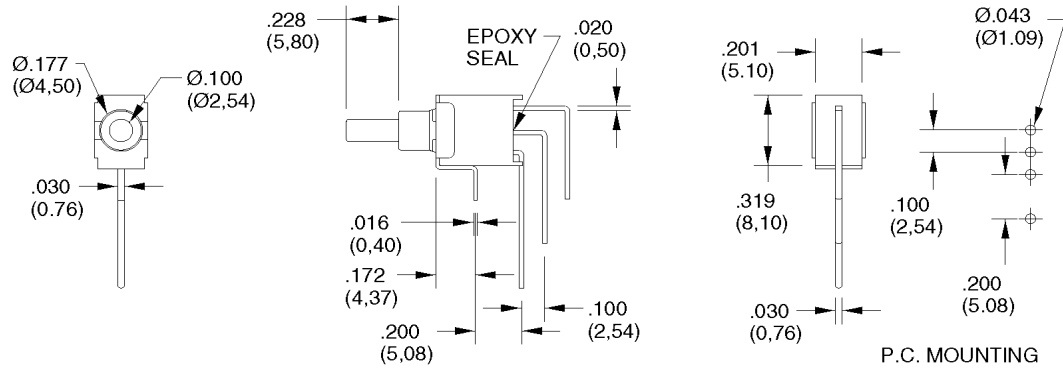
**DIMENSIONS** In inches (and millimeters)

**M7**

**DPST**

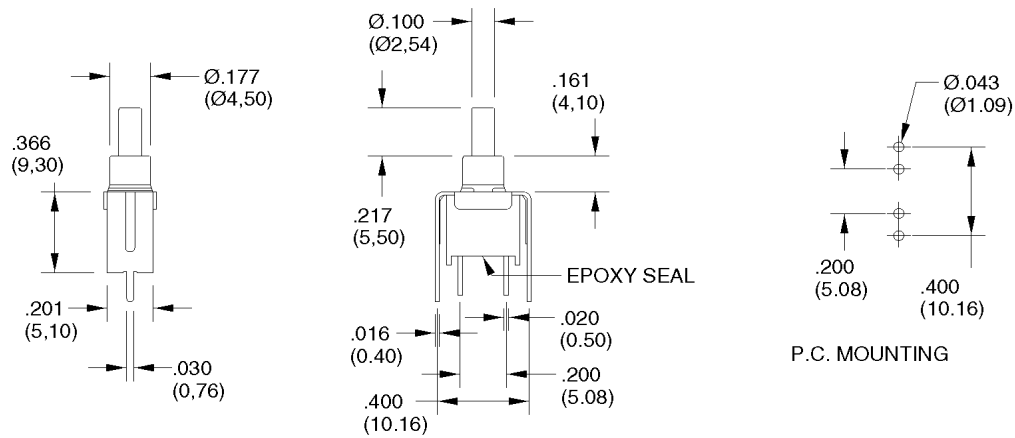


**SPDT**

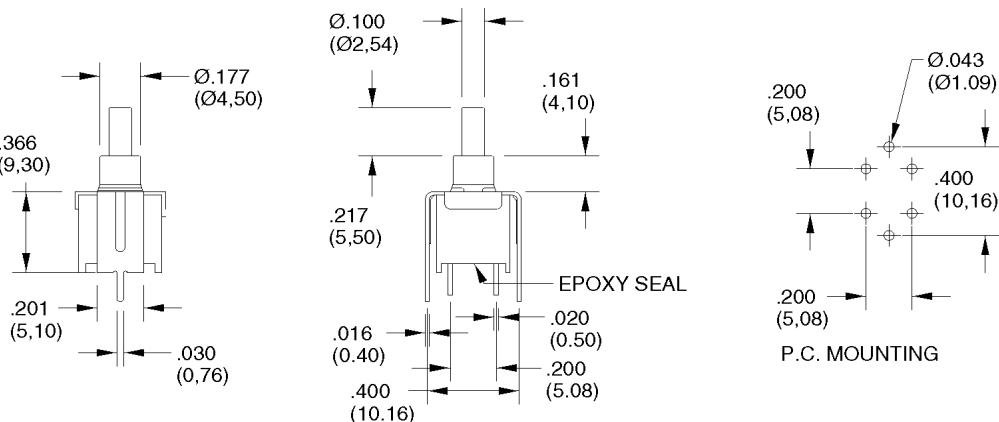


**V2**

**SPST**

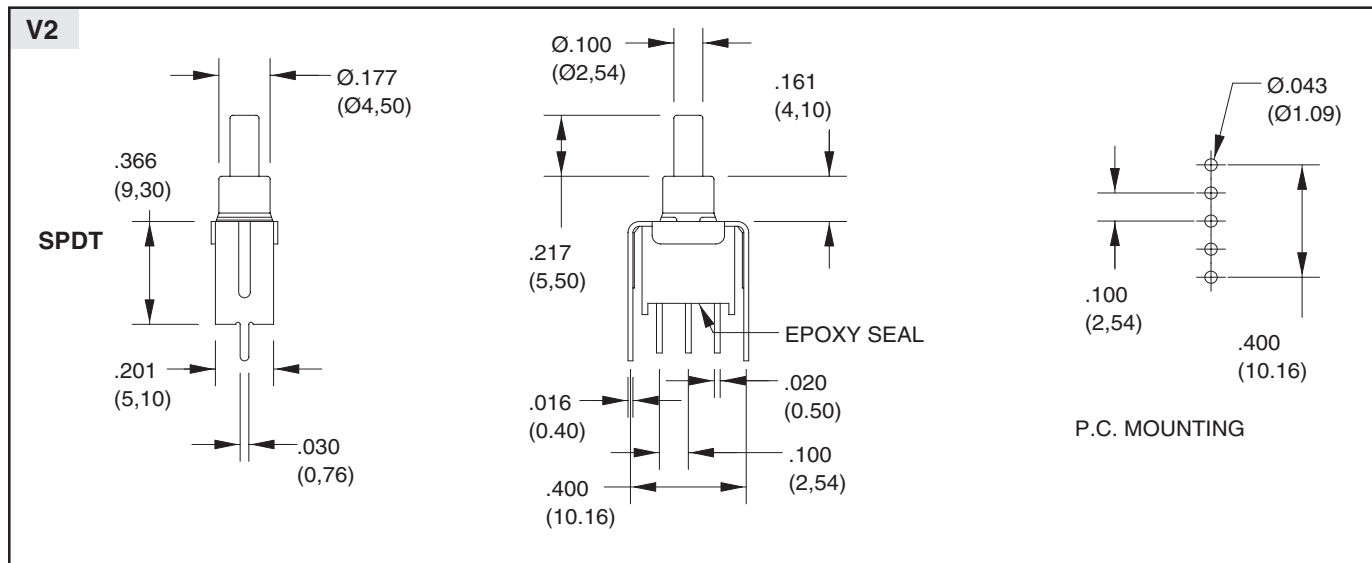


**DPST**

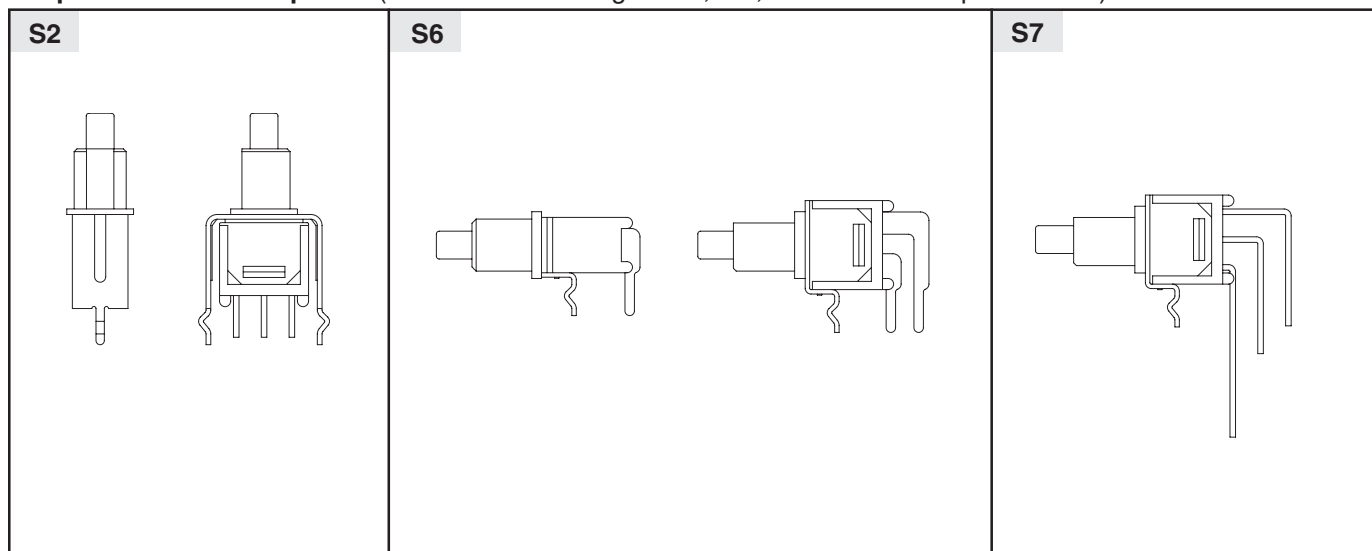


### SERIES 38G

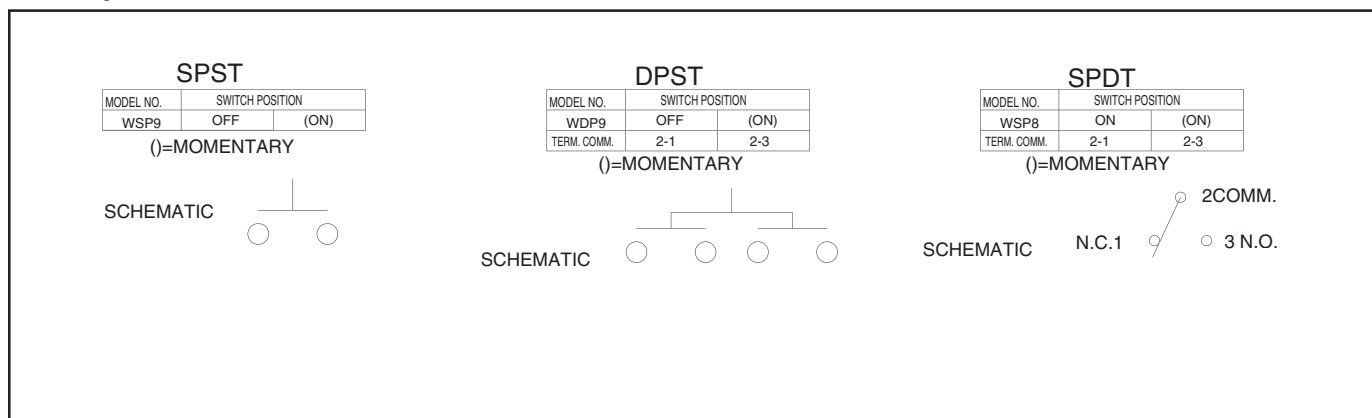
**DIMENSIONS** In inches (and millimeters)



**Snap-in Termination Options** (Same P.C. mounting as V2, M6, M7 but with snap-in bracket)



### Circuitry



Pushbutton Switches

## SERIES 38G

### SPECIFICATIONS

#### Rating Criteria

**Operating Life:** 30,000 make-and-break cycles at full load

#### Contact Rating (resistive load):

R Option: 0.4 VA maximum at 20 Vac or Vdc maximum

G Option: 1A max at 125 Vac or 28 Vdc

**Contact Resistance:** 20 milliohms max initial at 2-4 Vdc, 100 mA

**Insulation Resistance:** 1000 megaohms minimum

**Voltage Breakdown:** 1500 Vrms minimum at sea level

**Operating Temperature:** -30°C. to +85°C.

**Terminals:** Copper alloy

**Spring:** Plated Music Wire

**Contact System:** Copper alloy

**Switch Support:** Brass, tin-plated

#### Materials and Finishes

**Case:** Glass filled Nylon 6/6 (UL 94V-0)

**Plunger:** Thermoplastic Polyester(UL 94V-0) (with internal o-ring seal)

### ORDERING INFORMATION

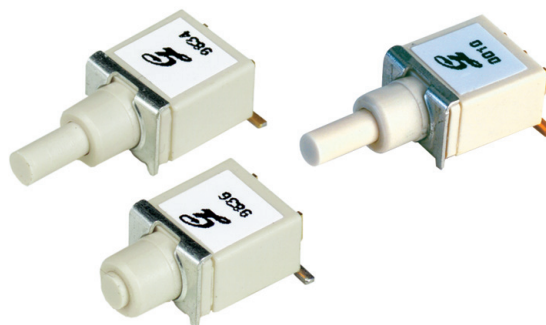
38G	WSP8	M7	R	T
Subminiature Sealed Pushbutton Switches	Options: WSP8, WSP9, WDP9 (see models for switching positions)	Options: M6, M7, S2, S6, S7, V2 (see termination options)	R = Copper alloy, gold plate over nickel plate.  G=Gold plate over silver plate	T = Lead Free and RoHS Compliant

### SERIES 38H

#### Sealed Surface Mount Subminiature Pushbutton Switches

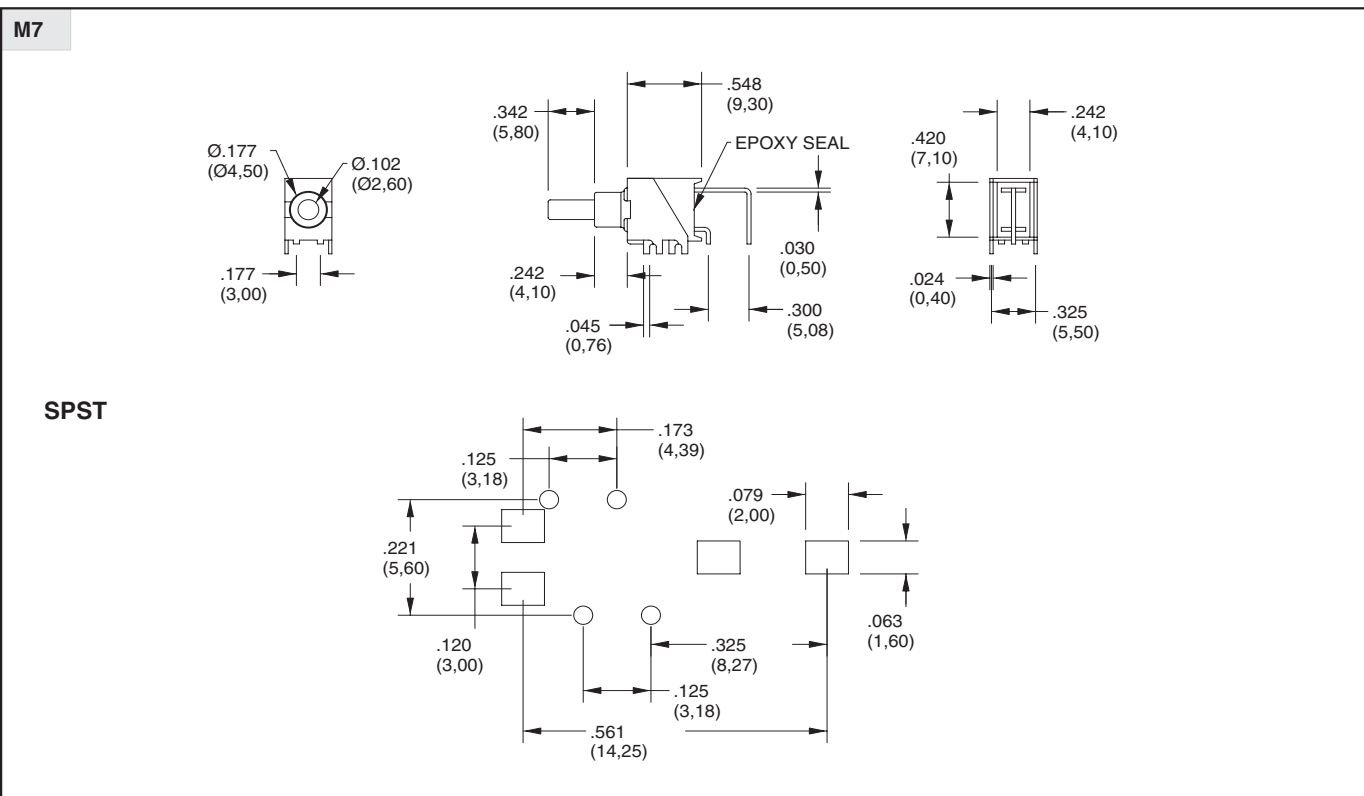
#### FEATURES

- ï Surface Mount Process Compatible
- ï Sealed Construction
- ï Solder-Coated Terminals
- ï Tape and Reel Packaging
- ï SPST and SPDT Momentary Contact
- Sealed Per IP67



### SERIES 38H

#### DIMENSIONS In inches (and millimeters)

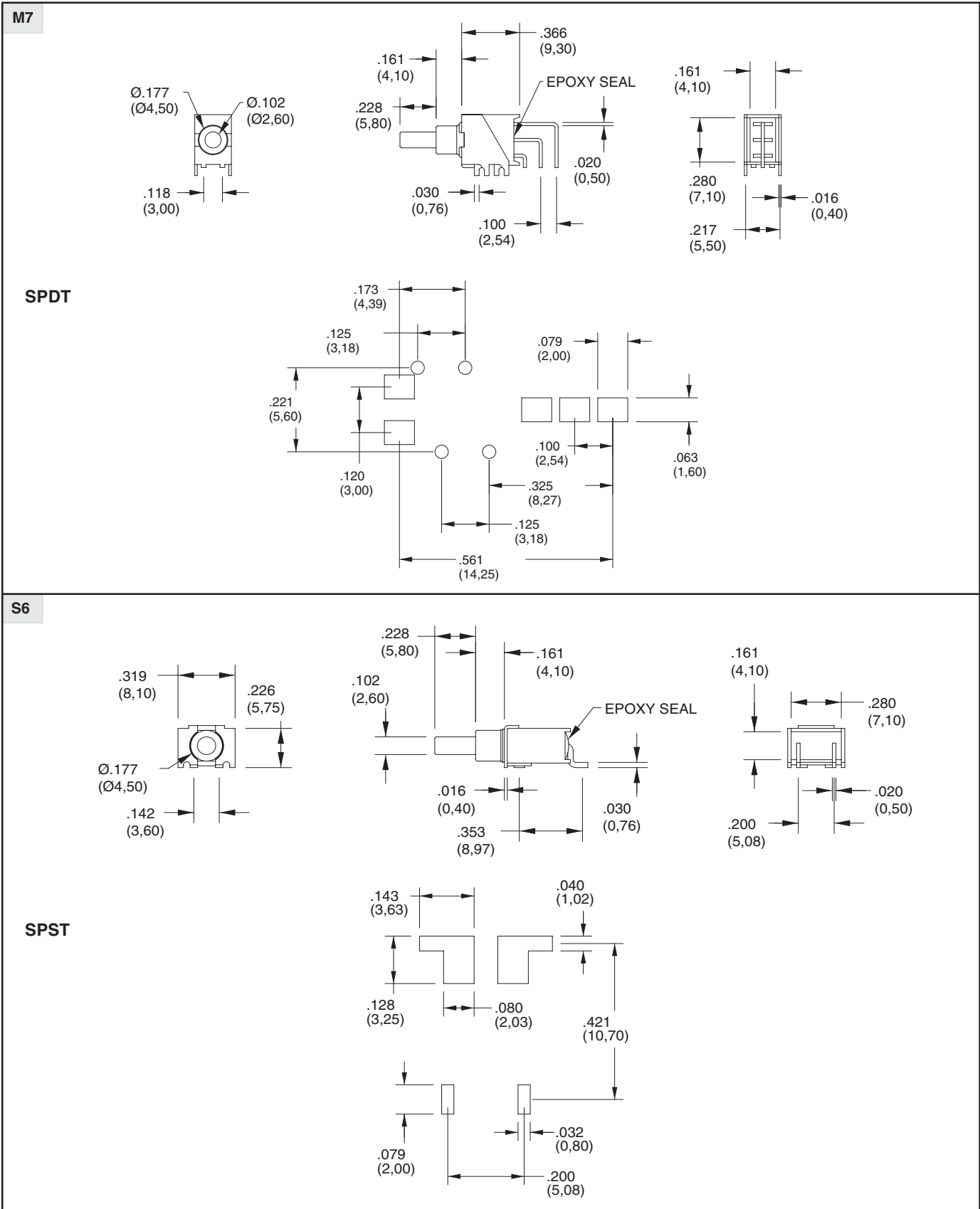


Pushbutton Switches



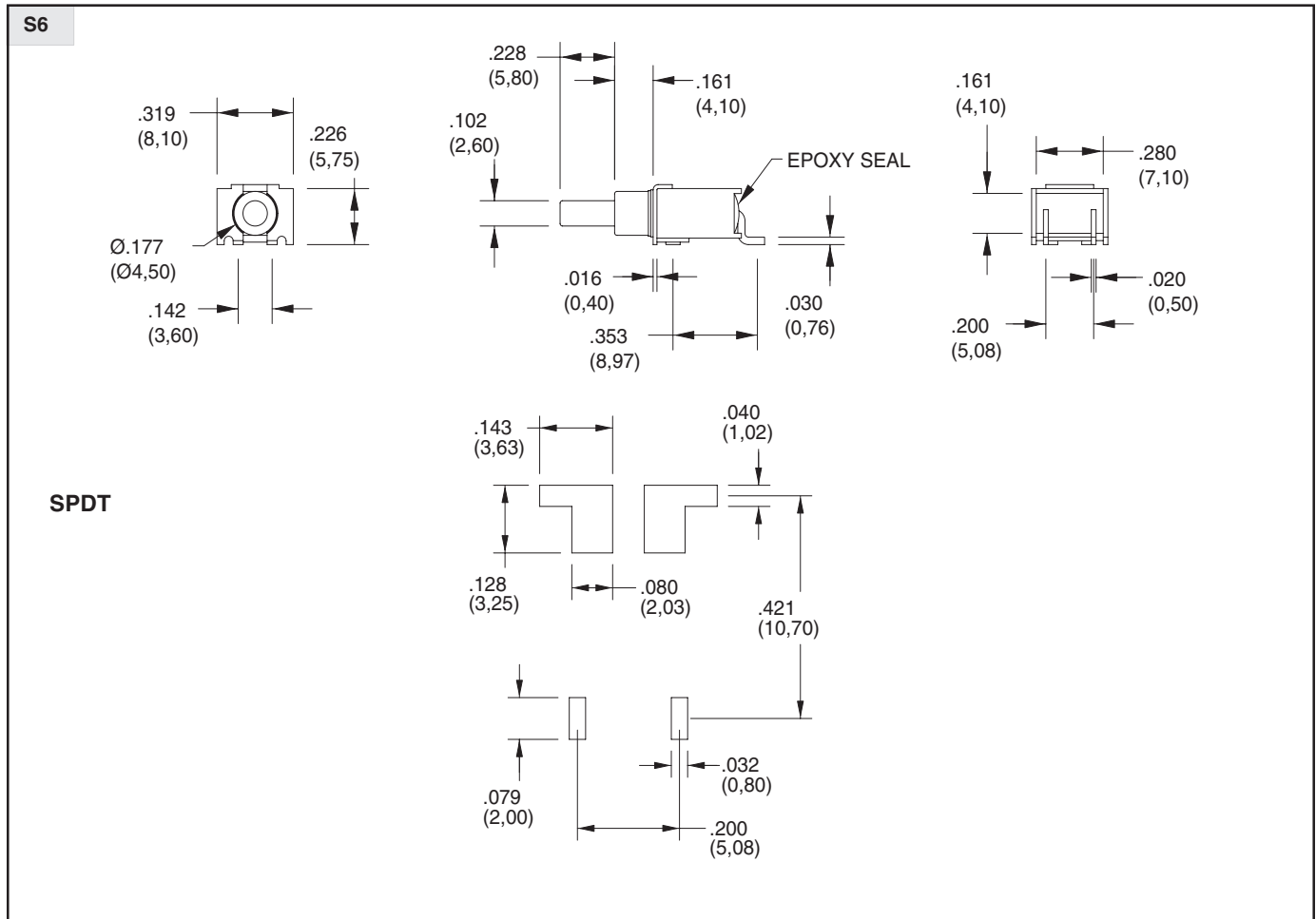
**SERIES 38H**

**DIMENSIONS** In inches (and millimeters)



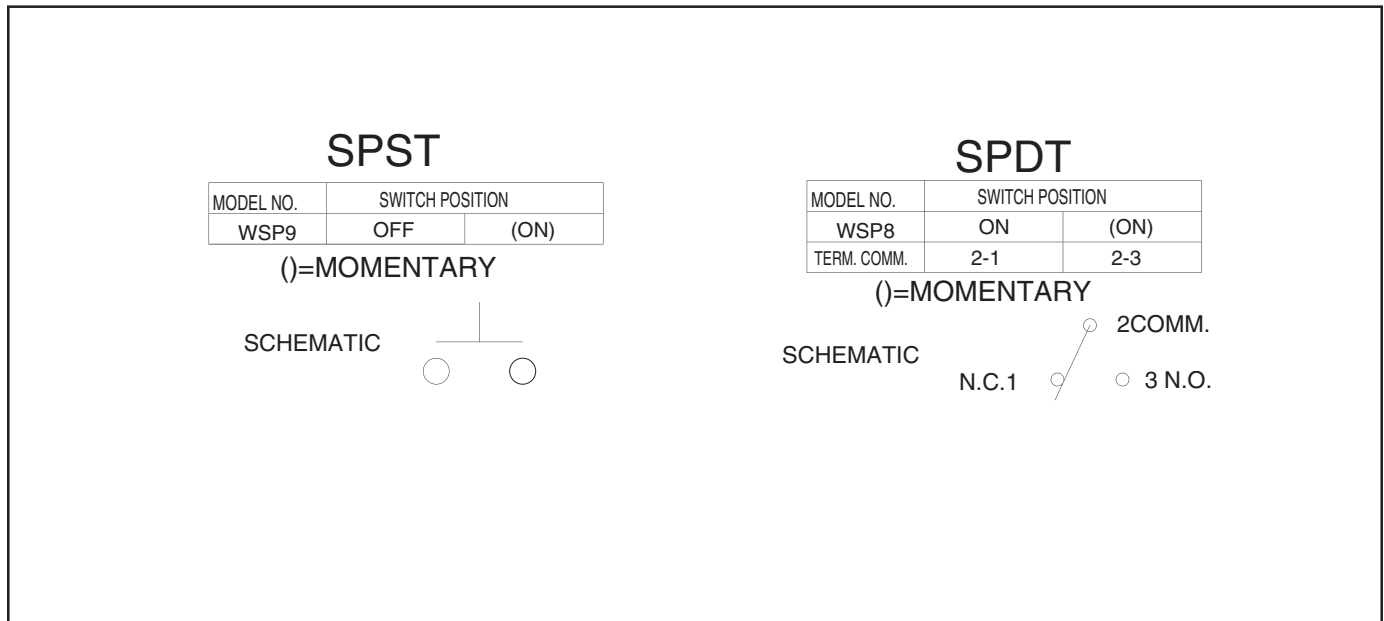
**SERIES 38H**

**DIMENSIONS** In inches (and millimeters)



Pushbutton Switches

**Circuitry**



## SERIES 38H

### SPECIFICATIONS

#### Rating Criteria

**Operating Life:** 30,000 make-and-break cycles at full load

#### Contact Rating (resistive load):

R Option: 0.4 VA maximum at 20 Vac or Vdc maximum

Q & G Options: 1A max at 125 Vac or 28 Vdc

**Contact Resistance:** 20 milliohms max initial at 2-4 Vdc, 100 mA

**Insulation Resistance:** 1000 megaohms minimum

**Voltage Breakdown:** 1500 Vrms minimum at sea level

**Operating Temperature:** -30°C. to +85°C.

**Contact System:** Copper alloy

**Switch Support:** Brass, tin-plated

#### Materials and Finishes

**Case:** Glass Filled Nylon 4/6, UL94V-

**Plunger:** Thermoplastic Polyester(UL 94V-0) (with internal o-ring seal)

**Terminals:** Copper alloy

**Spring:** Plated Music Wire

### ORDERING INFORMATION

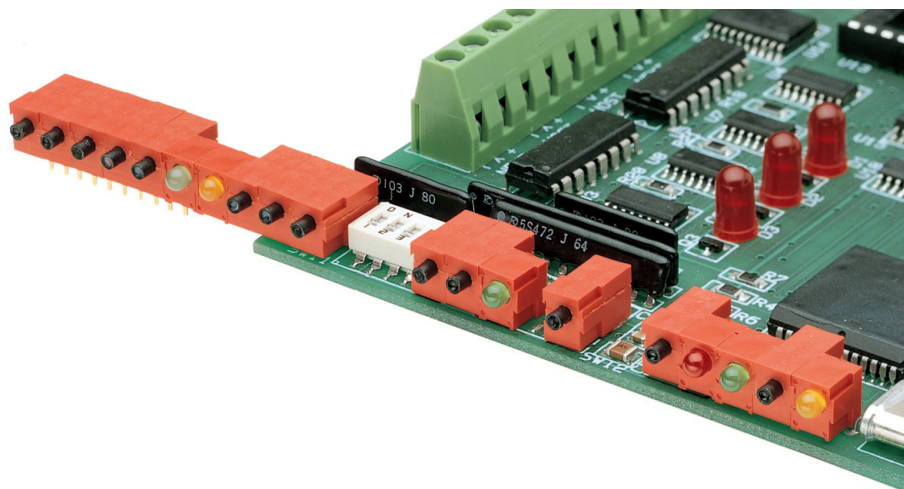
SERIES	MODEL NO.	TERMINATION	CONTACT	SEAL
<b>38H</b>	<b>WSP8</b>	<b>M7</b>	<b>R</b>	<b>T</b>
Sealed Surface Mount Subminiature Pushbutton Switches	Options: WSP8, WSP9 (see models for switching positions)	Options: M7, S6 (see termination options)	R = Copper alloy, gold plate over nickel plate.  G = Copper alloy, Gold plate over silver plate  Q = Copper alloy, Silver Plate	T = Lead Free and RoHS compliant

Pushbutton Switches

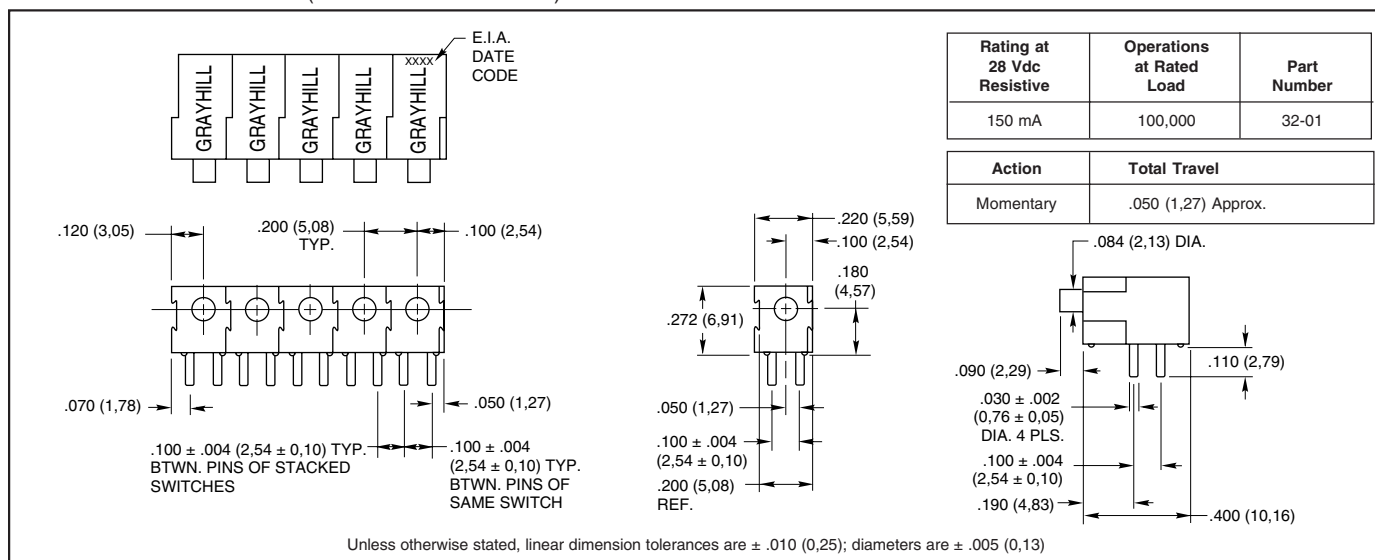
**SERIES 32**  
**SPST and SPDT,**  
**Stackable with LED**

**FEATURES**

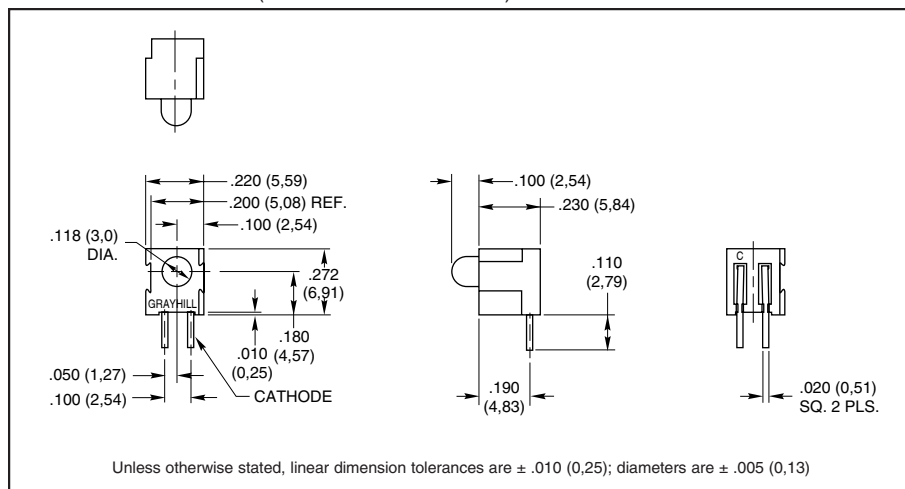
- Stackable, Provides Custom Switch Arrangements
- .200" Centers When Stacked
- SPST–N.O., SPST–N.C. Circuitry in the Same Package
- Process Compatible, Internally Sealed Plunger
- Status/Reset or Press-to-Test Functions with Companion LED



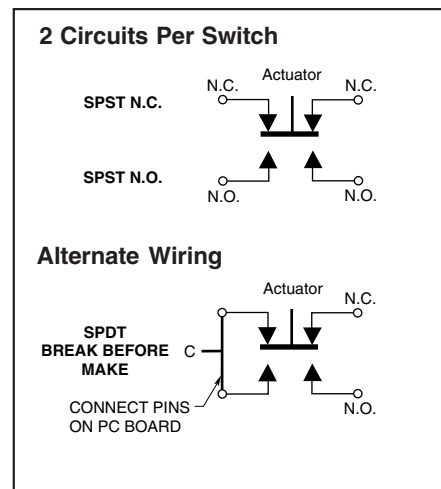
**SWITCH DIMENSIONS** (In inches and millimeters)



**LED DIMENSIONS** (In inches and millimeters)



**SWITCH CIRCUITRY**



Pushbutton Switches

## SPECIFICATIONS

### Rating Criteria

**Contact Resistance:** 25 milliohms maximum on a new switch

**Voltage Breakdown:** 1,000 Vac between mutually insulated parts

**Insulation Resistance:** 1,000 megohms minimum

**Switch and LED Operating Temperature:** -40°C to +85°C

### Materials and Finishes

**Switch Base, LED Base, Button and Cover:** Polyester

**Shorting Bar:** Phosphor bronze, gold-plated over nickel

**Switch Terminals:** Brass, gold-plated over nickel

**LED Terminals:** Steel, tin-plated

**Spring:** Tinned Music Wire

### LED Information

Color	MCD*		Viewing Angle
	Min.	Max.	
Red	0.8	5.0	60°
Green	0.8	3.2	60°
Yellow	0.8	3.2	60°

\*MCD = Millicandellas at 2 mA

**Recommended Current:** 2mA

Current limiting resistor is **not** supplied.

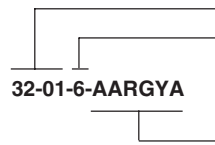
## ORDERING INFORMATION: Individual Units

Part Number	Description
32-01	Switch, 10 microinches gold plating, black button, red body
32-02	Switch, 30 microinches gold plating, black button, red body
32LED-RED	Red LED and holder, red body
32LED-GRN	Green LED and holder, red body
32LED-YEL	Yellow LED and holder, red body

Grayhill or your local Distributor will assemble stacks of switches, LEDs or combinations.

## Assemblies of Switches or Switches and LED Combinations

Example Part Number



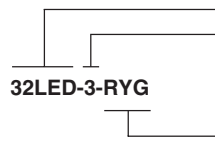
**Basic switch part number** (see *Ordering Information*)  
**Number of ganged elements** (2 thru 6)

**Arrangement definition** (left to right, front view)  
 A = Switch  
 R = Red LED  
 G = Green LED  
 Y = Yellow LED

Example part number describes a stack of 6 elements consisting of two switches, a red LED, a green LED, a switch and a yellow LED. Shorter stacks will have fewer letters in the arrangement definition. Contact Grayhill for stacks of more than six elements.

## Assemblies of LEDs Only

Example Part Number



**Basic identification for LEDs**  
**Number of ganged elements** (2 thru 6)

**Arrangement definition** (left to right, front view)  
 R = Red LED  
 G = Green LED  
 Y = Yellow LED

Example part number describes a stack of 3 LEDs, arranged red, yellow and green from left to right. Maximum number of stacked LEDs in this part numbering scheme is six. Contact Grayhill for stacks of more than six elements.

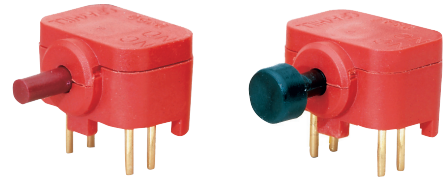
**Available from your local Grayhill Distributor.**

For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

**SERIES 39**  
SPST and SPDT, 1/4 Amp

**FEATURES**

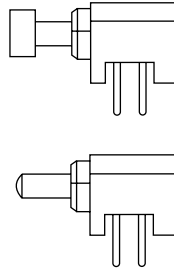
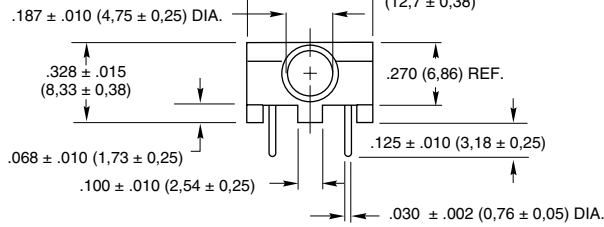
- Fully Protected During Flux Cleaning Operations



**DIMENSIONS** In Inches (and millimeters)

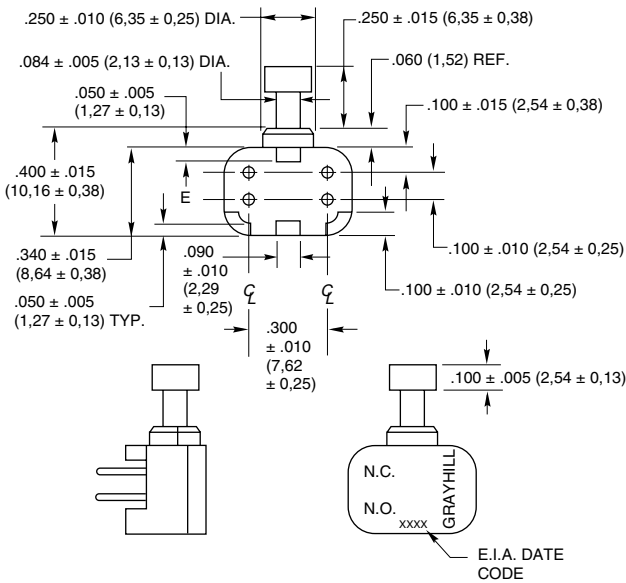
**SPDT-PC Mount**  
**Large Button Style**

39-261\*



Rating at 28 Vdc Resistive	Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Partial Part Number
150 mA	1/4 Amp	1/8 Amp	500,000	39-251* 39-261*

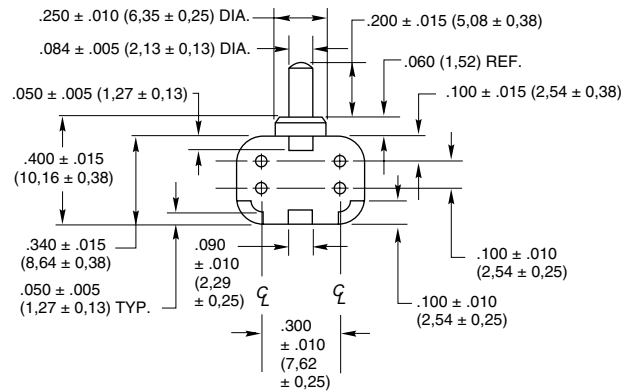
Action	Total Travel	Actuating Force (oz.)
Momentary	.090 + .010/ - .015 (2,29 + 0,25/ - 0,38)	10 ± 3 oz.



**Small Button Style**

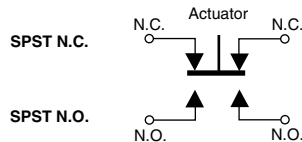
39-251\*

END OF BUTTON HAS A .200 (5,08) SPHERICAL RADIUS

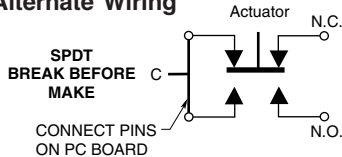


**CIRCUITRY**

**2 Circuits Per Switch**



**Alternate Wiring**



**SPECIFICATIONS**

**Rating Criteria**

**Contact Resistance:** 25 milliohms maximum on a new switch

**Voltage Breakdown:** 1,000 Vac between mutually insulated parts

**Insulation Resistance:** 1,000 megohms minimum

**Operating Temperature:** -40°C to +125°C

**Materials and Finishes**

**Button:** Nylon

**Base and Cover:** Polyester, red in color

**Shorting Bar:** Phosphor bronze, gold-plated over nickel

**Terminals:** Brass, gold-plated over nickel

**Spring:** Tinned music wire

**O-Ring:** Fluorosilicone

**ORDERING INFORMATION**

*Complete Part Number	Description
39-251 RED	Small Red Button, SPDT
39-251 BLK	Small Black Button, SPDT
39-261 RED	Large Red Button, SPDT
39-261 BLK	Large Black Button, SPDT

Available from your local Grayhill Distributor.

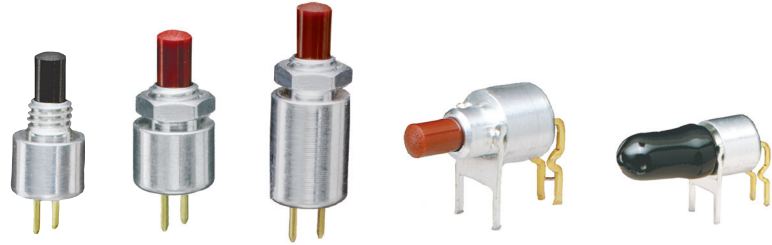
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

Pushbutton Switches

## SERIES 39 SPST, 150 mA

### FEATURES

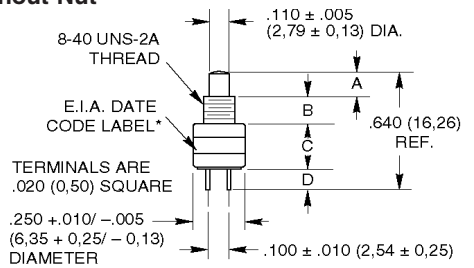
- 1/4" Diameter
- Up to 1,000,000 Cycles of Operation
- PC Mount



### DIMENSIONS In Inches (and millimeters)

#### SPST–Normally Open, Without Nut

39-405\*



\*Label increases nominal diameter to .255 (6,48)

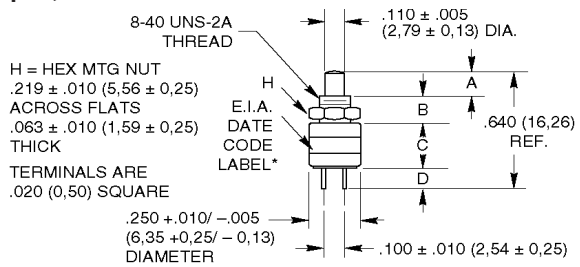
- A = .175 + .025 / - .020 (4,45 + 0,64 / - 0,51)
- B = .125 ± .010 (3,18 ± 0,25)
- C = .215 ± .015 (5,46 ± 0,38)
- D = .125 ± .010 (3,18 ± 0,25)

Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	1,000,000	39-405 RED 39-405 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)
Momentary	.035 ± .015 (0,89 ± 0,38)	4 + 4 - 2

#### SPST–Normally Open, With Nut

39-401\*



\*Label increases nominal diameter to .255 (6,48)

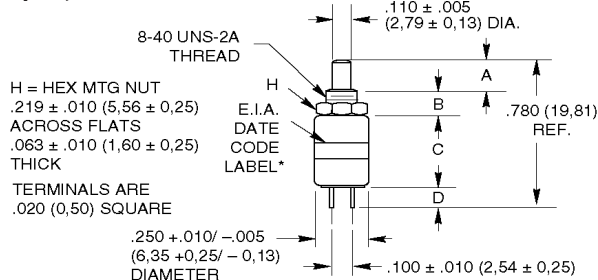
- A = .175 + .025 / - .020 (4,45 + 0,64 / - 0,51)
- B = .125 ± .010 (3,18 ± 0,25)
- C = .215 ± .015 (5,46 ± 0,38)
- D = .125 ± .010 (3,18 ± 0,25)

Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	1,000,000	39-401 RED 39-401 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)
Momentary	.035 ± .015 (0,89 ± 0,38)	4 + 4 - 2

#### SPST–Normally Open, With Overtravel

39-424\*



\*Label increases nominal diameter to .255 (6,48)

- A = .175 + .025 / - .020 (4,45 + 0,64 / - 0,51)
- B = .125 ± .010 (3,18 ± 0,25)
- C = .355 ± .015 (9,02 ± 0,38)
- D = .125 ± .010 (3,18 ± 0,25)

Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	100,000	39-424 RED 39-424 BLK	Red Black

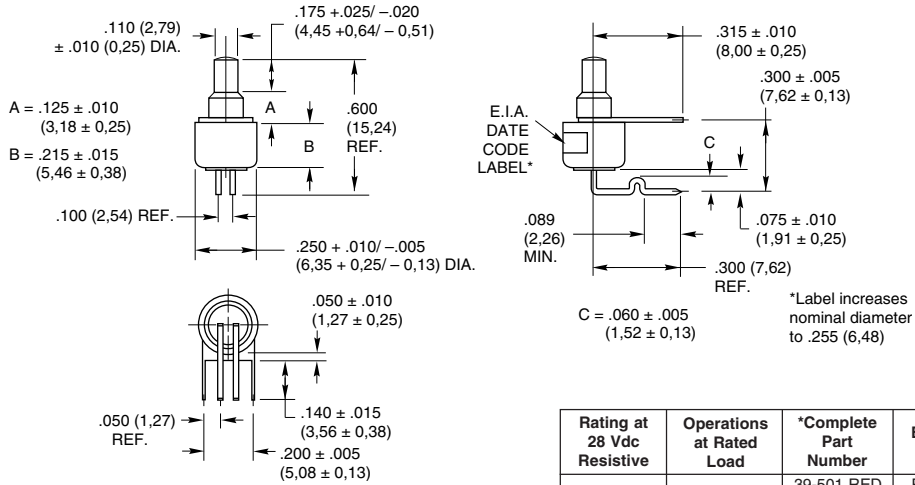
Action	Total Travel	Over Travel	Actuating Force (oz.)
Momentary	.130 ± .025 (3,30 ± 0,64)	.015 (0,38) Min.	5 ± 3

Pushbutton Switches

**DIMENSIONS** In Inches (and millimeters)

**Right Angle, SPST-Normally Open**

39-501\*  
39-503\*



**Mounting Footprint**

Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	1,000,000	39-501 RED 39-501 BLK 39-503 RED 39-503 BLK	Red Black Red Black

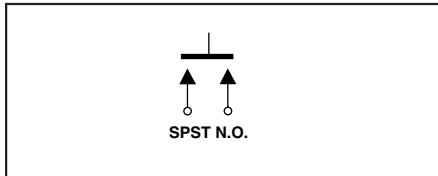
Action	Total Travel	Actuating Force (oz.)
Momentary	.035 ± .015 (0,89 ± 0,38)	4 + 4 - 2

Protective cap (included with 39-503 RED and 39-503 BLK) seals switch during wave soldering.

\*Label increases nominal diameter to .255 (6,48)

Pushbutton Switches

**CIRCUITRY**



**ACCESSORIES**

SHH1699  
30B1012-5  
30B1012-8  
30B1012-9  
See page E-36 for dimensions.

**SPECIFICATIONS**

**Rating Criteria**

- Contact Resistance:** 25 milliohms maximum on a new switch
- Voltage Breakdown:** 1,000 Vac between mutually insulated parts
- Insulation Resistance:** 1,000 megohms minimum
- Operating Temperature:** -40°C to +85°C

**Materials and Finishes**

- Bushing/Housing:** Brass, tin zinc
- Standoff:** (39-501 and 39-503) Brass, tin plated over nickel
- Base and Button:** Thermoplastic
- Shorting Bar:** Brass, gold-plated over nickel plate for 39-501 and 39-503; fine silver, gold-plated for others
- Terminals:** Brass, gold-plated over nickel
- Spring:** Tinned music wire
- Mounting Nut:** (39-401 and 39-424) Brass, zinc trivalent chromate-plated

**ORDERING INFORMATION**

Part No.	Type & Button Color
39-401 RED	N.O., Red
39-401 BLK	N.O., Black
39-405 RED	N.O., No Nut, Red
39-405 BLK	N.O., No Nut, Black
39-424 RED	N.O., Overtravel, Red
39-424 BLK	N.O., Overtravel, Black
39-501 RED	N.O., Right Angle, Red
39-501 BLK	N.O., Right Angle, Black
39-503 RED	39-501 Red & Cap Seal
39-503 BLK	39-501 Blk & Cap Seal

Accessory Part Number	Description
30B1012-5	Red Accessory Cap
30B1012-8	White Accessory Cap
30B1012-9	Black Accessory Cap
SHH1699	Cap Seal Only, Black

Accessory cap may be used with part numbers 39-405, 39-401, 39-424, 39-501, 39-503.

**Available from your local Grayhill Distributor.** For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.



## SERIES 39 Miniature Limit

### FEATURES

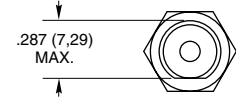
- Adjustable Location Setting
- Plunger Sealed Version

### DIMENSIONS In Inches (and millimeters)

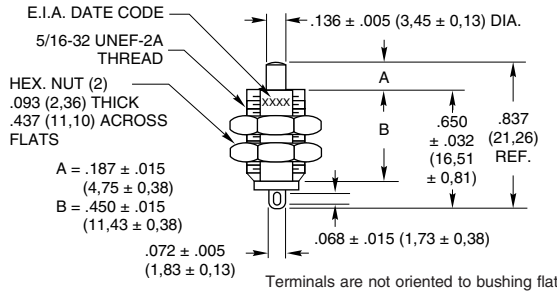


#### SPST-Normally Open, With Overtravel

39-101



Mounting Hole  
.339 (8,61) Diameter  
'D' shape per above.



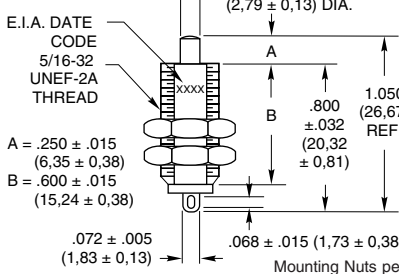
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1/2 Amp	1/4 Amp	500,000	39-101	Nat. Nylon

Action	Total Travel	Over Travel	Actuating Force (oz.)
Momentary	.187 ± .015 (4,75 ± 0,38)	.060 (1,52) Min. from top of bushing	5 + 3 - 2

#### SPST-Normally Open, With Extended Overtravel

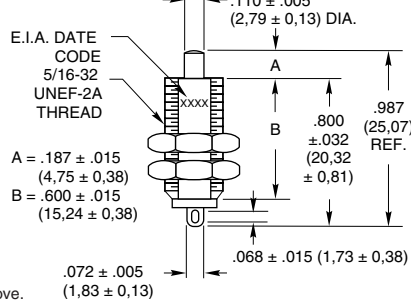
39-102

39-103



#### SPST-Normally Open, With Overtravel, Sealed Actuator

39-701

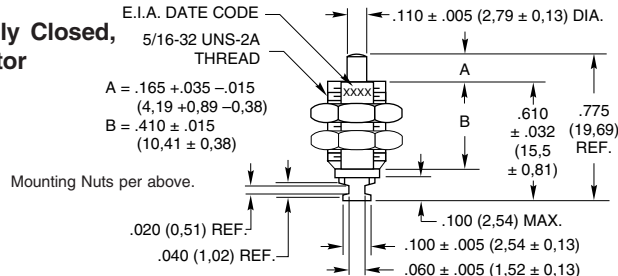


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
150 mA	75 mA	30,000	39-102	Nat. Nylon
150 mA	75 mA	100,000	39-701	Nat. Nylon
1/2 Amp	1/4 Amp	30,000	39-103	Nat. Nylon

Action	Total Travel	Over Travel	Actuating Force (oz.)
Momentary	.250 ± .015 (6,35 ± 0,38)	39-102 and 39-103: .200 (5,08) Nominal. from top of bushing	6.8 ± 5
Momentary	.187 ± .015 (4,75 ± 0,38)	39-701: .060 (1,52) Min. from top of bushing	8 ± 4

#### SPST-Normally Closed, Sealed Actuator

39-702



Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1/4 Amp	1/8 Amp	100,000	39-702	Nat. Nylon

Action	Total Travel	Over Travel	Actuating Force (oz.)
Momentary	.042 ± .010 (1,07 ± 0,25)	None	8 ± 4

### CIRCUITRY



### SPECIFICATIONS

#### Rating Criteria

- Contact Resistance:** 25 milliohms maximum on a new switch
- Voltage Breakdown:** 1,000 Vac between mutually insulated parts
- Insulation Resistance:** 1,000 megohms minimum
- Operating Temperature:** -40°C to +85°C

#### Materials and Finishes

- Bushing and Mounting Nuts:** Brass, tin zinc
- Insulation Sleeve:** Molded polyester for 39-101, 39-102, 39-103 and 39-701; phenolic per MIL-M-14 type CFG for 39-702
- Base:** Thermoset plastic
- Terminals:** Commercial bronze, gold plated over nickel for 39-101, 39-102, 39-103 and 39-701; silver for 39-702
- Springs:** Tinned music wire
- Contacts:** Commercial bronze, gold-plated for 39-101, 39-102, 39-103 and 39-701; fine silver for 39-702
- Button:** Thermoplastic
- O-Ring:** (39-701 & 39-702) Silicone

### STANDARD OPTIONS

Optional plating: gold-plated contacts for dry circuit conditions, contact Grayhill.

### ORDERING INFORMATION

Part No.	Description
39-101	SPST, N.O. With Overtravel
39-102	SPST, N.O. With Extended Overtravel
39-103	SPST, N.O. With Extended Overtravel
39-701	SPST, N.O. With Overtravel, Sealed
39-702	SPST, N.C. Sealed

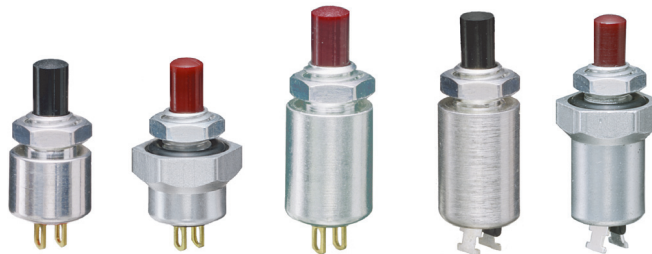
Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.



**SERIES 39**  
SPST, 150 mA to 1/2 Amp

**FEATURES**

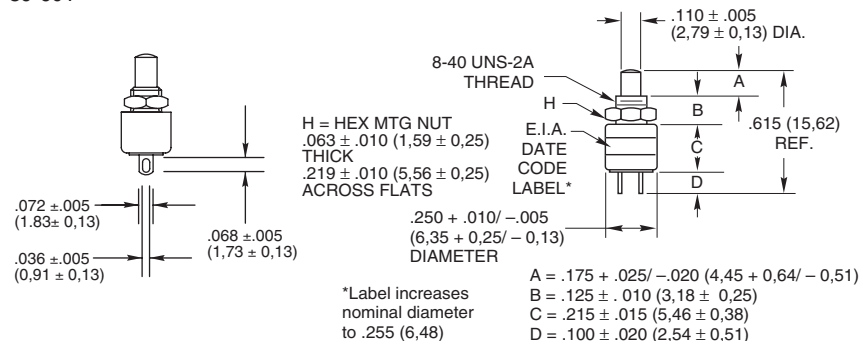
- Requires an Absolute Minimum of Space
- Molded-In Terminals in SPST–N.O.
- Solder Lug Terminals



**DIMENSIONS** In Inches (and millimeters)

**Normally Open–SPST Economy and Standard Version**

39-1  
39-3  
39-601\*



**Economy Version**

Electrical Ratings		Operations at Rated Load	*Complete Part Number	Button Color
At 5 Vdc 150 mA	At 20 Vdc 20 mA	1,000,000	39-601 RED 39-601 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.035 ± .015 (0,89 ± 0,38)	4 + 4 - 2	11/64" (4,37) DIA.

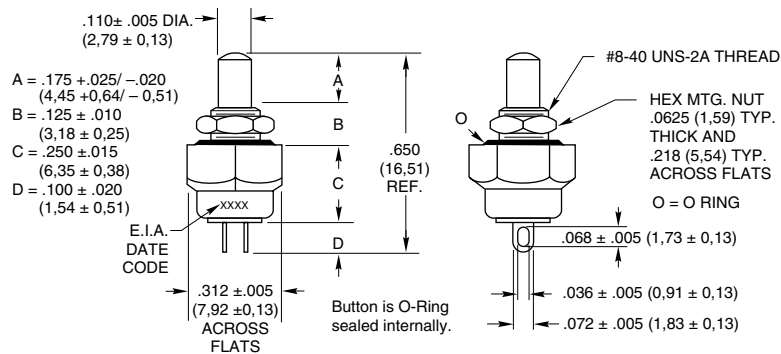
**Standard**

Electrical Ratings		Operations at Rated Load	Complete Part Number	Button Color
At 115 Vac 1/2 Amp Res.	At 220 Vac 1/4 Amp Res	1,000,000	39-1 39-3	Red Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.035 ± .015 (0,89 ± 0,38)	4 + 4 - 2	11/64" (4,37) DIA.

**Normally Open–SPST with Sealed Bushing and Button**

39-351\*

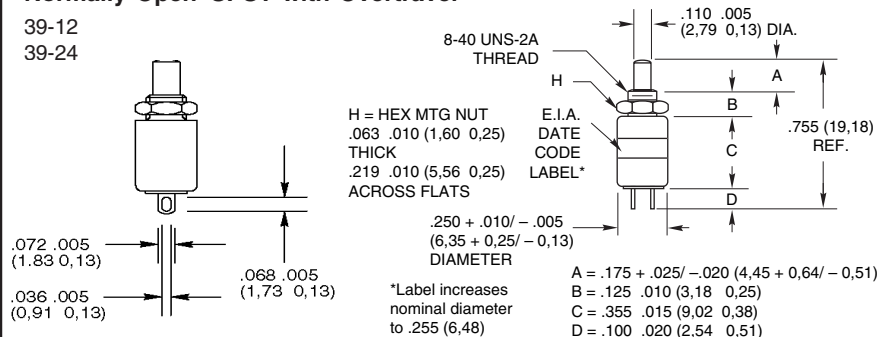


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1/2 Amp	1/4 Amp	250,000	39-351 RED 39-351 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)
Momentary	.035 ± .015 (0,89 ± 0,38)	16 ± 8

**Normally Open–SPST with Overtravel**

39-12  
39-24



Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Complete Part Number	Button Color
1/2 Amp	1/4 Amp	100,000	39-12 39-24	Red Black

Action	Total Travel	Over Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.130 ± .025 (3,30 ± 0,64)	.015 (0,38) Min.	5 ± 3	11/64" (4,37) DIA.

## DIMENSIONS In Inches (and millimeters)

### Normally Closed-SPST

39-2

H = HEX MTG NUT  
.063 ± .010 (1,60 ± 0,25)  
THICK  
.219 ± .010 (5,56 ± 0,25)  
ACROSS FLATS

8-40 UNS-2A  
THREAD

E.I.A. DATE  
CODE  
LABEL\*

.105 ± .005  
(2,67 ± 0,13) DIA.

.780 (19,81)  
REF.

.250 +.010/- .005  
(6,35 + 0,25/- 0,13)  
DIAMETER

A = .175 ± .025 (4,45 ± 0,64)  
B = .125 ± .010 (3,18 ± 0,25)  
C = .390 ± .010 (9,91 ± 0,25)  
D = .100 (2,54) MAX.

\*Label increases nominal diameter to .255 (6,48)

Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Cap Color
1/4 Amp	1/8 Amp	250,000	39-2	Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.042 ± .010 (1,07 ± 0,25)	+ 4 - 2	.172 (4,37) DIA.

### Normally Closed-SPST with Sealed Bushing and Button

39-352\*

.110 ± .005 DIA.  
(2,79 ± 0,13)

A = .165 +.035/- .015  
(4,19 + 0,89/- 0,38)  
B = .125 ± .007  
(3,18 ± 0,18)  
C = .429 ± .015  
(10,90 ± 0,38)  
D = .100 (2,54) MAX.  
E = 10° TO 40°  
APPROX.

.819  
(20,80)  
REF.

#8-40 UNS-2A  
THREAD

H = HEX MTG. NUT  
.0625 (1,59) TYP.  
THICK AND  
.218 (5,56) TYP.  
ACROSS FLATS

O-RING

E.I.A. DATE  
CODE  
LABEL\*

.250 +.010/- .005  
(6,35 + 0,25/- 0,13)

.312 ± .005  
(7,92 ± 0,13)  
ACROSS  
FLATS

Button is o-ring  
sealed internally.

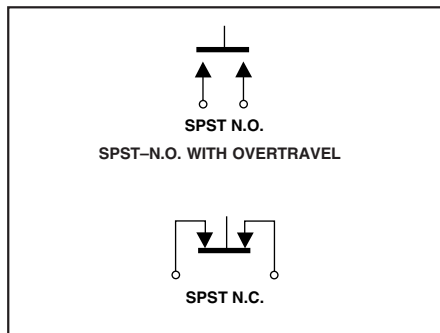
\*Label increases nominal diameter to .255 (6,48)

Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1/4 Amp	1/8 Amp	100,000	39-352 RED 39-352 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)
Momentary	.042 ± .010 (0,17 ± 0,25)	8 ± 4

Pushbutton Switches

## CIRCUITRY



## SPECIFICATIONS

### Rating Criteria

**Contact Resistance:** 25 milliohms maximum on a new switch

**Voltage Breakdown:** 1,000 Vac between mutually insulated parts

**Insulation Resistance:** 1,000 megohms minimum

**Operating Temperature:** -40°C to +85°C

**Mounting Torque:** 2 inch-pounds

## Materials and Finishes

**Mounting Nut:** Brass, tin zinc

**Housing:** Aluminum, clear anodized for 39-351 and 39-352; Brass, zinc trivalent chromate-plated for others

**Button:** Thermoset plastic

**Base:** Thermoset plastic

**Shorting Bar:** Fine silver for 39-2 and 39-352; brass, gold-plated over nickel plate for 39-601; fine silver, gold-plated for others

**Terminals:** Fine silver for 39-2 and 39-352; commercial bronze with gold-plated fine silver contact surface for others

**Spring:** Tinned music wire

**O-Rings:** (39-351 and 39-352) Internal ring is silicone; external ring is buna 'N'

## ACCESSORY

**Button Cap**  
Part No. 30B1012  
For use with part numbers 39-351 and 39-352.  
(Fasten to button with Cyanoacrylate Adhesive)  
See page E-XX for dimensions.

## ORDERING INFORMATION

Part Number	Description
39-1	N.O., Red Button
39-2	N.C., Black Button
39-3	N.O., Black Button
39-12	N.O., Overtravel Red Button
39-24	N.O., Overtravel Black Button
39-351 RED	N.O., Sealed, Red Button
39-351 BLK	N.O., Sealed, Black Button
39-352 RED	N.C., Sealed, Red Button
39-352 BLK	N.C., Sealed, Black Button
39-601 RED	N.O., Economy, Red Button
39-601 BLK	N.O., Economy, Black Button

Accessory cap may be used with all switches shown except 39-2.

Accessory Part Number	Description
30B1012-5	Red Button Cap
30B1012-9	Black Button Cap
30B1012-8	White Button Cap

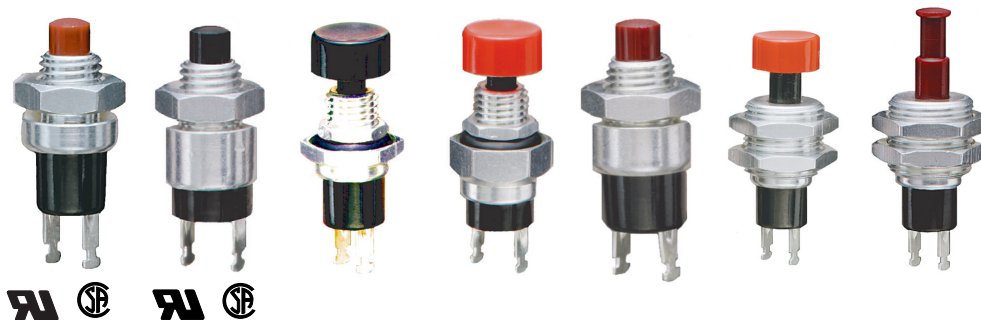
Available from your local Grayhill Distributor.

For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

**SERIES 30**  
SPST, 1 and 5 Amp

**FEATURES**

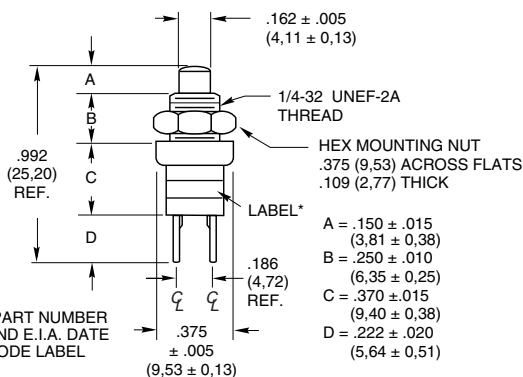
- Reliable
- Economical
- Large Selection
- UL Recognized
- CSA Certified
- Sealed Bushing and Pushbutton Option



**DIMENSIONS** In Inches (and millimeters)

**Normally Open-SPST Standard, Economy and UL Recognized**

- 30-1
- 30-1UL
- 30-3
- 30-3UL
- 30-601\*



**Standard**

Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1 Amp	0.5 Amp	1,000,000	30-1 30-3	Red Black
Action	Total Travel	Actuating Force (oz.)	Mtg. Hole	
Momentary	$.062 \pm .010$ (1,57 ± 0,25)	10 ± 4	17/64" (6,75)	

**Economy Version**

Electrical Ratings		Operations at Rated Load	*Complete Part Number	Button Color
At 5 Vdc 150 mA	At 20 Vdc 20 mA	1,000,000	30-601 RED 30-601 BLK	Red Black
Action	Total Travel	Actuating Force (oz.)	Mtg. Hole	
Momentary	$.062 \pm .010$ (1,57 ± 0,25)	10 ± 4	17/64" (6,75)	

**UL Recognized**

Rating at 120 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
5 Amp	2.5 Amp	6,000	30-1UL 30-3UL	Red Black
Action	Total Travel	Actuating Force (oz.)	Mtg. Hole	
Momentary	$.062 \pm .010$ (1,57 ± 0,25)	10 ± 4	17/64" (6,75)	

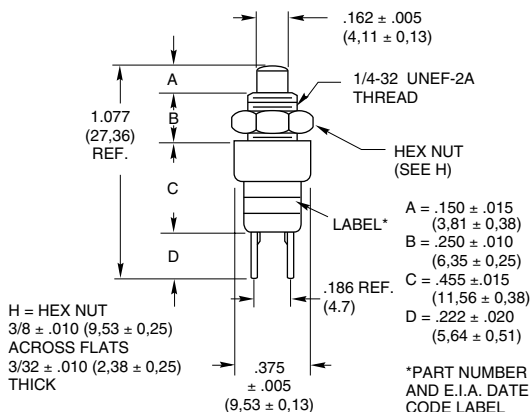
Pushbutton Switches



**DIMENSIONS** In Inches (and millimeters)

**Normally Open-SPST With Overtravel**

30-15  
30-37

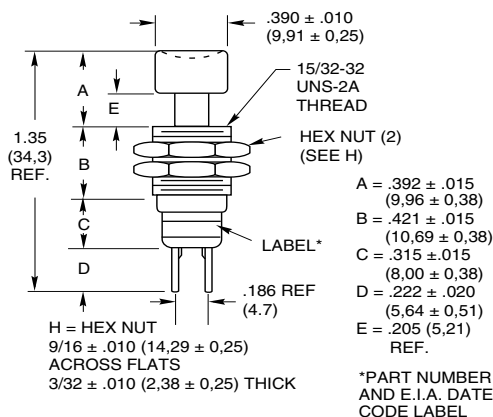


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1 Amp	1/2 Amp	500,000	30-15 30-37	Red Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary .020" Overtravel	.125 + .020/ - .010 (3,18 + 0,51/ - 0,25)	8 ± 4	17/64" (6,75)

**Normally Open-SPST With Positive Feel**

30-17\*

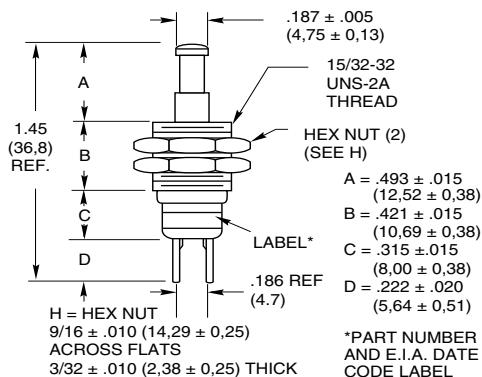


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1 Amp	1/2 Amp	200,000	30-17 RED 30-17 BLK	Red Black

Action	Total Travel	Over Travel	Actuating Force (oz.)	Mtg. Hole
Momentary Pos. Feel	.156 ± .015 (3,96 ± 0,38)	.046 (1,17) Min.	18 ± 4	31/64" (12,30)

**Normally Open-SPST With Push-Pull**

30-16\*



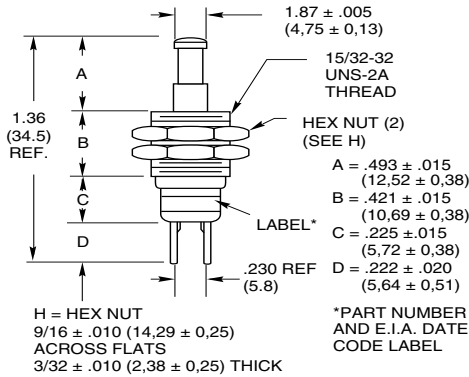
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1 Amp	1/2 Amp	100,000	30-16 RED 30-16 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Push-to-Make	.145 ± .015 (3,68 ± 0,38)	56 ± 16	31/64" (12,30)

## DIMENSIONS In Inches (and millimeters)

### Normally Closed-SPST With Push-Pull

30-32



Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1 Amp	1/2 Amp	100,000	30-32 RED 30-32 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Pull-to-Make	.145 ± .015 (3,68 ± 0,38)	56 ± 16	31/64" (12,30)

## SPECIFICATIONS

### Rating Criteria

For UL recognized switches, see individual switch chart. File number is E35289.

**Contact Resistance:** 25 milliohms maximum on a new switch

**Voltage Breakdown:** 1,000 Vac between mutually insulated parts

**Insulation Resistance:** 1,000 megohms minimum

**Operating Temperature:** -40° to +85°C

**Mounting Torque:** 2 inch-pounds

### Switch Materials and Finishes

**Mounting Nut and Cover Bushing:** Brass, tin zinc

**Base:** Thermoset plastic

**Button:** Polyester for 30-16 and 30-32; Phenolic for 30-17, 30-1UL, 30-2, 30-2UL, 30-3UL, 30-6 and 30-6UL; Polycarbonate for all others.

**Shorting Bar:** Brass with gold over nickel plating for 30-601; brass with fine silver contact surface for all others.

**Terminals:** Brass with gold over nickel plating for 30-601; commercial brass with fine silver contact surface and silver-plated for all others.

**Spring:** Tinned music wire

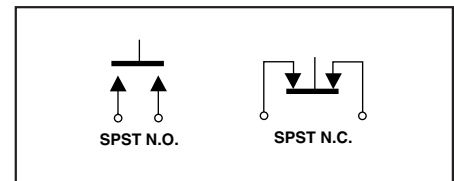
**Button Cap:** Nylon for 30-17; Polyethylene for 30-251 and 30-252.

**Detent Balls:** Carbon steel, nickel-plated

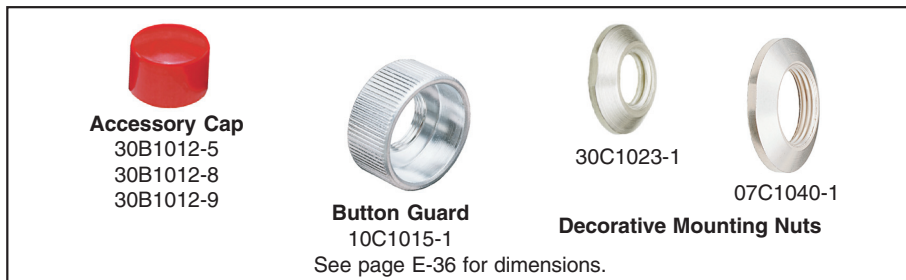
**Terminal Type:** Solder lug

**O-Ring Seal:** (30-251, 30-252) Nitrile per MIL-P-5516

## CIRCUITRY



## ACCESSORIES



### Decorative Mounting Nuts

Part Number 30C1023-1 is made for switches with 1/4" (6,35) inch diameter bushings. It may be used with the following Series 30 switches: 30-1, 30-1 UL, 30-2, 30-2 UL, 30-3, 30-6, 30-15, 30-37, 30-251 BLK, 30-251 RED, 30-252 BLK, 30-252 RED, 30-601 BLK and 30-601 RED.

Part Number 07C1040-1 is made for switches with 15/32" (11,91) inch diameter bushings. It may be used with the following Series 30 switches: 30-16 BLK, 30-16 RED, 30-17 BLK, 30-17 RED, 30-32 BLK and 30-32 RED.

**For the dimensions, materials and finishes of these decorative mounting nuts, see page E-36.**

### Button Cap and Guard

The button cap is available in 3 colors: part number 30B1012-5 is red; part number 30B1012-8 is white; and part number 30B1012-9 is black. It may be fastened to the button with adhesive. It may be used with the following Series 30 switches: 30-1, 30-1UL, 30-2, 30-2UL, 30-3, 30-3UL, 30-15, 30-37, 30-601 BLK, and 30-601 RED.

The button guard, part number 10C1015-1 is made to be used with 15/32" (11,91) inch diameter switches to prevent unintentional actuation. It may be used with the following Series 30 switches: 30-16 BLK, 30-16 RED, 30-17 BLK, 30-17 RED, 30-32 BLK, and 30-32 RED.

**For the dimensions, materials and finishes of the button cap and guard, see page E-36.**

## ORDERING INFORMATION

Part Number	Description and Button Color
30-1*	N.O., Standard, Red
30-2*	N.C., Standard, Black
30-3*	N.O., Black
30-6*	N.C., Red
30-15	N.O., Overtravel, Red
30-16 BLK	Push to Make, Black
30-16 RED	Push to Make, Red
30-17 BLK	N.O., Positive Feel, Black
30-17 RED	N.O., Positive Feel, Red
30-32 BLK	Pull to Make, Black
30-32 RED	Pull to Make, Red
30-37 BLK	N.O., Overtravel, Black
30-251 BLK	N.O., Sealed, Black
30-251 RED	N.O., Sealed, Red
30-252 BLK	N.C., Sealed, Black
30-252 RED	N.C., Sealed, Red
30-601 BLK	N.O., Economy, Black
30-601 RED	N.O., Economy, Red

Accessory Part Number	Description
30B1012-5	Accessory Cap, Red
30B1012-8	Accessory Cap, White
30B1012-9	Accessory Cap, Black
30C1023-1	Accessory Nut
07C1040-1	Accessory Nut
10C1015-1	Button Guard

\*Add "UL" suffix to part number for UL recognized switches.

**Available from your local Grayhill Distributor.** For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

## STANDARD OPTIONS

Decorative mountings, see pages E-24 to E-26.

**SERIES 04**  
**4PST**

**FEATURES**

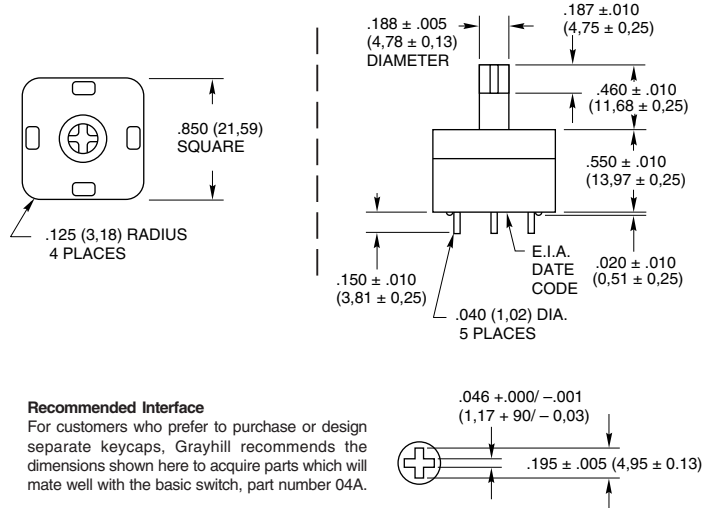
- Joy Stick Action
- Position Locator On CRT Screens
- Moves Cursor On Menu Display



**DIMENSIONS** In Inches (and millimeters)

**Basic Switch**

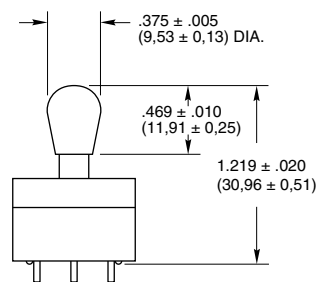
04A



**Recommended Interface**  
 For customers who prefer to purchase or design separate keycaps, Grayhill recommends the dimensions shown here to acquire parts which will mate well with the basic switch, part number 04A.

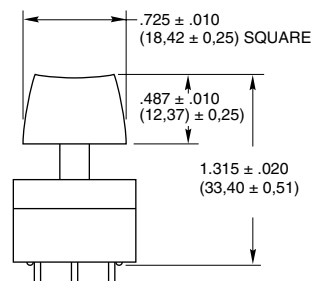
**Bat Handle**

04A-B01



**Keycap**

04A-K01



**SPECIFICATIONS**

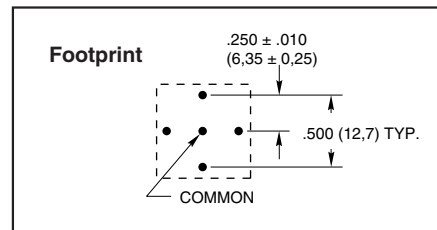
**Rating Criteria**

- Rated:** Make and break 250 mA at 115 Vac or 125 mA at 220 Vac resistive load for 500,000 operations
- Contact Resistance:** 25 milliohms maximum on a new switch
- Insulation Resistance:** 1,000 megohms at 100 Vdc
- Dielectric Strength:** 500 Vac RMS minimum
- Operating Temperature:** -40°C to +85°C

**Materials and Finishes**

- Base, Cover and Switch Actuator:** Polyester (Black)
- Terminals:** Brass, gold-plated over nickel
- Shorting Bar:** Phosphor bronze, gold-plated over nickel
- Spring:** Tinned music wire
- Keycap:** ABS or equivalent
- Bat-Handle:** ABS

**CIRCUITRY**



**ORDERING INFORMATION**

Description	Part No.
Basic Switch	<b>04A</b>
Switch with Arrowhead Keycap	<b>04A-K01</b>
Switch with Bat-Handle	<b>04A-B01*</b>

\*Shipped with bat handle permanently attached.

**Available from your local Grayhill Distributor.**  
 For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

Pushbutton Switches



## SERIES 30 Snap-in Panel Mounting

### FEATURES

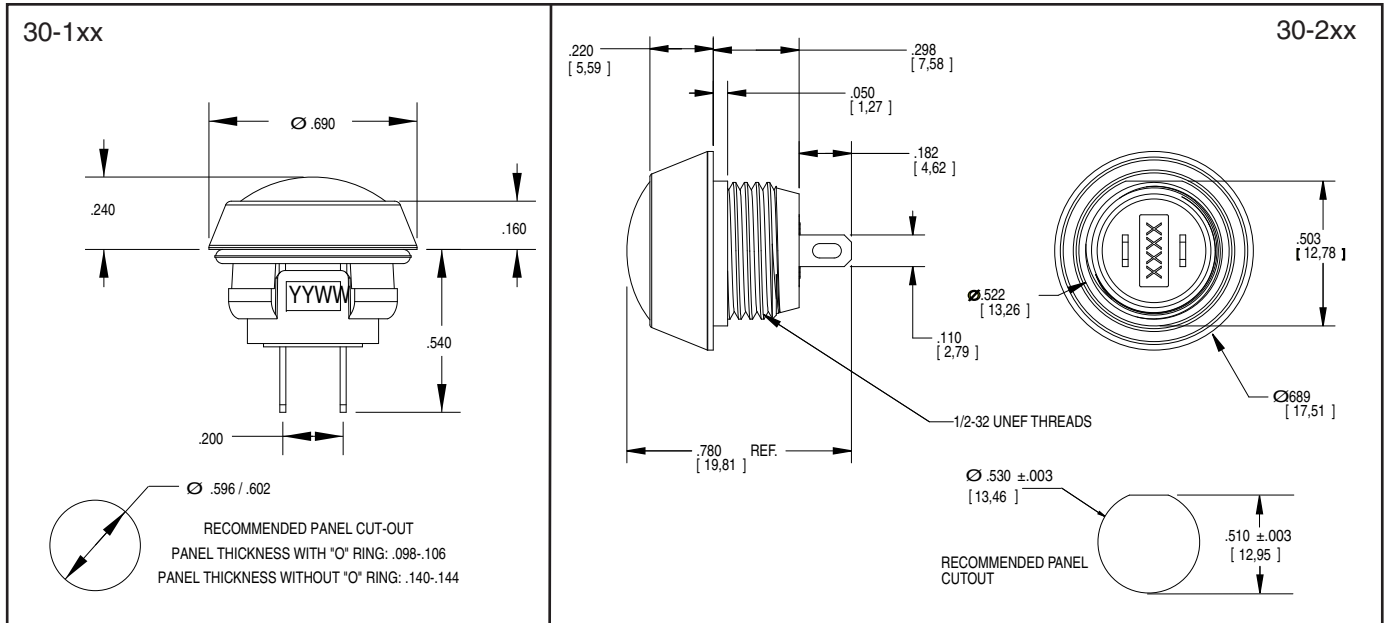
- Convenient snap-in panel mounting
- Choice of 6 button colors
- SPST (momentary contact)
- Gold plated contacts
- Butt contact system
- Sealed against dust and moisture (30-2xx to IP67)



30-1xx

30-2xx

### DIMENSIONS In inches (and millimeters)



### MATERIAL

**Housing:** Aluminum, black chrome finish (30-2xx), Nylon, 45% glass-filled (30-1xx)

**Button, Base, and Plunger:** Nylon, 45% glass-filled

**Terminal and Shorting Bar:** Brass, gold-plated over nickel

**Internal Seal:** Silicone rubber

**O-ring Seal:** Silicone (panel on 30-2xx)

**Spring:** Tinned music wire

**Travel:** .090 nominal

**Travel Before Make:** .035 nominal

### RATING

**Cycles:** 500,000 actuations

**Operating Temperature:** -40°C to +80°C

**Shock:** 100 G's/6 milliseconds

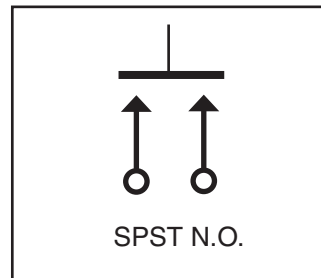
**Rating at 24 VDC:** 150 milliamps

**Voltage Breakdown:** 1000 Vac between mutually insulated parts

**Contact Resistance:** 25 megaohms max on new switch

**Insulation:** 1,000 megaohms minimum

### CIRCUITRY



### ORDERING INFORMATION

Part Number	Description
30-100	Black
30-101	Red
30-102	Green
30-103	Yellow
30-104	Orange
30-105	Blue
30-200	Sealed, Black
30-201	Sealed, Red
30-202	Sealed, Green
30-203	Sealed, Yellow
30-204	Sealed, Orange
30-205	Sealed, Blue

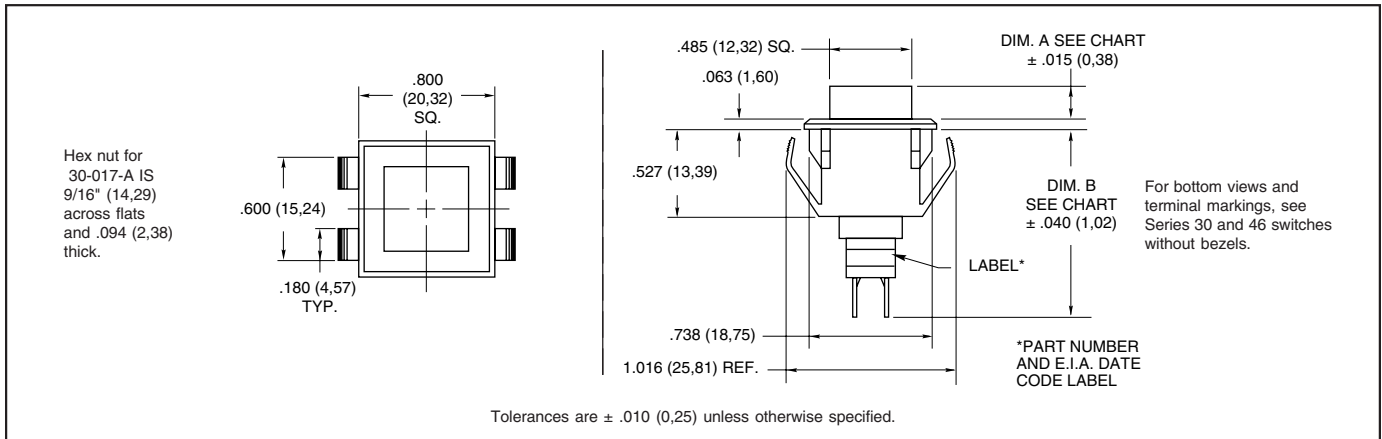
## SERIES 30 and 46 Snap-in Panel Mount

### FEATURES

- Sleek Black Matte Bezel
- Convenient Snap-In Front Mount
- Choice of 6 Button Colors
- SPST, SPDT or DPDT Circuitry
- Alternate Action, Positive Feel and Overtravel Versions
- Printed Button Option

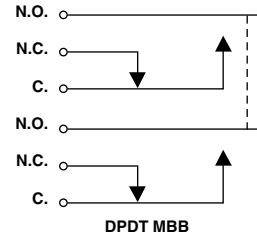
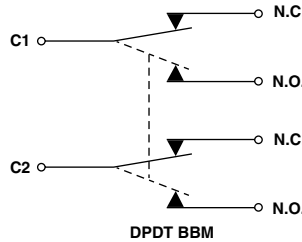
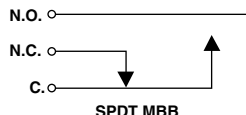
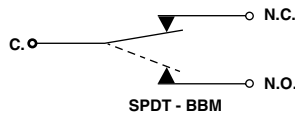


### DIMENSIONS In Inches (and millimeters)



### CIRCUITRY

Switches have momentary action unless otherwise indicated in the chart below.



### ADDITIONAL DIMENSIONS AND PART NUMBERS

Circuitry and Features	Dim. A: Button Height (± .015)	Dim. B: Behind Panel Length (± .040)	Total Travel	Actuating Force	Partial Part No.*
<b>Butt Contact Switches - Series 30</b>					
SPST-N.O.	.205 (5,21)	1.119 (28,42)	.062 ± .010 (1,57 ± 0,25)	10 ± 4 oz.	30-001-A-*
SPST-N.O., Overtravel	.205 (5,21)	1.204 (30,58)	.125 ± .020 (3,18 ± 0,51)	8 ± 4 oz.	30-015-A-*
SPST-N.O., Overtravel & Positive Feel	Adjustable**	Adjustable**	.156 ± .015 (3,96 ± 0,38)	18 ± 4 oz.	30-017-A-*
SPST-N.O., Economical	.205 (5,21)	1.119 (28,42)	.062 ± .010 (1,57 ± 0,25)	10 ± 4 oz.	30-601-A-*
SPST-N.C.	.205 (5,21)	1.132 (28,75)	.065 ± .015 (1,65 ± 0,38)	8 ± 4 oz.	30-002-A-*
<b>Wiping Contact Switches - Series 46</b>					
SPDT, BBM	.205 (5,21)	1.417 (35,99)	.180 (4,57) min.	1.1 ± .25 lbs.	46-102-A-*
SPDT, MBB	.205 (5,21)	1.417 (35,99)	.180 (4,57) min.	1.1 ± .25 lbs.	46-111-A-*
SPDT, BBM, Alternate Action	.293 (7,44)	1.448 (36,78)	.180 (4,57) min.	1.5 ± .25 lbs.	46-502-A-*
DPDT, BBM	.205 (5,21)	1.448 (36,78)	.180 (4,57) min.	2.2 ± .5 lbs.	46-200-A-*
DPDT, MBB	.205 (5,21)	1.448 (36,78)	.180 (4,57) min.	2.2 ± .5 lbs.	46-201-A-*
DPDT, BBM, Alternate Action	.293 (7,44)	1.448 (36,78)	.180 (4,57) min.	1.8 ± .5 lbs.	46-402-A-*

\*Partial part number, complete part number by adding a dash for button color: white -01; red -03; green -04; blue -05; yellow -06 or black -07, see Ordering Information.

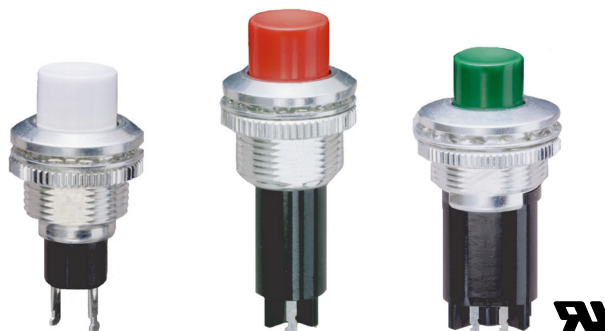
\*\*Adjustable from Dim. A .170 (4,32) minimum, Dim. B 1.285 (32,64) maximum to Dim. A .290 (7,37) maximum, Dim. B 1.165 (29,59) minimum with hex nut below bezel.

## SERIES 30 and 46

### Decorator Line

#### FEATURES

- Attractive Front Panel Bezels (6 choices)
- Space-Saving: Only 5/8" Diameter (SPST & SPDT) and 3/4" Diameter (DPDT) Round Bezels
- SPST with Option of Positive Feel
- SPDT, DPDT with Momentary Contact or Alternate Action
- Sturdy Metal Sleeve or Bushing and Nut Provide Secure Mounting
- UL Recognized Version



#### DIMENSIONS In Inches (and millimeters)

##### SPST—Normally Open

30-05-01-502-\*  
30-05-04-502-\*

B = .375 ± .010 (9,53 ± 0,25) DIA.  
C = .625 ± .005 (15,88 ± 0,13) DIA.  
D = .255 ± .032 (6,48 ± 0,81) DIA.  
E = .093 ± .010 (2,36 ± 0,25) DIA.  
F = .355 ± .015 (9,02 ± 0,38) DIA.  
G = .220 ± .025 (5,59 ± 0,64) DIA.

DIM A ± .020 (0,51) (SEE CHART)

1/2-32 UN-2A THREAD  
INSULATING BARRIER

\*PART NUMBER AND E.I.A. DATE CODE LABEL

Feature	Partial Part No.	Dim. A
Momentary	30-05-01-502-*	.710 (18,03)
Pos. Feel	30-05-04-502-*	.910 (23,11)

##### SPDT—Break Before Make

46-05-05-502-\*  
46-05-07-502-\*

B = .375 ± .010 (9,53 ± 0,25) DIA.  
C = .625 ± .005 (15,88 ± 0,13) DIA.  
D = .255 ± .032 (6,48 ± 0,81) DIA.  
E = .093 ± .010 (2,36 ± 0,25) DIA.  
F = .355 ± .015 (9,02 ± 0,38) DIA.  
G = .150 ± .010 (3,81 ± 0,25) DIA.

DIM A ± .015 (0,38) (SEE CHART)

1/2-32 UN-2A THREAD  
INSULATING BARRIER

\*PART NUMBER AND E.I.A. DATE CODE LABEL

Feature	Partial Part No.	Dim. A
Momentary	46-05-05-502-*	.992 (25,20)
Alt. Action	46-05-07-502-*	1.278 (32,46)

##### DPDT—Break Before Make

46-05-08-502-\* (UL)\*\*  
46-05-09-502-\*

B = .375 ± .010 (9,35 ± 0,25) DIA.  
C = .750 ± .005 (19,05 ± 0,13) DIA.  
D = .255 ± .032 (6,48 ± 0,81) DIA.  
F = SEE CHART ± .015 (0,38)  
E = .093 ± .010 (2,36 ± 0,25) DIA.  
G = .150 ± .010 (3,81 ± 0,25) DIA.

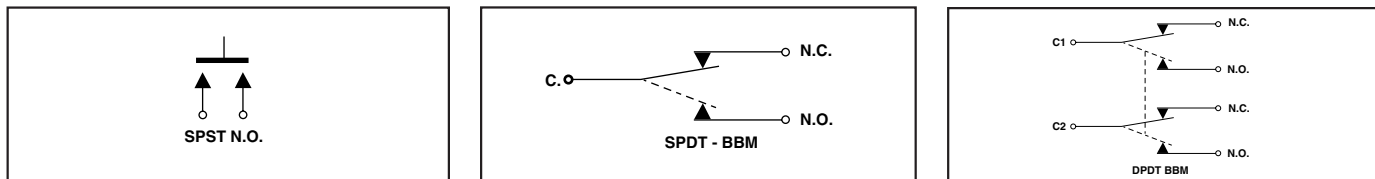
DIM A ± .015 (0,38) (SEE CHART)

5/8-32 UN-2A THREAD  
INSULATING BARRIER

\*PART NUMBER AND E.I.A. DATE CODE LABEL

Feature	Partial Part No.	Dim. A	Dim. F
Momentary	46-05-08-502-*	1.001 (25,43)	.314 (7,98)
Alt. Action	46-05-09-502-*	1.130 (28,70)	.355 (9,02)

#### CIRCUITRY



#### RECOMMENDED PANEL CUTOUT AND MOUNTING HARDWARE

##### SPST AND SPDT VERSION

.440 (11,17) MIN. ACROSS FLATS

.516 (13,10) MIN. DIA.

##### DPDT VERSION

.565 (14,35) MIN. ACROSS FLATS

.641 (16,28) MIN. DIA.

Note: All switches fit panels up to .250 (6,35) thick, except 46-05-08-502 which fits panels up to .187 (4,75) thick. Front and back panel access required for installation.

##### Mounting Hardware

**For 46-05-08-502 & 46-05-09-502:**  
 One internal tooth lockwasher  
 One knurled ring nut .765 ± .010 (19,43 ± 0,25) Dia.  
 .094 ± .010 (2,39 ± 0,25) Thk.

**For SPST & SPDT switches**  
 One internal tooth lockwasher  
 One knurled ring nut .640 ± .010 (16,26 ± 0,25) Dia.  
 .094 ± .010 (2,39 ± 0,25) Thk.

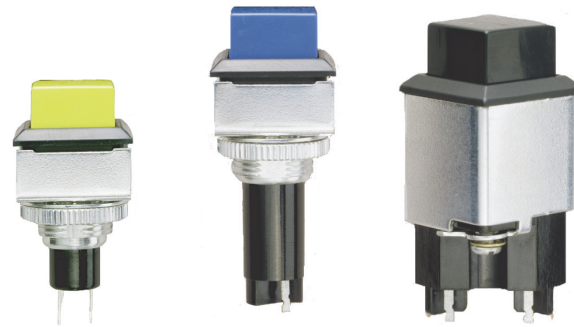
\*Partial part number; complete part number by adding a dash for button color: white -01; red -03; green -04; blue -05; yellow -06 or black -07, see Ordering Information.

\*\* Contact Grayhill for part number.

## SERIES 30 and 46 Decorator Line

### FEATURES

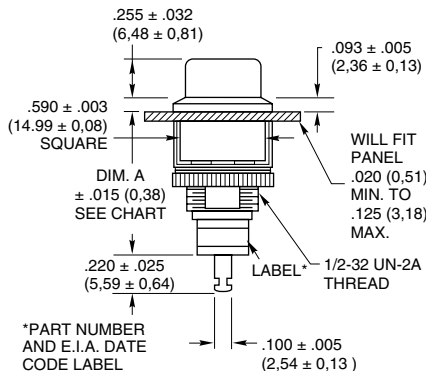
- Attractive Front Panel Bezels (6 choices)
- Space-Saving: Only 11/16" Square
- SPST with Option of Positive Feel
- SPDT, DPDT with Momentary Contact or Alternate Action
- Sturdy Metal Sleeve or Bushing and Nut Provide Secure Mounting



### DIMENSIONS In Inches (and millimeters)

#### SPST—Normally Open

30-01-01-500-\*  
30-01-04-500-\*

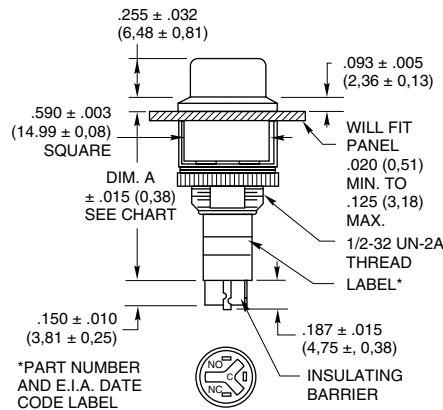


\*PART NUMBER AND E.I.A. DATE CODE LABEL

Feature	Partial Part No.	Dim. A
Momentary	30-01-01-500-*	.880 (22,35)
Pos. Feel	30-01-04-500-*	1.037 (26,34)

#### SPDT—Break Before Make

46-01-05-500-\*  
46-01-07-500-\*



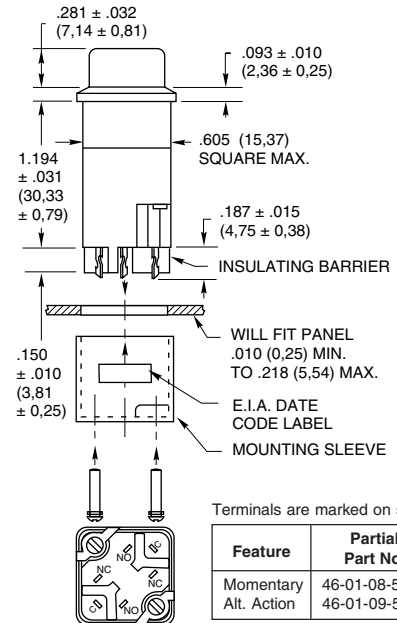
\*PART NUMBER AND E.I.A. DATE CODE LABEL

Terminals are marked on switch.

Feature	Partial Part No.	Dim. A
Momentary	46-01-05-500-*	1.174 (29,82)
Alt. Action	46-01-07-500-*	1.264 (32,11)

#### DPDT—Break Before Make

46-01-08-500-\*  
46-01-09-500-\*

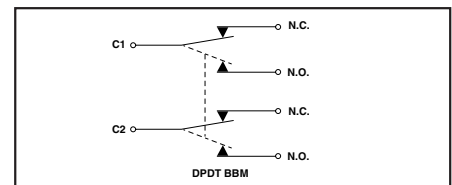
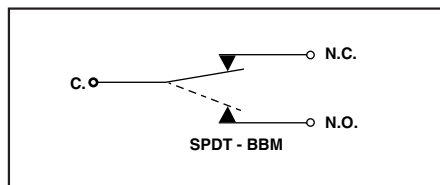
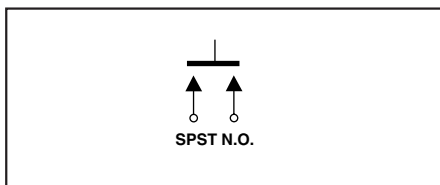


Terminals are marked on switch.

Feature	Partial Part No.
Momentary	46-01-08-500-*
Alt. Action	46-01-09-500-*

Pushbutton Switches

### CIRCUITRY



### FRONT VIEWS AND MOUNTING

RECOMMENDED PANEL CUTOUT FOR SQUARE BEZEL SWITCHES

SINGLE      STACKED

#### Mounting Hardware

**For 46-01-08-500 & 46-01-09-500**  
(See drawing above—mounting hardware shipped loose.)

**For SPST & SPDT switches**  
One internal tooth lockwasher  
One knurled ring nut .640 ± .010 (16,26 ± 0,25) DIA.  
.094 ± .010 (2,39 ± 0,25) Thk.

Note: All switches fit panels up to .250 (6,35) thick.  
Front and back panel access required for installation.

\*Partial part number; complete part number by adding a dash for button color: white -01; red -03; green -04; blue -05; yellow -06 or black -07, see Ordering Information.

**SPECIFICATIONS**

**Material and Finishes**

**Lockwasher (Round Bezel):** Steel, zinc trivalent chromate-plated

**Behind Panel Plate (Square Bezel):** Steel, zinc trivalent chromate-plated

**Mounting Sleeve and Screws (46-01-08-500, 46-01-09-500 only):** Steel, zinc trivalent chromate-plated. **Base:** Phenolic per MIL-M-14, Type CFG

**Square Bezel:** ABS (SPST, SPDT), thermoset plastic (DPDT)

**Mounting Nut, Bushing, and Round Bezel:** Brass, tin zinc

**Button Cap:** ABS (UL version is PPS)

**Shorting Bar:** Series 30—Fine silver contact area

Series 46—Phosphor bronze, silver-plated

**Terminals:** Series 30—Fine silver contact area with silver-plated terminal ends

Series 46—Silver contact surface with tin/silver clad terminal ends

**Spring:** Tinned music wire

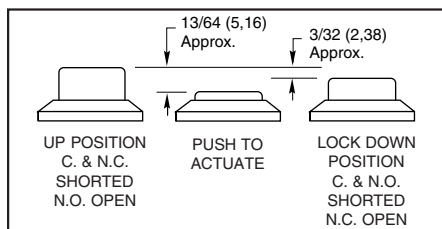
**Plunger:** Polyphenylene sulfide (PPS) for 30-01-01-500-X and 46-01-05-500-X. Nickel-plated brass for 46-01-07-500-X, 46-05-07-502-X, 46-01-09-500-X and 46-05-09-502-X. Zinc trivalent chromate-plated brass for 46-01-08-500-X. Polycarbonate for all others.

**Operating Temperature:** -40°C to +85°C

**ALTERNATE ACTION (PUSH-PUSH) OPERATING SEQUENCE**

Part Number\* 46-05-07-502, 46-05-09-502, 46-01-07-500, 46-01-09-500

Alternate action (Push-Push) switches provide a maintained actuated position until the button is pushed again to release.



**STANDARD OPTIONS**

Epoxy-sealed terminals and wire leads, see page E-35.

**ORDERING INFORMATION & OPERATING FEATURES**

Butt Contact	Square Bezel	Round Bezel	Circuitry	Feature	Total Travel	Bottoming Force	Actuating Force	Overtravel
Butt Contact	30-01-01-500-*	30-05-01-502-*	SPST-N.O.	Momentary	.080 ± .015 (2,03 ± 0,38)	—	10 ± 4 oz.	—
	30-01-04-500-*	30-05-04-502-*	SPST-N.O.	Positive Feel & Overtravel	.156 ± .015 (3,96 ± 0,38)	—	18 ± 4 oz.	.046 Min.
Wiping Contact	46-01-05-500-*	46-05-05-502-*	SPDT	Momentary	.180 min. (4,57)	1.1 ± .25 Lbs	—	—
	46-01-07-500-*	46-05-07-502-*	SPDT	Alternate Action	.210 ± .015 (5,33 ± 0,38)	1.5 ± .25 Lbs	—	—
	46-01-08-500-*	46-05-08-502-*	DPDT	Momentary	.180 min. (4,57)	1.6 ± .5 Lbs.	—	—
	46-01-09-500-*	46-05-09-502-*	DPDT	Alternate Action	.210 ± .015 (5,33 ± 0,38)	1.8 ± .5 Lbs.	—	—

\*Partial part number; complete the part number by adding a dash for button color: white -01; red -03; green -04; blue -05; yellow -06 or black -07.

**Available from your local Grayhill Distributor.** For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

**RATINGS**

Electrical Ratings	Series 30	Series 46
<b>Contacts</b>	Butt type	Wiping type
<b>Rating at 115 Vac Res.</b>	1 Amp	0.25 Amp
<b>Rating at 220 Vac Res.</b>	0.5 Amp	0.125 Amp
<b>Circuitry</b>	SPST-N.O. (Standard); SPST-N.O. (w/Overtravel), SPST-N.O. (w/Positive Feel)	SPDT, DPDT Break Before Make
<b>Life Expectancy</b>	SPST-N.O. (Standard): 1,000,000 operations SPST-N.O. (w/Positive Feel): 200,000 operations; SPST-N.O. (w/Overtravel): 500,000 operations	250,000 operations
<b>Contact Resistance</b>	25 milliohms or less on a new switch	
<b>Voltage Breakdown</b>	1000 Vac between mutually insulated parts	
<b>Insulation Resistance</b>	1000 megohms minimum	
<b>Operating Temperature</b>	-40°C to +85°C	

**LEGENDS**

All button caps can be printed in epoxy ink. Any type style or design can be used to produce the legend. If News Gothic Condensed style is used, limits can be approximated from the chart below; actual limits depend on specific legend.

There is a per-button impression charge. A nominal set up charge per legend applies to orders of 1 to 99 pieces. (Non-standard legends are subject to a one time tooling charge. Contact Grayhill for more specifics.)

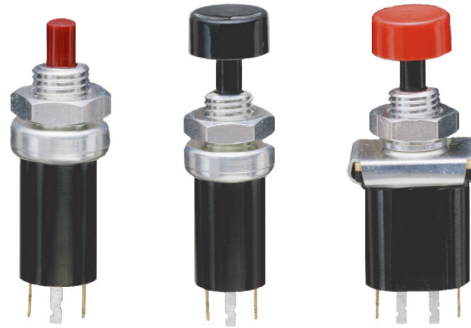
Grayhill Type Identification No.	Character Height (Typ.)	Sample Style and Sizes	Square Button Character and Line Limitation		Round Button Character and Line Limitation	
			Character	Line	Character	Line
4GH088	.083 (2,1)	ABCDEFGHIJ	6 Char. 2 Lines	TAB LOCATE	3 Char. 1 Line	OFF
1GH125	.138 (3,5)	ABCDEFGHIJ	5 Char. 1 Lines	INDEX	3 Char. 1 Line	TAB
3GH187	.207 (5,3)	ABCDEF	3 Char. 1 Line	OFF	2 Char. 1 Line	15
2GH250	.276 (7,0)	ABCD	2 Char. 1 Line	15	N/A	N/A

Pushbutton Switches

## SERIES 46 SPST and DPDT, 1/4 Amp

### FEATURES

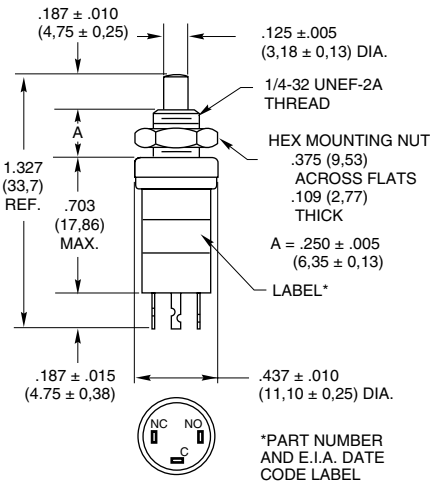
- Long Wipe Contact Assures High Reliability
- 250,000 Cycles of Operation



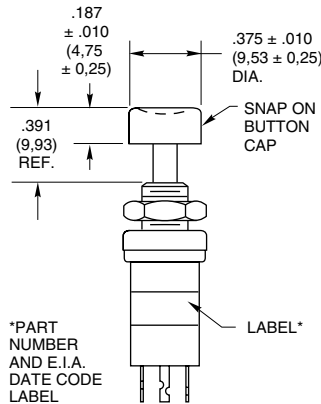
### DIMENSIONS In Inches (and millimeters)

#### Single Pole/Double Throw

46-101\* (BBM)  
46-110\* (MBB)

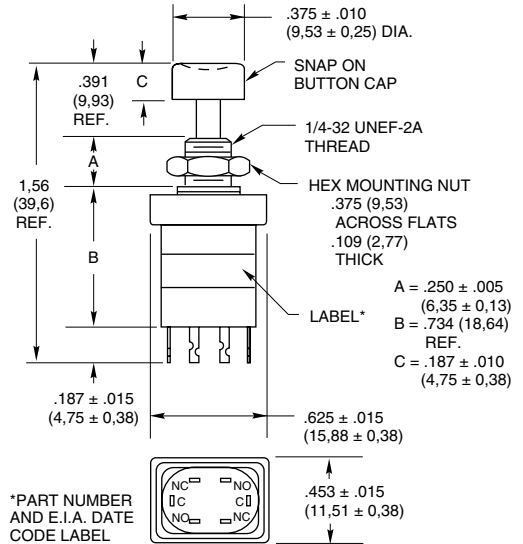


46-102\* (BBM)  
46-111\* (MBB)



#### Double Pole/Double Throw

46-200\* (BBM)  
46-201\* (MBB)



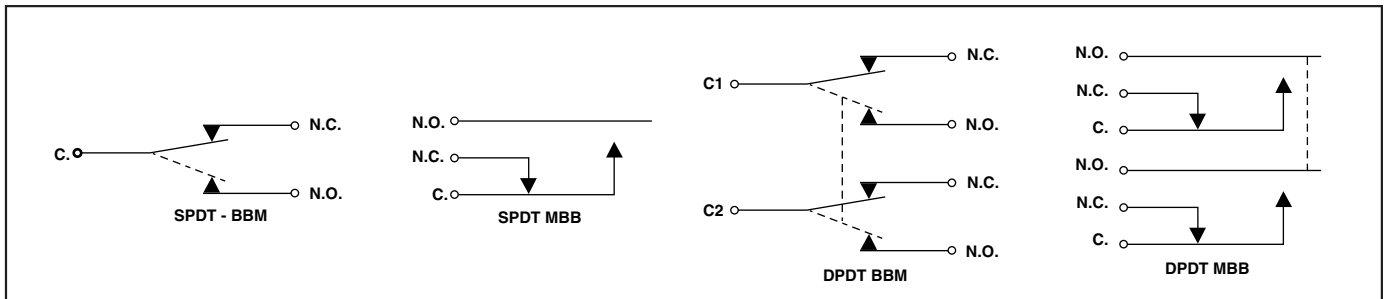
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button or Cap Color
1/4 Amp	1/8 Amp	250,000	46-101 RED	Red
			46-101 BLK	Black
			46-102 RED	Red
			46-102 BLK	Black
			46-110 RED	Red
			46-110 BLK	Black
46-111 RED	Red			
46-111 BLK	Black			

Action	Total Travel	Bottoming Force (oz.)	Mtg. Hole
Momentary	.180 (4,57) Min.	17 ± 5	17/64" (6,75)

Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Cap Color
1/4 Amp	1/8 Amp	250,000	46-200 RED	Red
			46-200 BLK	Black
			46-201 RED	Red
			46-201 BLK	Black

Action	Total Travel	Bottoming Force (oz.)	Mtg. Hole
Momentary	.180 (4,57) Min.	35 ± 9	17/64" (6,75)

### CIRCUITRY



**SERIES 46**  
SPST and DPDT, 1/4 Amp

**FEATURES**

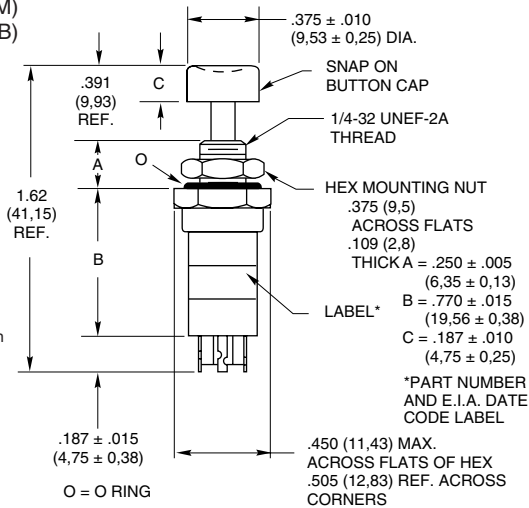
- Bushing and Button Seal
- Environmentally Sealed



**DIMENSIONS** In Inches (and millimeters)

**Sealed Bushing and Button Single Pole/Double Throw**

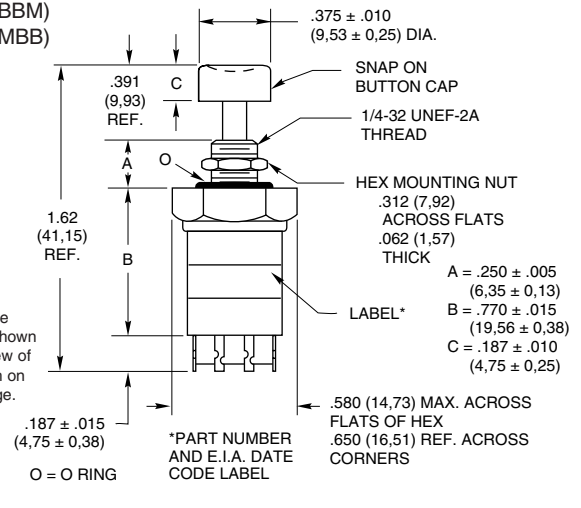
46-150\* (BBM)  
46-151\* (MBB)



Terminals are marked as shown in bottom view of SPDT switch on previous page.

**Sealed Bushing and Button Double Pole/Double Throw**

46-270\* (BBM)  
46-271\* (MBB)



Terminals are marked as shown in bottom view of DPDT switch on previous page.

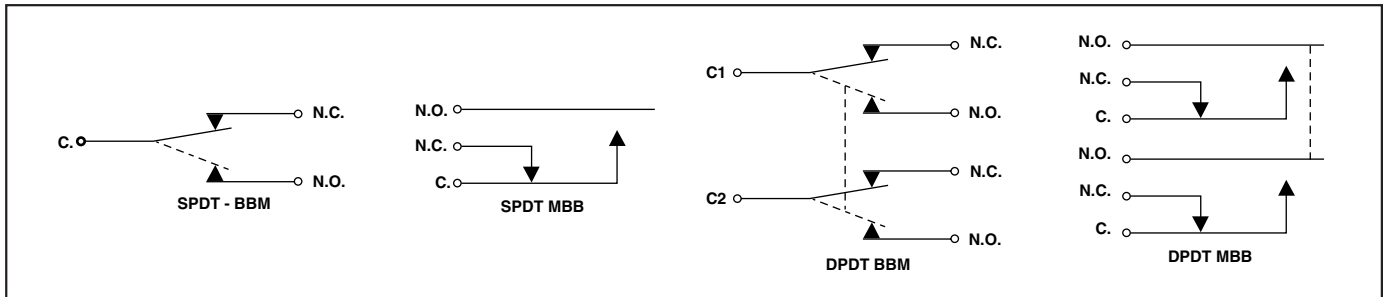
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Cap Color
1/4 Amp	1/8 Amp	100,000	46-150 RED	Red
			46-150 BLK	Black
			46-151 RED	Red
			46-151 BLK	Black

Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Cap Color
1/4 Amp	1/8 Amp	100,000	46-270 RED	Red
			46-270 BLK	Black
			46-271 RED	Red
			46-271 BLK	Black

Action	Total Travel	Bottoming Force (oz.)	Mtg. Hole
Momentary	.180 (4,57) Min.	24 ± 4	17/64" (6,75)

Action	Total Travel	Bottoming Force (oz.)	Mtg. Hole
Momentary	.180 (4,57) Min.	48 ± 4	17/64" (6,75)

**CIRCUITRY**



## DIMENSIONS In Inches (and millimeters)

**Environmentally Sealed Double Pole/Double Throw**  
46-260\* (BBM)

Dimensions:  
 A = 1.14 (29,0) MAX.  
 B = 22.00 (558,8) MAX.  
 C = .187 ± .010 (4,75 ± 0,25)  
 D = .125 ± .005 (3,18 ± 0,13)

Other dimensions:  
 .375 ± .010 (9,53 ± 0,25) DIA.  
 .390 ± .010 (9,90 ± 0,25)  
 .281 ± .010 (7,14 ± 0,25)  
 .250 ± .010 (6,35 ± 0,25)

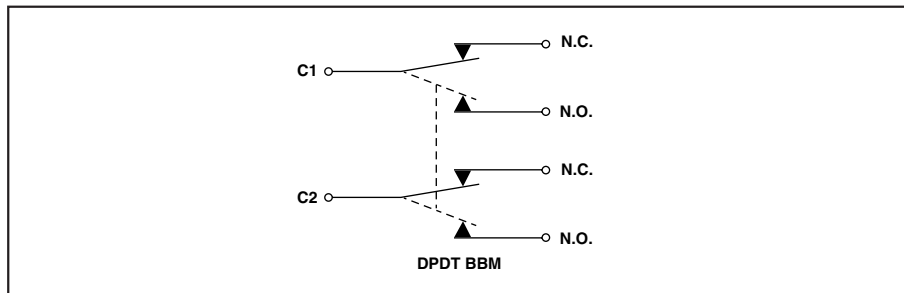
Component labels:  
 SNAP ON BUTTON CAP  
 O-RING SEALED  
 3/8-32 UNEF-2A THREAD TO .060 (15,24) MAX. FROM SHOULDER  
 HEX MOUNTING NUT .562 (14,2) ACROSS FLATS .094 (2,40) THICK  
 SWITCH AND WIRE LEADS ENCAPSULATED

Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Cap Color
1/4 Amp	1/8 Amp	250,000	46-260 RED 46-260 BLK	Red Black

Action	Total Travel	Bottoming Force (oz.)	Mtg. Hole
Momentary	.180 (4,57) Min.	Approx. 45	25/64" (9,92)

Pushbutton Switches

## CIRCUITRY



## SPECIFICATIONS

### Rating Criteria

**Contact Resistance:** Less than 25 milliohms at the switch initially. Less than 4 milliohms/inch of wire.

**Voltage Breakdown:** 1,000 Vac between mutually insulated parts

**Insulation Resistance:** 1,000 megohms minimum

### Materials and Finishes

**Cover, Bushing, Mounting Nut:** Brass, tin zinc

**Shorting Bar:** Phosphor bronze, silver-plated.

**Terminals:** Phosphor bronze, silver contact surface. Terminal ends are tin/silver

**Base or Potting Shell:** Phenolic per MIL-M-14, type CFG

**Spring:** Tinned music wire

**Button Cap:** Polyethylene

**Button:** Polyphenylene sulfide (PPS) for 46-200 and 46-201. Polycarbonate for all other unsealed versions. Aluminum for all sealed versions.

**O-Ring Seal:** Nitrile per MIL-P-5516, class B

**Seal Adapter and Hex Nut (46-260):** Brass, zinc trivalent chromate-plated

**Wire Leads (46-260):** Per MIL-W-16878 type E. #26 AWG, insulated teflon, copper stranded wire

### Operating Features

**Break-Before-Make:** Rest position to N.C. break .020" (0,51) minimum. Rest position to N.O. Make .140" (3,35) maximum.

**Make-Before-Break:** Rest position to N.O. make .065" ± .015 (1,65 ± 0,38). Rest position to N.C. break .130" ± .015 (3,30 ± 0,38).

**Operating Temperature:** -40°C to +85°C

## STANDARD OPTIONS

Epoxy sealed terminals and wire leads, see page E-34 and E-35.

Decorative mountings, see pages E-24 to E-26.

## ACCESSORY



### Decorative Mounting Nut

Part No. 30C1023-1

Fits .250" (6,35) Bushing

For dimensions, materials and finishes, see page E-36.

## ORDERING INFORMATION

Description	Part No.
SPDT, BBM, Red Button	46-101 RED
SPDT, BBM, Black Button	46-101 BLK
SPDT, BBM, Red Cap	46-102 RED
SPDT, BBM, Black Cap	46-102 BLK
SPDT, MBB, Red Button	46-110 RED
SPDT, MBB, Black Button	46-110 BLK
SPDT, MBB, Red Cap	46-111 RED
SPDT, MBB, Black Cap	46-111 BLK
SPDT, BBM, Red Cap	46-150 RED
SPDT, BBM, Black Cap	46-150 BLK
SPDT, MBB, Red Cap	46-151 RED
SPDT, MBB, Black Cap	46-151 BLK
DPDT, BBM, Red Cap	46-200 RED
DPDT, BBM, Black Cap	46-200 BLK
DPDT, MBB, Red Cap	46-201 RED
DPDT, MBB, Black Cap	46-201 BLK
DPDT, BBM, Red Cap	46-270 RED
DPDT, BBM, Black Cap	46-270 BLK
DPDT, MBB, Red Cap	46-271 RED
DPDT, MBB, Black Cap	46-271 BLK
DPDT, BBM, Sealed, Red	46-260 RED
DPDT, BBM, Sealed, Black	46-260 BLK

ACCESSORY	
Decorative Nut	30C1023-1

Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.



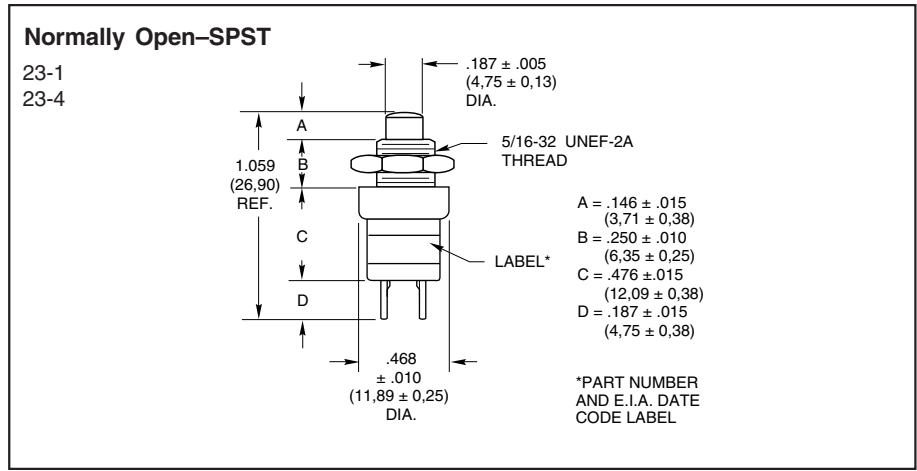
**SERIES 23**  
SPST, 1/4 Amp

**FEATURES**

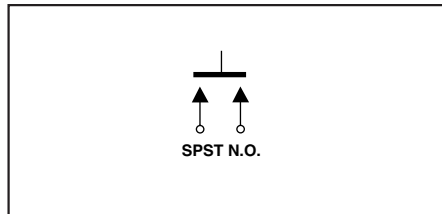
- Momentary Contact
- 100,000 Cycles of Operation



**DIMENSIONS** In Inches (and millimeters)



**CIRCUITRY**



**ACCESSORY**



**SPECIFICATIONS**

**Rating Criteria**

- Rated:** To-Make-and-Break: 1/4 Amp at 115 Vac, or 1/8 Amp at 220 Vac resistive.
- Contact Resistance:** 25 milliohms maximum on a new switch.
- Voltage Breakdown:** 1,000 Vac between mutually insulated parts.
- Insulation Resistance:** 1,000 megohms minimum.

- Terminals:** Brass, silver-plated.
- Spring:** Tinned music wire
- Shorting Bar:** Phosphor bronze, silver-plated.
- Operating Temperature:** -40° to +85°C

**Operating Features**

- Total Button Travel:** .095 ± .010 (2,41 ± 0,25)
- Overtravel:** .005 (0,13) minimum
- Actuating Force:** 16 ± 4 ounces
- Mounting Hole:** 21/64" (8,33)

**Materials and Finishes**

- Mounting Nut and Cover Bushing:** Brass, tin zinc
- Base:** Phenolic per MIL-M-14, Type CFG.
- Button:** Polycarbonate

**ORDERING INFORMATION**

Description & Button Color	Part No.
SPST, N.O., Red	23-1
SPST, N.O., Black	23-4
Accessory Nut	23C1024-1

**Available From Your Local Grayhill Distributor.**  
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

Pushbutton Switches

## SERIES 10 SERIES 4000 SPST, 1 and 3 Amp

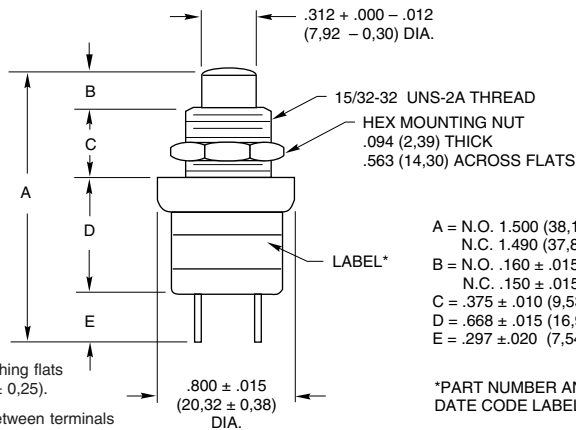
### FEATURES

- Momentary or Momentary With Positive Feel
- UL Recognized at 3 Amps



### DIMENSIONS In Inches (and millimeters)

4001(UL)  
10-09 (UL)  
10-100  
4002 (UL)  
10-10 (UL)  
10-101



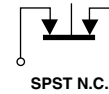
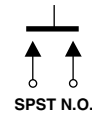
Dimension across bushing flats is .406 ± .010 (10,31 ± 0,25).  
The inside distance between terminals is .359 (9,12) at the switch base.

A = N.O. 1.500 (38,1) REF.  
N.C. 1.490 (37,8) REF.  
B = N.O. .160 ± .015 (4,06 ± 0,38)  
N.C. .150 ± .015 (3,81 ± 0,38)  
C = .375 ± .010 (9,53 ± 0,25)  
D = .668 ± .015 (16,97 ± 0,38)  
E = .297 ± .020 (7,54 ± 0,51)

\*PART NUMBER AND E.I.A. DATE CODE LABEL

Action	Part No.	Circuitry	Oper. at Rated Load	Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Actuating Force
Momentary	4001 10-09	SPST-N.O.	100,000	1 Amp	1/2 Amp	22 oz. ± 8
Momentary	4002 10-10	SPST-N.C.	100,000	1 Amp	1/2 Amp	23 oz. ± 7
Pos. Feel	10-100	SPST-N.O.	100,000	1 Amp	1/2 Amp	35 oz. ± 8
Pos. Feel	10-101	SPST-N.C.	100,000	1 Amp	1/2 Amp	35 oz. ± 10
<b>Underwriters Laboratory Recognized</b>						
Momentary	4001 UL 10-09 UL	SPST-N.O.	6,000	3 Amp	—	22 oz. ± 8
Momentary	4002 UL 10-10 UL	SPST-N.C.	6,000	3 Amp	—	23 oz. ± 7

### CIRCUITRY



### ACCESSORIES



**Decorative Mounting Nut**  
Part No. 07C1040-1



**Button Guard**  
Part No. 10C1015-1

### SPECIFICATIONS

#### Rating Criteria

**Rated:** See chart above

**Contact Resistance:** 25 milliohms or less on a new switch

**Voltage Breakdown:** 1,000 Vac between mutually insulated parts

**Insulation Resistance:** 1,000 megohms minimum

#### Additional Characteristics

**Total Travel:** Normally open .140 ± .032 (3,56 ± 0,81). Normally closed .110 ± .010/ - .020 (2,79 + 0,25/ - 0,51).

**Overtravel:** Normally open .020 (0,51) minimum

**Pretravel:** Normally closed .010 (0,25) minimum

**Operating Temperature:** -40°C to +85°C

**UL Recognition:** See chart above for rating. UL file number is 35289.

#### Materials and Finishes

**Mounting Nut:** Brass, tin zinc

**Mounting Bushing and Cover:** Zinc, zinc trivalent chromate-plated

**Button and Base:** Thermoset plastic

**Shorting Bar:** Brass, silver-plated

**Spring:** Tinned music wire

**Contact Terminals:** Beryllium copper, silver-plated .0003" to .0005"

#### STANDARD OPTIONS

Epoxy sealed terminals are not available through distributors.

For terminals bent at 90°, contact Grayhill.

### ORDERING INFORMATION

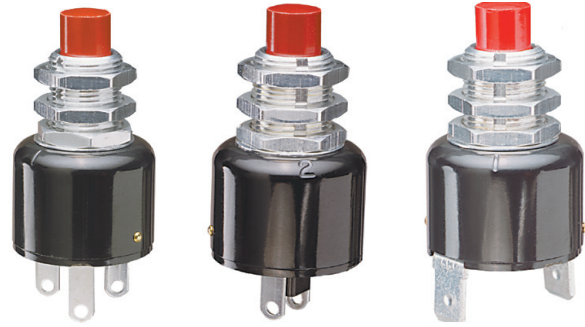
Description & Button Color	Part No.
SPST, N.O., Red	4001
SPST, N.O., Black	10-09
SPST, N.O., UL, Red	4001UL
SPST, N.O., UL, Black	10-09 UL
SPST, N.O., Positive Feel, Red	10-100
SPST, N.C., Positive Feel, Black	10-101
SPST, N.C., Red	10-10
SPST, N.C., Black	4002
SPST, N.C., UL, Red	10-10 UL
SPST, N.C., UL Black	4002 UL
Accessory Nut	07C1040-1
Accessory Button Guard	10C1015-1

**Available from your local Grayhill Distributor.**  
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

**SERIES 07**  
**SERIES 2000**  
**SPST and SPDT, 10 Amp**

**FEATURES**

- Momentary Contact
- Extremely Fast Make-and-Break
- Audible Click
- 25,000 Cycles of Operation



**DIMENSIONS** In Inches (and millimeters)

**SPDT Solder Lug Terminal**  
07-26\*

A = .273 ± .020 (6.93 ± 0.51)  
 B = .454 ± .015 (11.53 ± 0.38)  
 C = .796 ± .015 (20.22 ± 0.38)  
 D = .443 ± .015 (11.25 ± 0.38)

\*PART NUMBER AND E.I.A. DATE CODE LABEL

**SPST—Solder Lug Terminals**

2201  
2202  
07-7  
07-8

1.903 (48.34) REF.

\*PART NUMBER AND E.I.A. DATE CODE LABEL

**SPST—Faston Terminals**

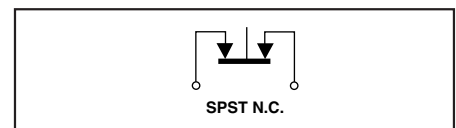
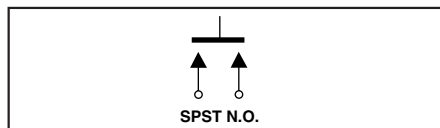
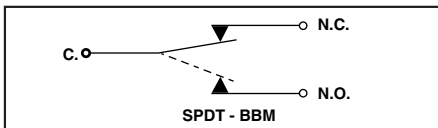
07-21  
07-22

1.910 (48.51) REF.

TERMINALS TO ACCOMMODATE 1/4 INCH PUSH-ON TERMINATION

\*PART NUMBER AND E.I.A. DATE CODE LABEL

**CIRCUITRY**



**SPECIFICATIONS**

**Rating Criteria**

**Rated:** To make and break 10 Amps at 115 Vac, or 5 Amps at 220 Vac resistive load for 25,000 operations

**Contact Resistance:** 25 milliohms or less on a new switch

**Voltage Breakdown:** 1,000 Vac between mutually insulated parts

**Insulation Resistance:** 1,000 megohms minimum

**Operating Features**

**Total Button Travel:** .065 (1,65) approximately

**Overtravel:** .008 (0,20) approximately

**Actuating Force:** 24 ounces approximately

**Mounting Hole:** 31/64" (12,30) inches

**Terminal Type:** Solder Lug/Faston

**Operating Temperature:** -40°C to +85°C

**Available from your local Grayhill Distributor.**

For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

**Materials and Finishes**

**Housing, Button and Internal Bridge:** Thermoset plastic

**Mounting Nuts, Bushings, and Internal Bracket:** Brass, tin zinc

**Fixed and Moving Contacts:** Fine silver

**Internal Spring, Link and Contact Carrier:** Beryllium, copper

**Cover-to-Base Mounting Pins:** Brass

**Faston Terminals:** Brass, tin over nickel

**Solder Lug Terminals:** Brass, zinc trivalent chromate-plated

**ACCESSORIES**



**ORDERING INFORMATION**

*Part Number	Description	Circuitry	Button	Terminal
2201	SPST—N.O.		Red	Solder
07-7	SPST—N.O.		Black	Solder
07-21	SPST—N.O.		Red	Faston
2202	SPST—N.C.		Black	Solder
07-8	SPST—N.C.		Red	Solder
07-22	SPST—N.C.		Black	Faston
07-26 RED	SPDT—BBM		Red	Solder
07-26 BLK	SPDT—BBM		Black	Solder

Part Number	Accessory Description
07Z1047-1 BLK	Black Button Cap
07Z1047-2 RED	Red Button Cap
07C1040-1	Decorative Nut
10C1015-1	Button Guard

## SEALED TERMINAL AND WIRE LEAD OPTIONS OPTION -E AND -EW

### FEATURES

- 1/4, 1/2, and 1 Amp
- Limit, Overtravel, or Panel Seal
- Butt or Wiping Contact
- Normally Open or Normally Closed
- Momentary or Push/Pull
- Series 23, 30, 39 and 46



**Option -E**  
Epoxy-Sealed  
Terminals



**Option -EW,**  
Potted Base & 6"  
Wire Leads

### SPECIFICATIONS

#### Rating Criteria

**Make and Break Current Rating:** See page for standard part number

**Contact Resistance:** 25 milliohms maximum on a new switch. Less than 4 milliohms per inch of wire for wire lead option styles.

**Insulation Resistance:** 1,000 megohms minimum between mutually insulated parts

**Voltage Breakdown:** 1,000 Vac minimum between mutually insulated parts

#### Materials and Finishes

**Potting Sleeve (Series 39):** Thermoset Plastic

**Wire Leads:** #26AWG, (.99mm diameter) insulated Teflon, Copper stranded wire, per MIL-W-16878, Type E. Ends are stripped 0.250" (6.35) and solder dipped. For other specifications, see Page References.

Standard Part Number Red Button	Standard Part Number Black Button	Choices of Suffix	Length Behind Panel In inches (and millimeters)	
			Standard Switch & Terminals	-EW Style Body
23-1	23-4	-E	0.665 (16,89)	—
30-1	30-3	-E, -EW	0.592 (15,04)	0.645 (16,38)
30-15	30-37	-E, -EW	0.679 (17,25)	0.728 (18,49)
30-17 RED	30-17 BLK	-E, -EW	0.958 (24,33)	1.007 (25,58)
30-16 RED	30-16 BLK	-E, -EW	0.958 (24,33)	1.007 (25,58)
30-251 RED	30-251 BLK	-E, -EW	0.632 (16,05)	0.685 (17,40)
30-252 RED	30-252 BLK	-E, -EW	0.645 (16,38)	0.700 (17,78)
30-32 RED	30-32 BLK	-E, -EW	0.867 (22,02)	0.896 (22,76)
30-6	30-2	-E, -EW	0.605 (15,37)	0.640 (16,26)
30-601 RED	30-601 BLK	-E, -EW	0.592 (15,04)	0.645 (16,38)
39-1*	39-3*	-EW**	0.315 (8,00)	0.440 (11,18)
39-12*	39-2	-E, -EW	0.490 (12,45)	0.575 (14,61)
39-101	39-24*	-EW**	0.455 (11,56)	0.575 (14,61)
39-351 RED	39-351 BLK	-EW**	0.650 (16,51)	0.775 (19,69)
39-352 RED*	39-352 BLK*	-E, -EW	0.350 (8,89)	0.450 (11,43)
39-601 RED	39-601 BLK	-E, -EW	0.529 (13,44)	0.630 (16,00)
39-701***	—	-EW*	0.315 (8,00)	0.440 (11,18)
39-702***	—	-EW**	0.800 (20,32)	0.925 (23,50)
46-101 RED	46-101 BLK	-E, -EW	0.510 (12,95)	0.750 (19,05)
46-102 RED	46-102 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-110 RED	46-110 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-111 RED	46-111 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-150 RED	46-150 BLK	-E, -EW	0.890 (22,61)	0.957 (24,31)
46-151 RED	46-151 BLK	-E, -EW	0.957 (24,31)	1.024 (26,01)
46-200 RED	46-200 BLK	-E	0.957 (24,31)	1.024 (26,01)
46-201 RED	46-201 BLK	-E	0.921 (23,39)	—
46-270 RED	46-270 BLK	-E	0.921 (23,39)	—
46-271 RED	46-271 BLK	-E	0.957 (24,31)	—

\*Epoxy potting sleeve enlarges the diameter of the -EW style to 0.300 (7,62).

\*\*Sealed terminal (-E) option is not necessary; terminals have sealed construction.

\*\*\*Natural Color Button

†Adjustable from 1.214 (30,84) to 1.334 (33,88) dependent on button height, see switch pages.

**ORDERING INFORMATION**

Use the Selector Charts at the beginning of the section to select a series. Use the pages listed there or referenced here to select a switch.

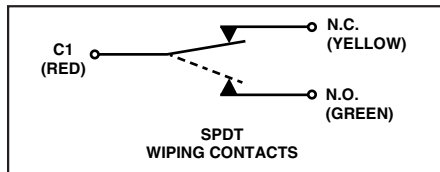
To order epoxy sealed terminals, add the suffix -E to the selected part number as allowed in the chart. **Example:** 30-1-E.

To order the epoxy-potted version with 6-inch wire leads, use the suffix -EW as allowed in the chart. **Example:** 39-1-EW

**Available From Your Local Grayhill Distributors.** For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

Standard Part Number Without Options Choice of Button Color (see switch pages)	Standard Part Number Choice of Button Color (see switch pages)	Choices of Options	Length Behind Panel In inches (and millimeters)	
			Standard Switch & Terminals	-EW Style Body
—	30-001-A-XX	-E, -EW	1.119 (28,42)	1.172 (29,77)
—	30-002-A-XX	-E, -EW	1.132 (28,75)	1.167 (29,64)
—	30-015-A-XX	-E, -EW	1.204 (30,58)	1.253 (31,83)
—	30-017-A-XX	-E, -EW	Adjustable†	Adjustable†
30-01-01-500-XX	30-1-1-50-XX	-E, -EW	1.100 (27,94)	1.153 (29,29)
30-01-04-500-XX	30-1-4-50-XX	-E, -EW	1.257 (31,93)	1.310 (33,27)
30-05-01-502-XX	30-5-1-52-XX	-E, -EW	0.930 (23,62)	0.983 (24,97)
30-05-04-502-XX	30-5-4-52-XX	-E, -EW	1.130 (28,70)	1.183 (30,05)
—	30-601-A-XX	-E, -EW	1.119 (28,42)	1.172 (29,77)
46-01-05-500-XX	46-1-5-50-XX	-E, -EW	1.361 (34,57)	1.428 (36,27)
46-01-07-500-XX	46-1-7-50-XX	-E, -EW	1.451 (36,86)	1.518 (38,56)
46-01-08-500-XX	46-1-8-50-XX	-E	1.381 (35,08)	—
46-01-09-500-XX	46-1-9-50-XX	-E	1.381 (35,08)	—
46-05-05-502-XX	46-5-5-52-XX	-E, -EW	1.179 (29,95)	1.246 (31,65)
46-05-07-502-XX	46-5-7-52-XX	-E, -EW	1.465 (37,21)	1.532 (38,91)
46-05-08-502-XX	46-5-8-52-XX	-E	1.188 (30,18)	—
46-05-09-502-XX	46-5-9-52-XX	-E	1.317 (33,45)	—
—	46-102-A-XX	-E, -EW	1.417 (35,99)	1.484 (37,69)
—	46-111-A-XX	-E, -EW	1.417 (35,99)	1.484 (37,69)
—	46-200-A-XX	-E	1.448 (36,78)	—
—	46-201-A-XX	-E	1.448 (36,78)	—

**CIRCUITRY: Series 46**



\*Epoxy potting sleeve enlarges the diameter of the -EW style to 0.300 (7,62).  
 \*\*Sealed terminal (-E) option is not necessary; terminals have sealed construction.  
 \*\*\*Natural Color Button  
 †Adjustable from 1.214 (30,84) to 1.334 (33,88) dependent on button height, see switch pages.

Pushbutton Switches

## ACCESSORIES

### For Pushbutton Switches



Decorative Mounting Nuts



Button Caps

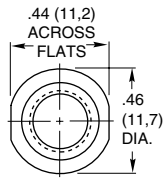
Button Guard



Pendant Housing

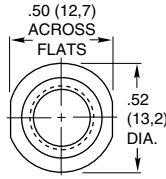
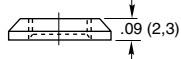
## DIMENSIONS In Inches (and millimeters)

### Decorative Mounting Nuts



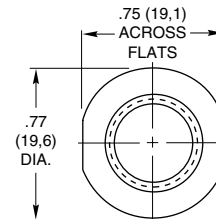
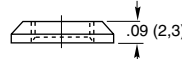
30C1023-1

Brass, nickel-plated for 1/4" (6,35) bushing.



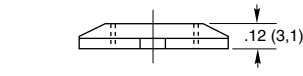
23C1024-1

Brass, nickel-plated for 5/16" (7,93) bushing.

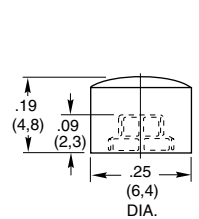


07C1040-1

Brass, nickel-plated for 15/32" (11,9) bushing.



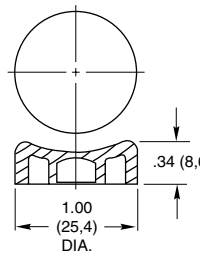
### Button Caps and Guard



30B1012

Thermosetting plastic (Fasten to button with cyanoacrylate adhesive) black, red or white.

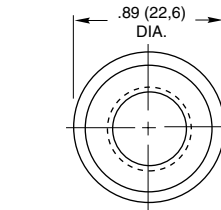
For use with all Series 30 and 39 switches except part number 39-101. See switch pages.



07Z1047

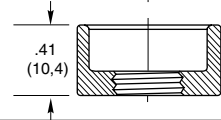
Thermoplastic, black or red color.

For use with Series 2000 and Series 7 switches. See switch pages.

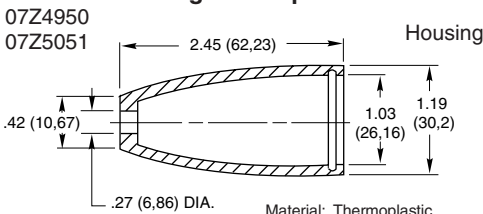


10C1015-1

Brass, zinc trivalent chromate-plated for 15/32" (11,9) bushing.



### Remote Switching Accessories Pendant Housing and Caps

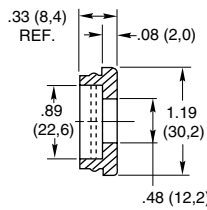


07Z4950

07Z5051

Housing

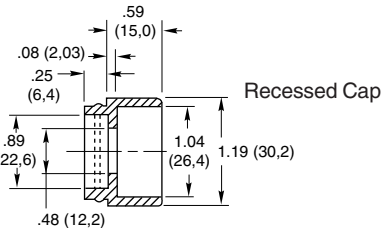
Material: Thermoplastic  
Specials: other colors available on special order.



Flat Cap

Application:

All grayhill pushbutton switches with 15/32-32 bushings: catalog numbers 2201, 2202, 07-7, 07-8, 07-21, 07-22, 07-26, 4001, 4002, 10-9, 10-10, 10-100, 10-101, 30-16, 30-17 and 30-32. any other switch with 15/32-32 bushing if it fits housing.



Recessed Cap

## ORDERING INFORMATION:

### Mounting Nuts, Button Caps, and Guards

Part Number	Color
07C1040-1	Decorative Nut
23C1024	Decorative Nut
30C1023-1	Decorative Nut
07Z1047-1 BLK	Black Button Cap
07Z1047-2 RED	Red Button Cap
10C1015-1	Button Guard
30B1012-5	Red Cap
30B1012-8	White Cap
30B1012-9	Black Cap

### Pendant Housing and Caps

Part Number	Description
07Z4950 RED	Red Flat Cap & Housing
07Z4950 BLK	Black Flat Cap & Housing
07Z5051 RED	Red Rcstd Cap & Housing
07Z5051 BLK	Black Rcstd Cap & Housing

Sold only as sets of one housing and one cap.

### Available from your local Grayhill Distributor.

For prices and discounts, contact a local Sales Office, an authorized local Distributor, or Grayhill.