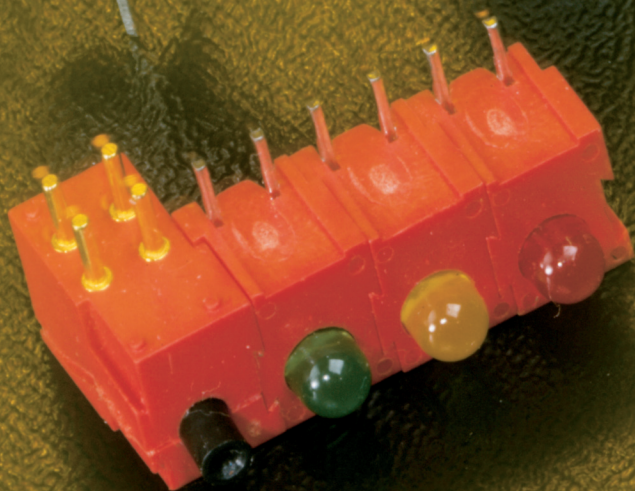




PUSHBUTTON SWITCHES

- 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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SELECTION CHART	3
 BUTT CONTACT PUSHBUTTON SWITCHES	
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SPDT and DPDT, 1/4 Amp	Series 46 54
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Accessories	

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).

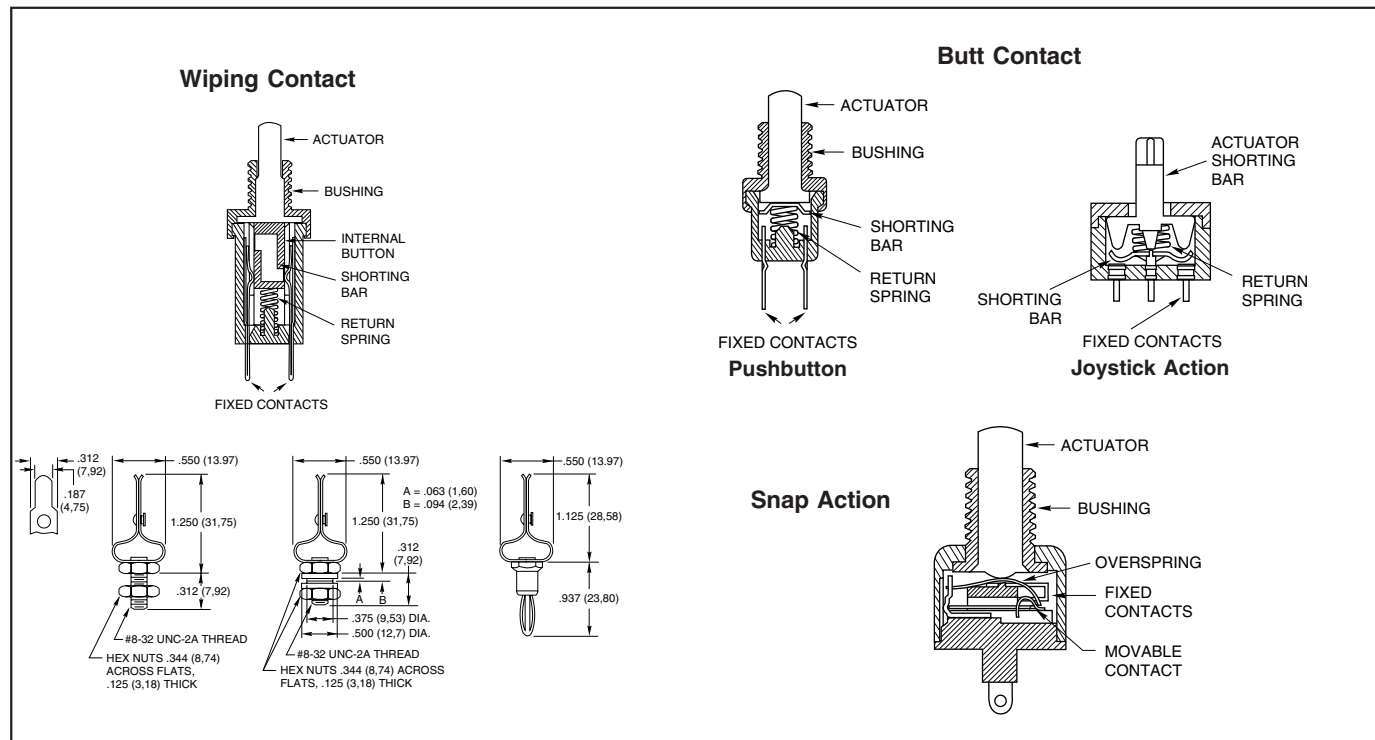
Wiping Contacts are self-cleaning and usually provide a low resistance in circuits where contact resistance is critical. However, the wiping action creates mechanical wear and conductive wear products.

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



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
BUTT CONTACT							
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
	N.O.	.4VA	40,000	.177 (4,5)	Process Sealed, Subminiature	49	E-32
DPDT	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

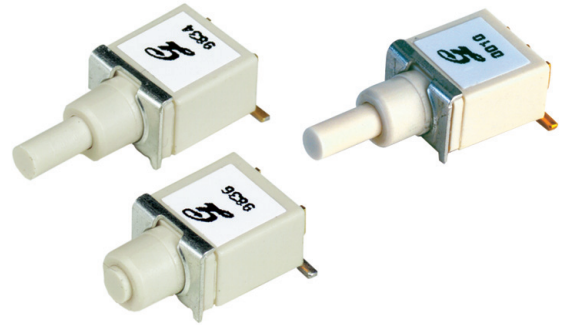
** Rated for 28 Vdc and/or 5 Vdc (.150 A) and 20 Vdc (.020 A).

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

SERIES 38BM AND 38BC Sub-Miniature Surface Mount

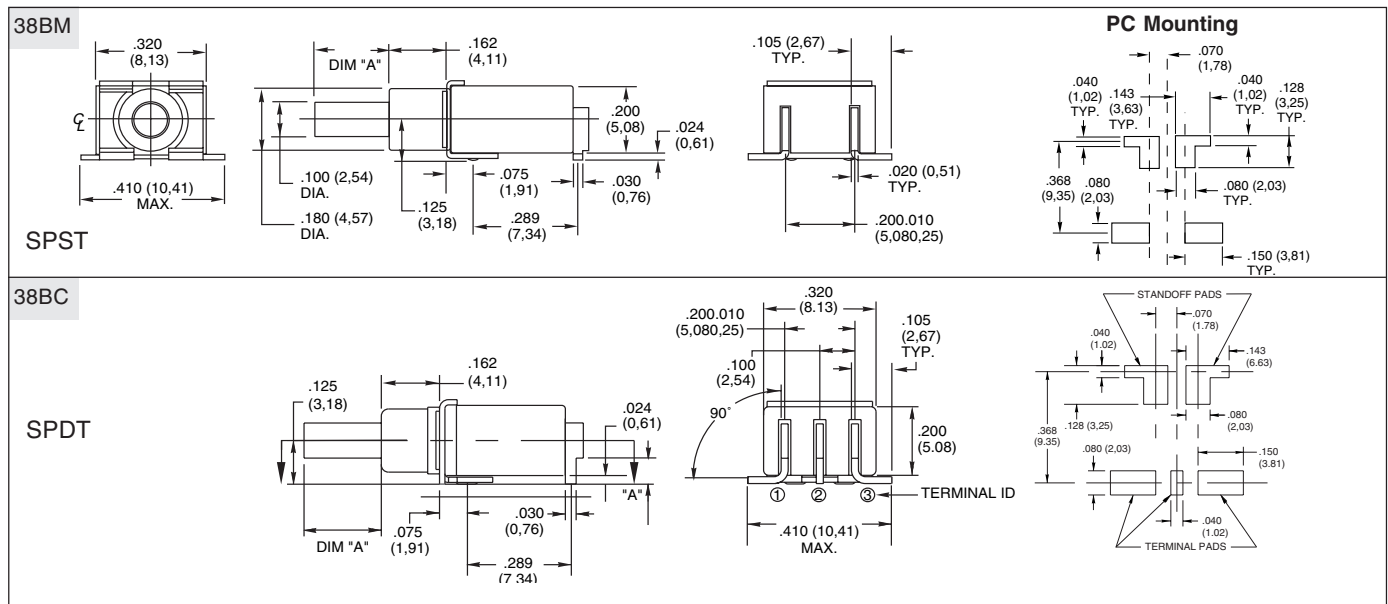
FEATURES

- 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

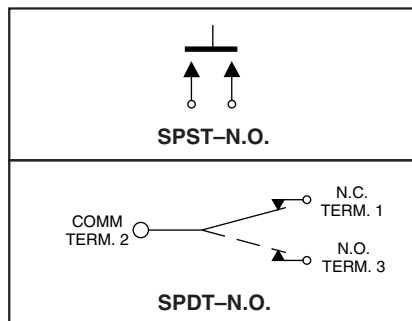
Available from your local Grayhill Distributor.

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

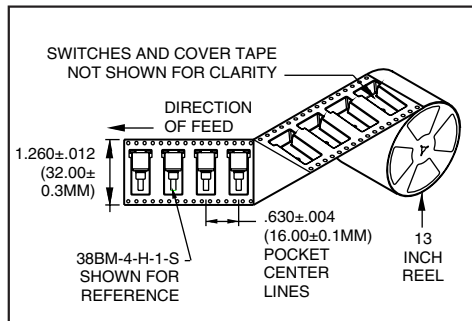
SERIES 38BM AND 38BC

Sub-Miniature Surface Mount

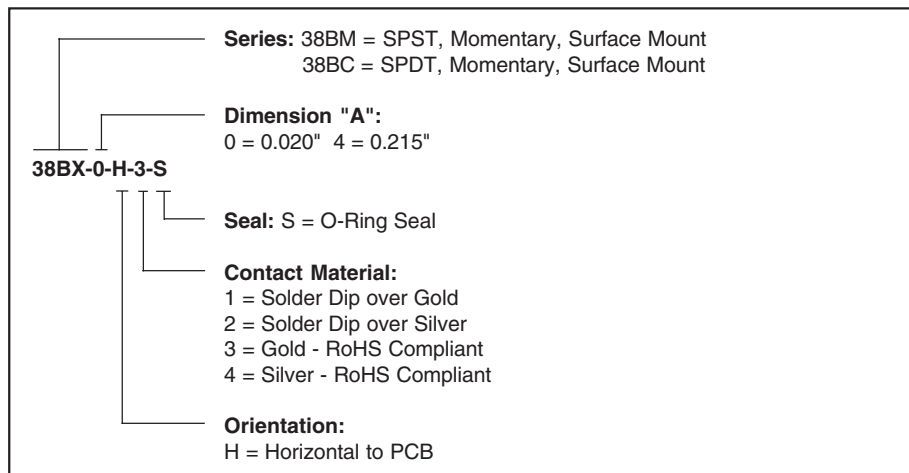
CIRCUITRY



TAPE AND REEL PACKAGING



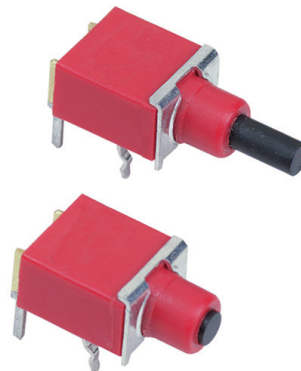
ORDERING INFORMATION



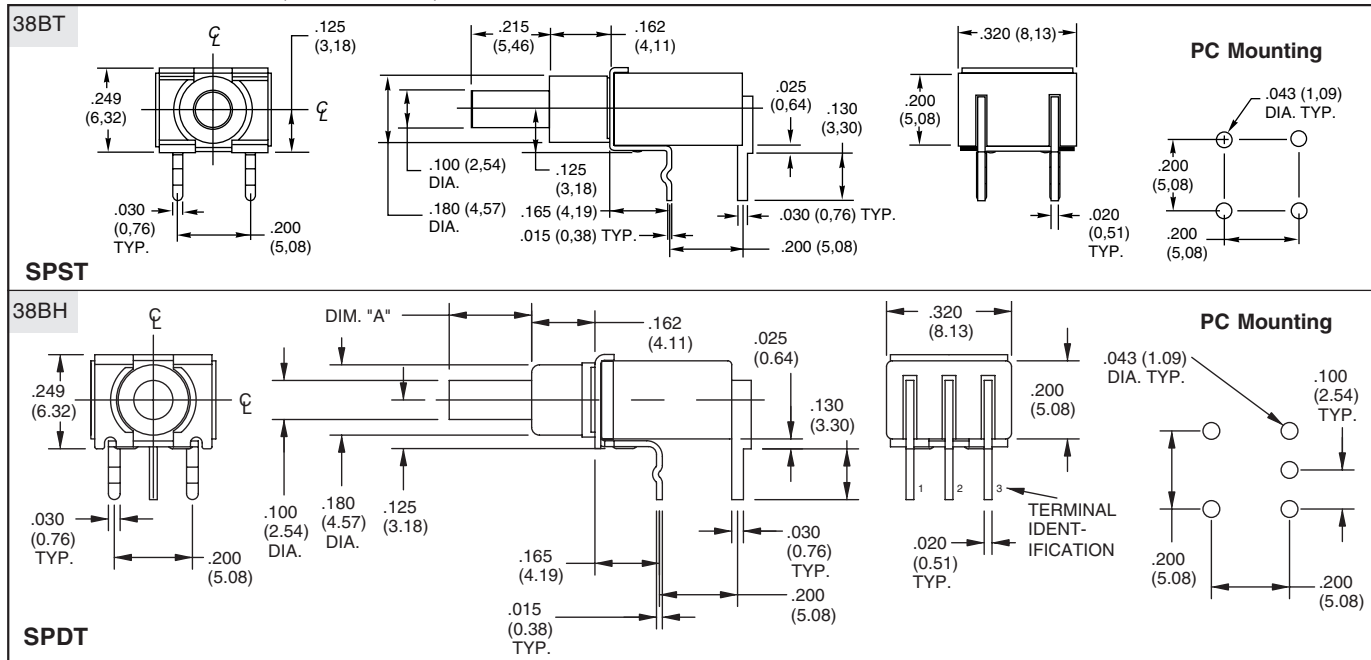
SERIES 38BT and 38BH Sub-Miniature Horizontal PC Mount

FEATURES

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



DIMENSIONS In inches (and millimeters)



Unless otherwise indicated, tolerances are $\pm .010$ (0,25)

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)

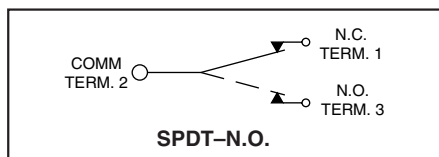
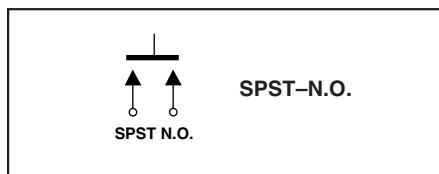
Terminals: Copper alloy, gold or silver plate (as specified) over nickel plate

Spring: Plated Music Wire

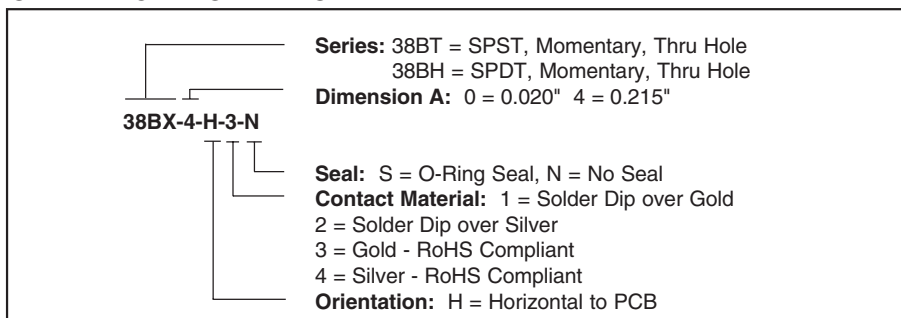
Contact System: Copper alloy, gold or silver plate (as specified) over nickel plate

Switch Support: Brass, tin-plated

CIRCUITRY



ORDERING INFORMATION



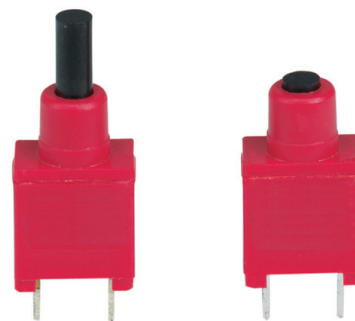
Available from your local Grayhill Distributor For prices and discounts, contact a local Sales Office, an authorized local distributor, or Grayhill.

SERIES 38BT and 38BC

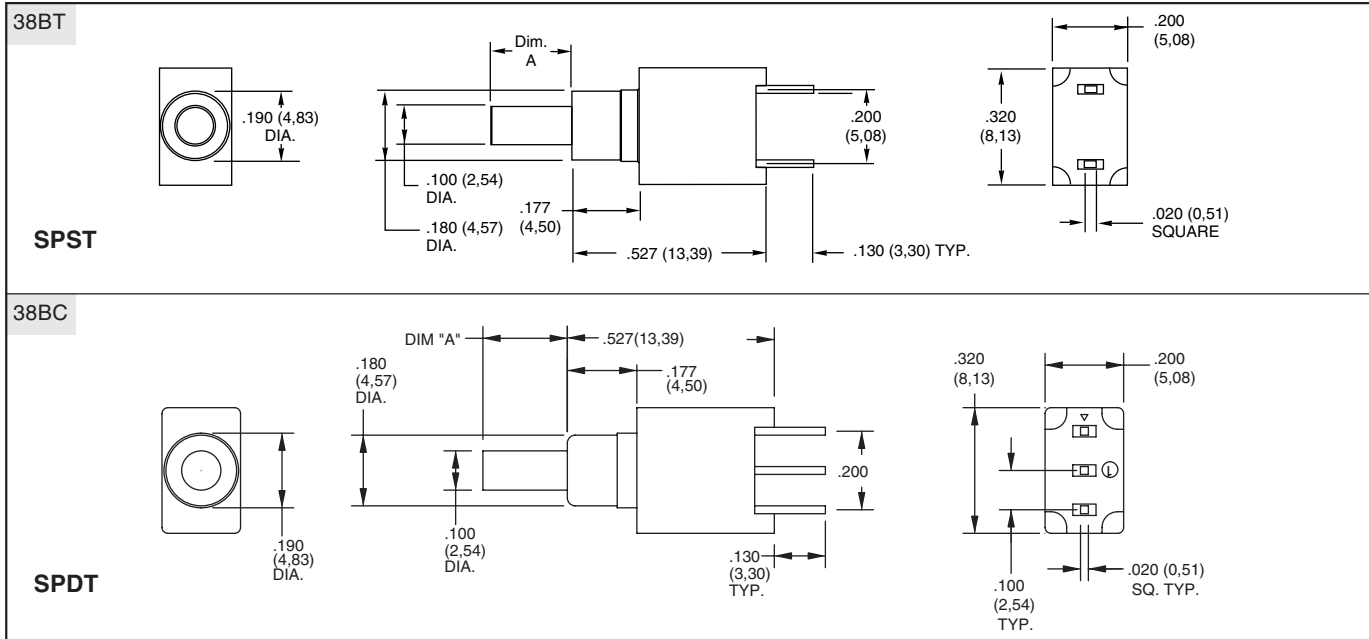
Sub-Miniature Vertical PC Mount

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 $\pm .010$ (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)

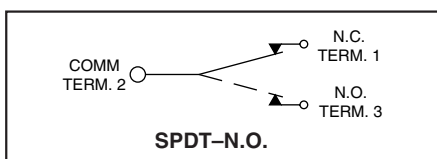
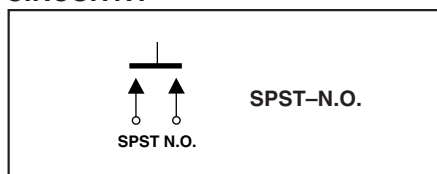
Plunger: Thermoplastic (UL 94V-0), (S versions include an internal o-ring seal)

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

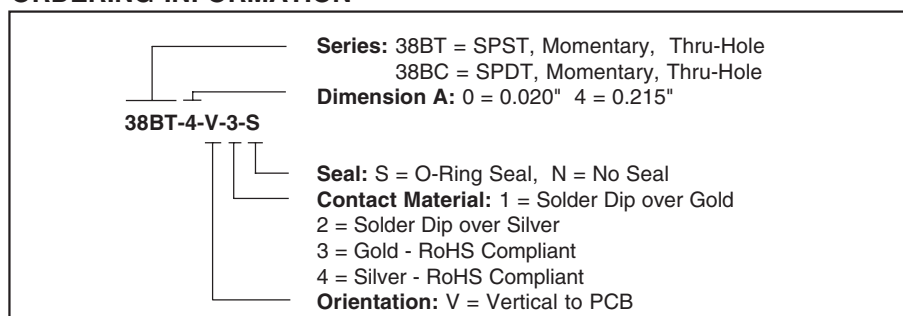
Spring: Plated music wire

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

CIRCUITRY



ORDERING INFORMATION



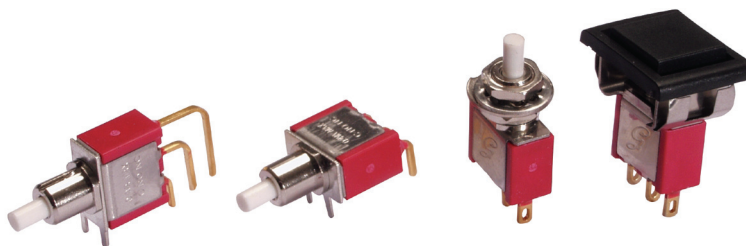
Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 38C

Miniature Pushbutton Switches

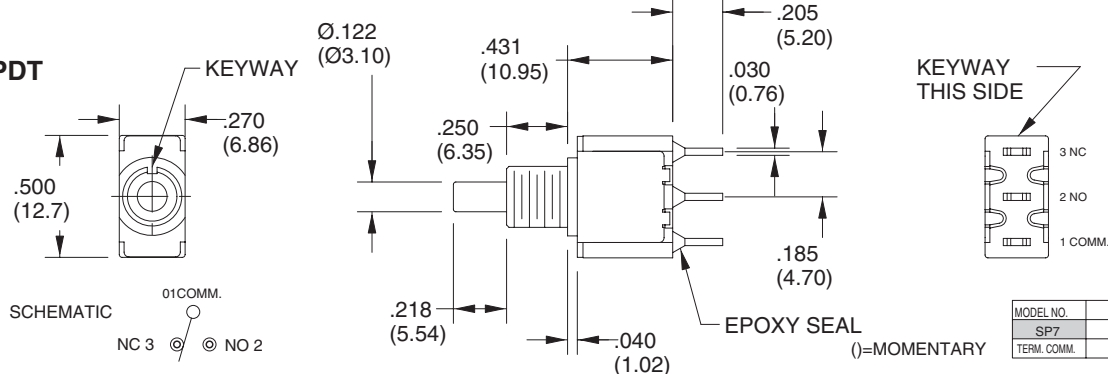
FEATURES

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

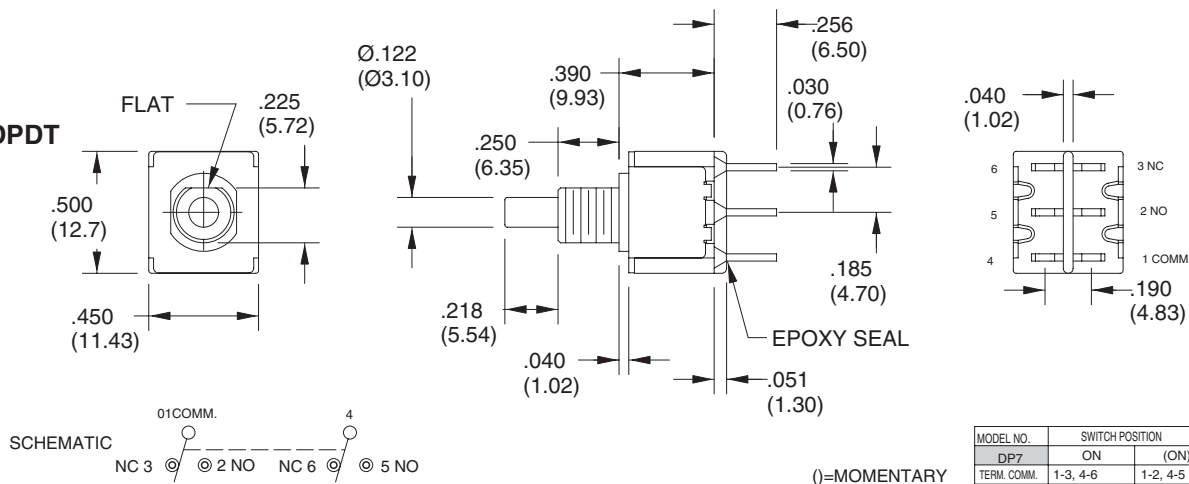


DIMENSIONS IN INCHES (AND MILLIMETERS)

SPDT

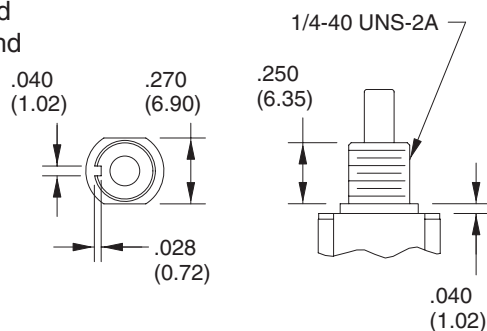


DPDT

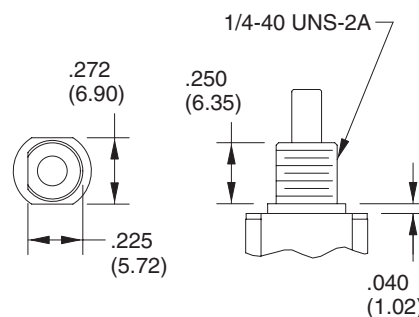


BUSHING OPTIONS IN INCHES (AND MILLIMETERS)

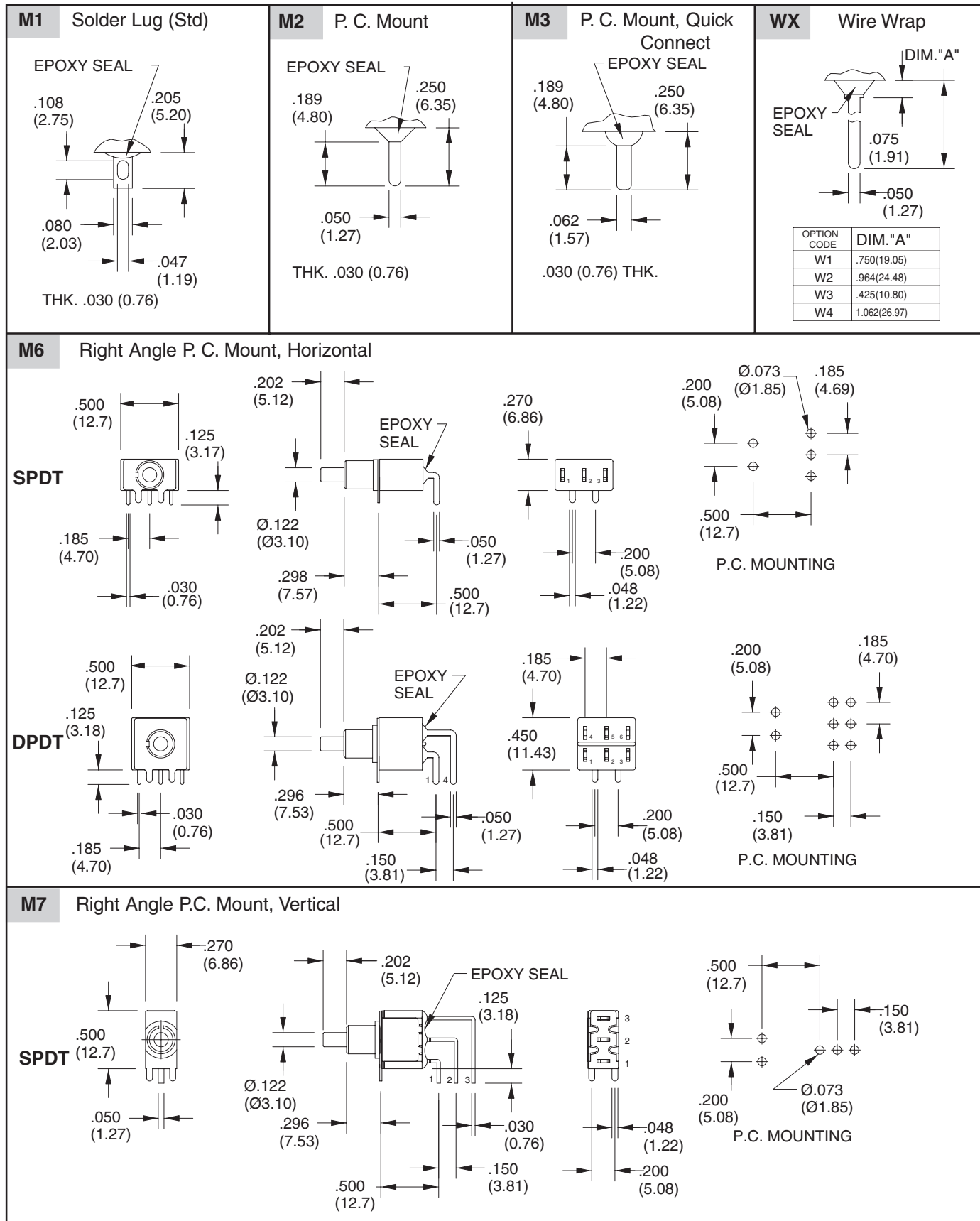
B10 Thd Std B20 Non-Thd



B11 Thd Std B21 Non-Thd



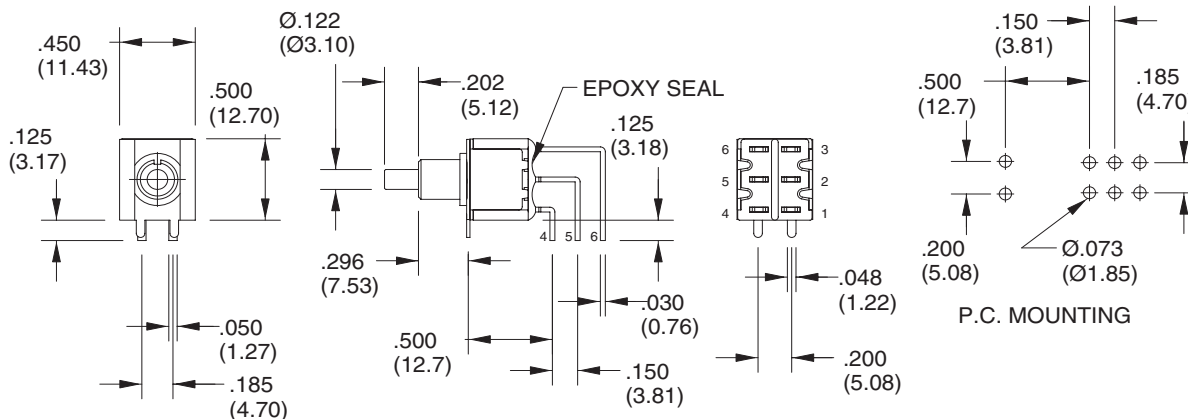
TERMINATION OPTIONS IN INCHES (AND MILLIMETERS)



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

M7

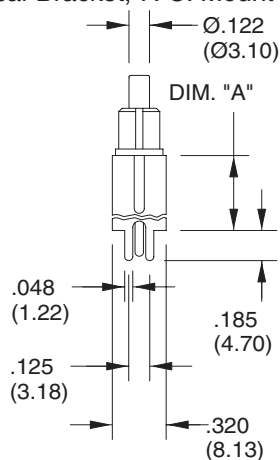
DPDT



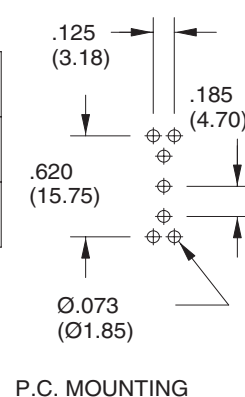
V2-V3

Vertical Bracket, P. C. Mount

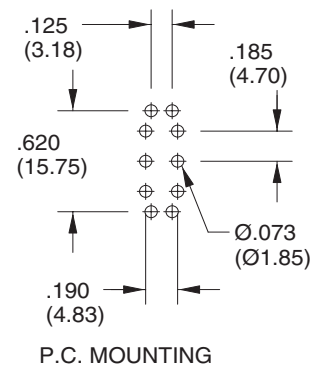
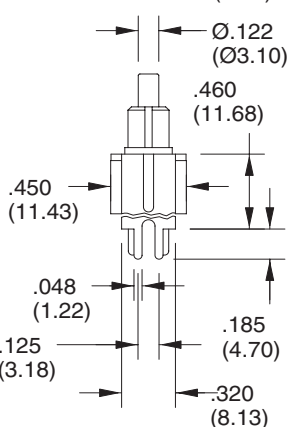
SPDT



OPTION CODE	DIM. "A"
V2	.460 (11.68)
V3	.630 (16.00)



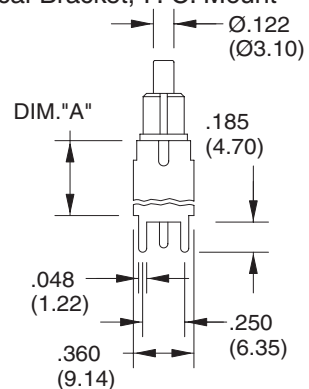
DPDT



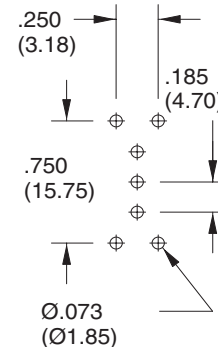
V4-V5

Vertical Bracket, P. C. Mount

SPDT

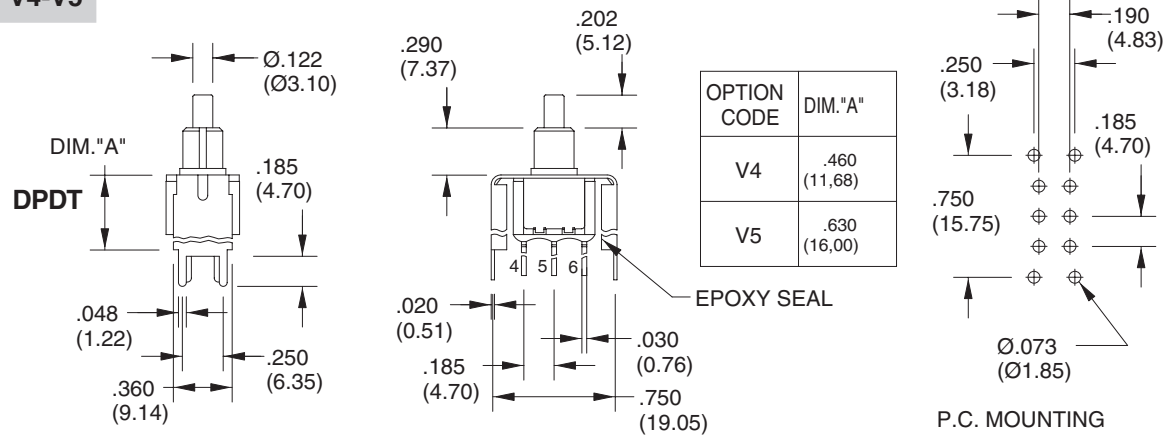


OPTION CODE	DIM. "A"
V4	.460 (11.68)
V5	.630 (16.00)



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

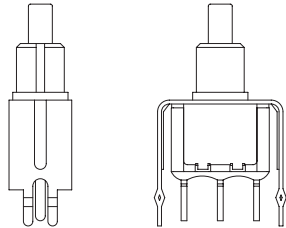
V4-V5



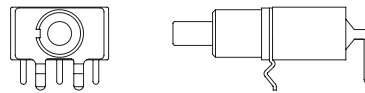
Snap-in Termination Options

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

S2



S6

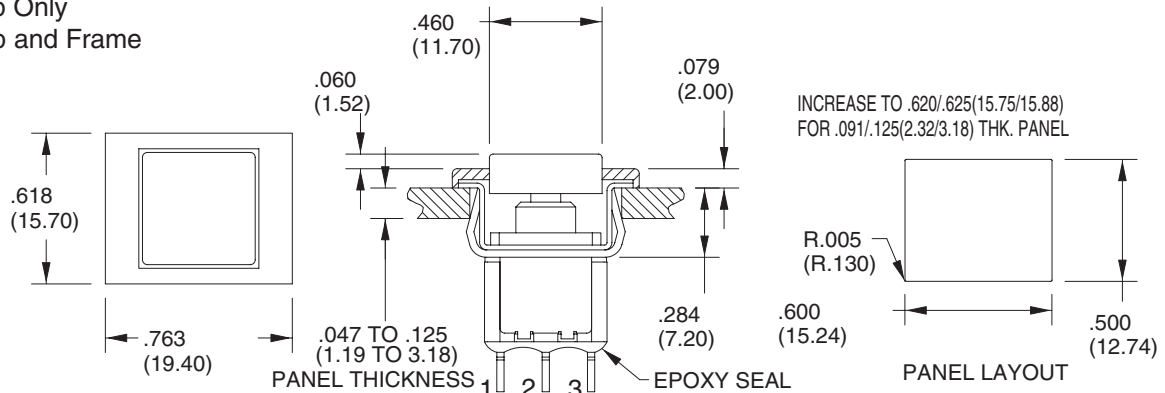


BUSHING OPTIONS IN INCHES (AND MILLIMETERS)

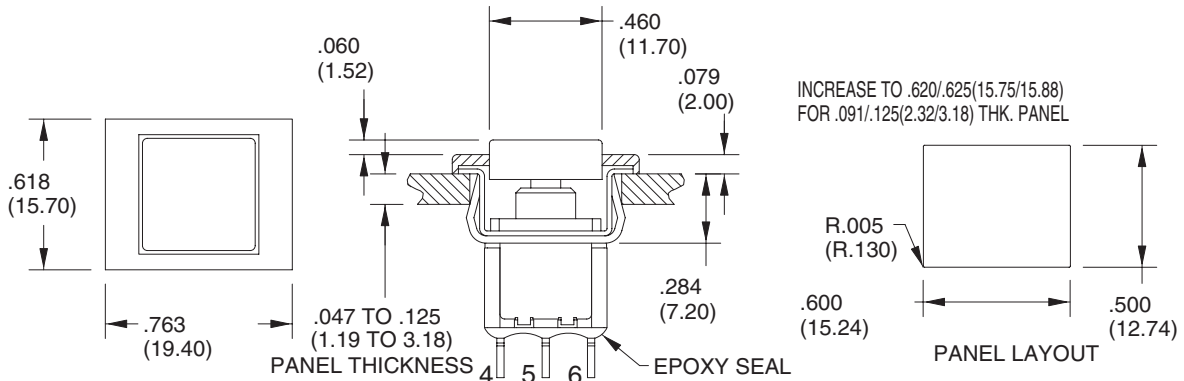
FOR PANEL MOUNTING

- AP1** Cap Only
- AP2** Cap and Frame

SPDT



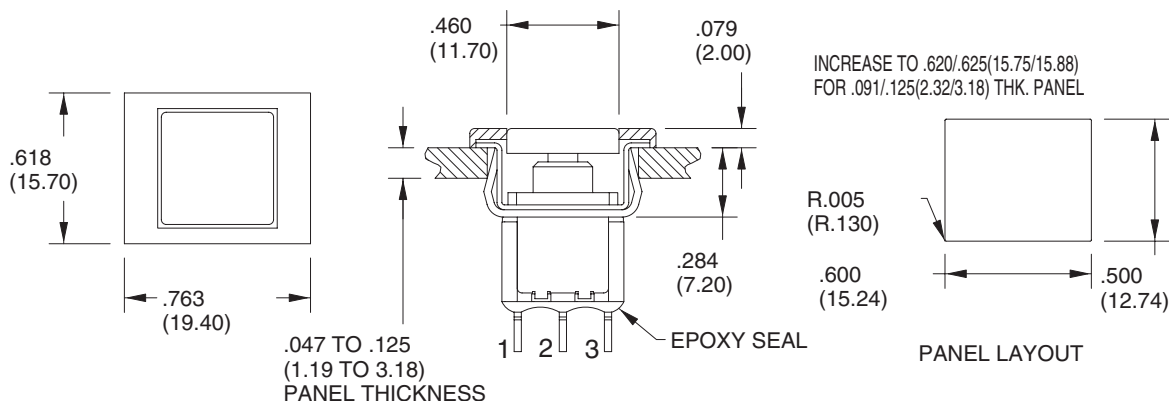
DPDT



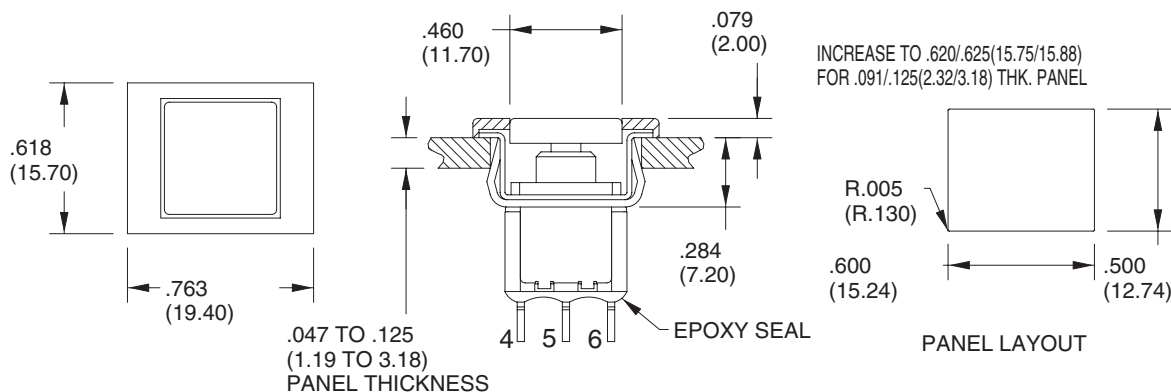
BUSHING OPTIONS IN INCHES (AND MILLIMETERS) FOR PANEL MOUNTING

AP3 Cap Only
AP4 Cap and Frame

SPDT



DPDT



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, electroplated

Terminal Seal: Epoxy

ORDERING INFORMATION

SERIES	MODEL NO.	PLUNGER	BUSHING	TERMINATION	CONTACT	SEAL
38C	SP7		B10	M1	Q	T
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

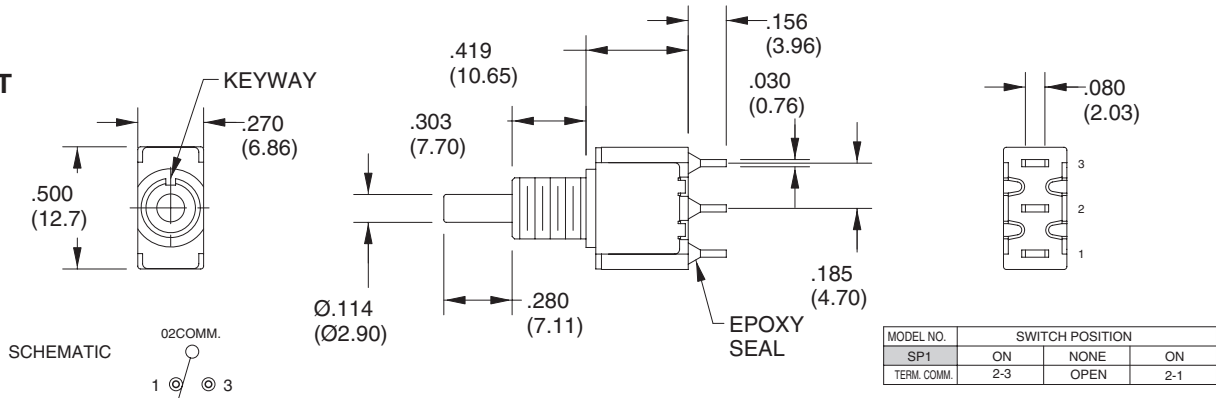
FEATURES

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

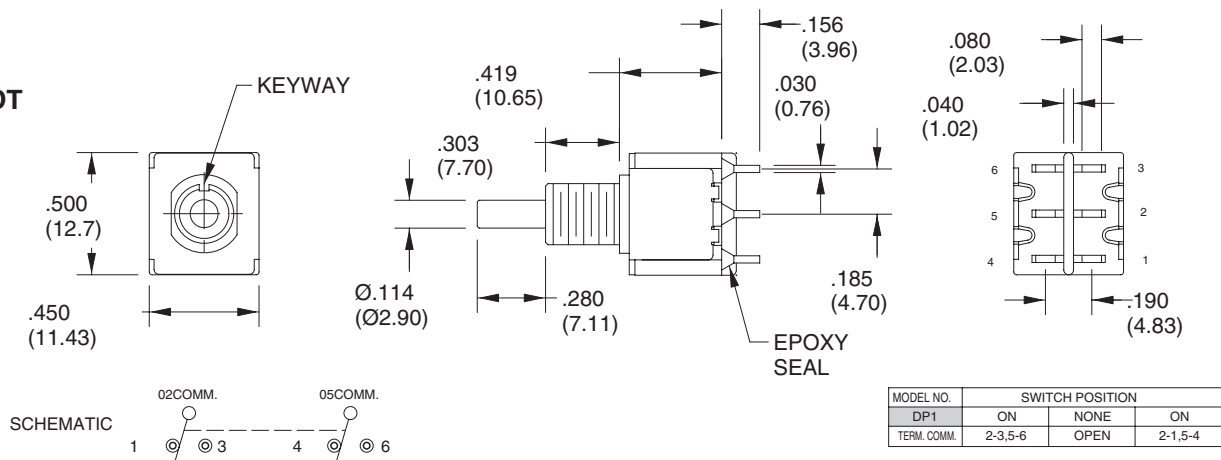


MODELS IN INCHES (AND MILLIMETERS)

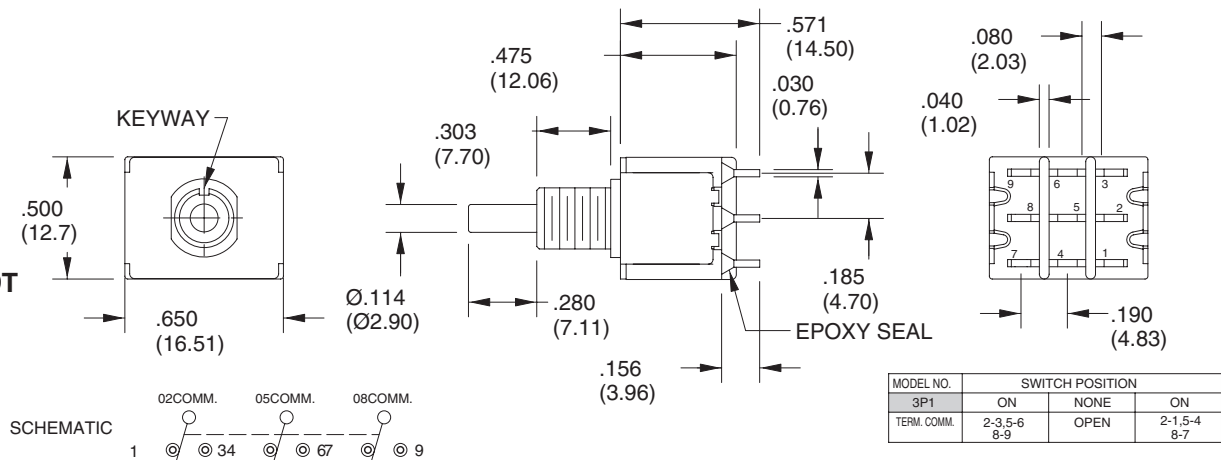
SPDT



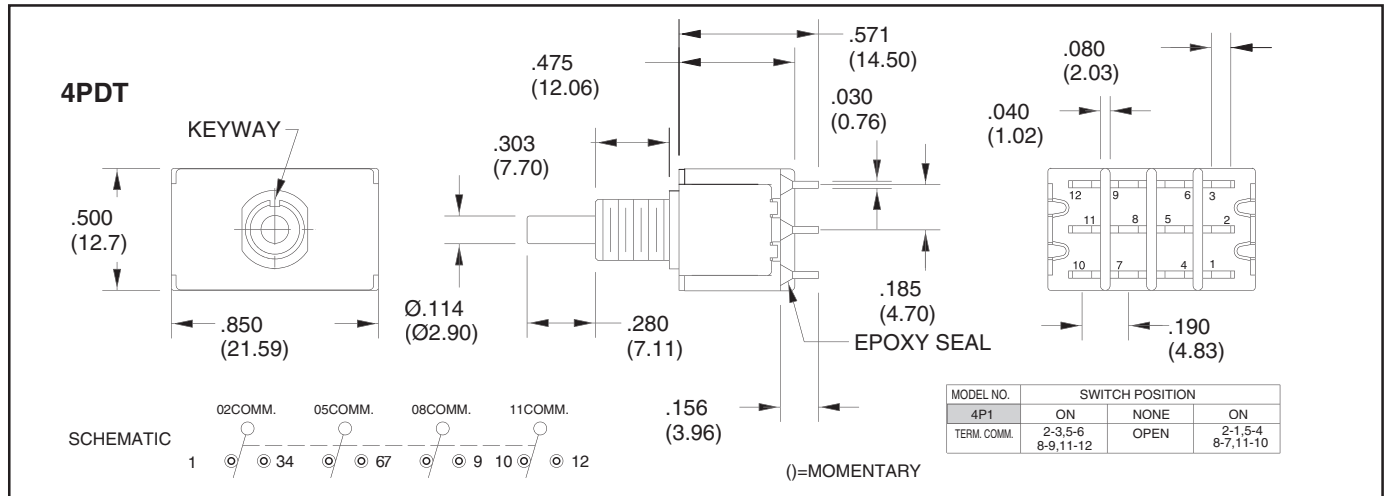
DPDT



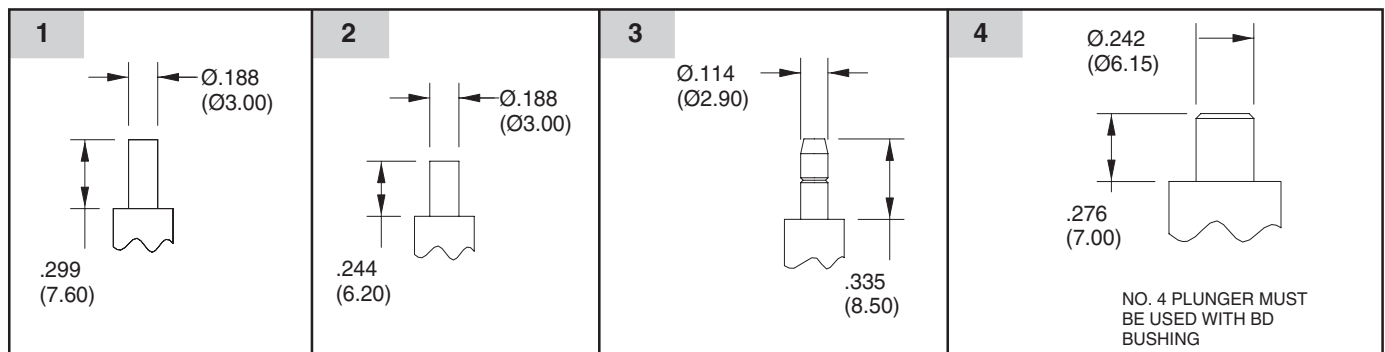
3PDT



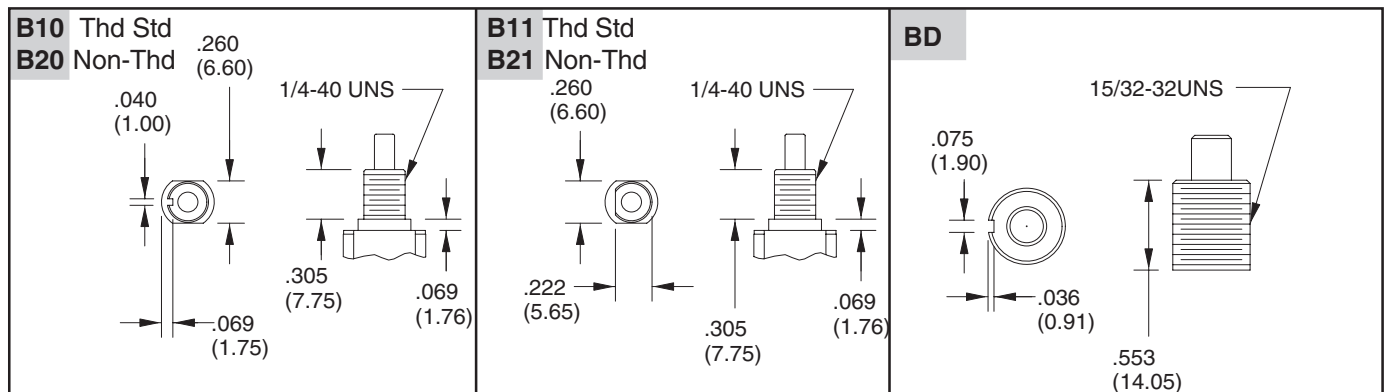
TERMINATION OPTIONS IN INCHES (AND MILLIMETERS)



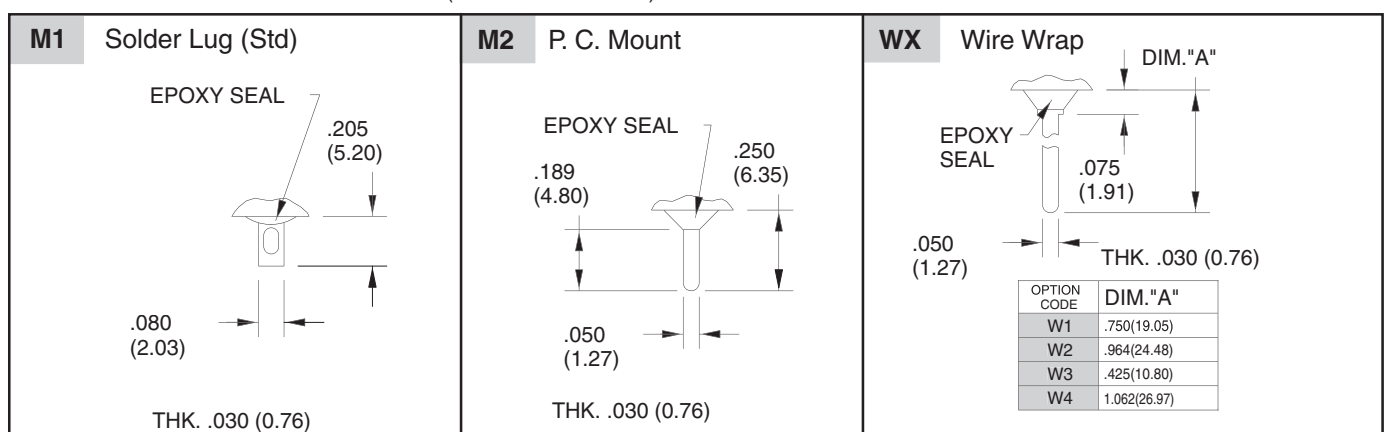
PLUNGER OPTIONS IN INCHES (AND MILLIMETERS)



BUSHING OPTIONS IN INCHES (AND MILLIMETERS)

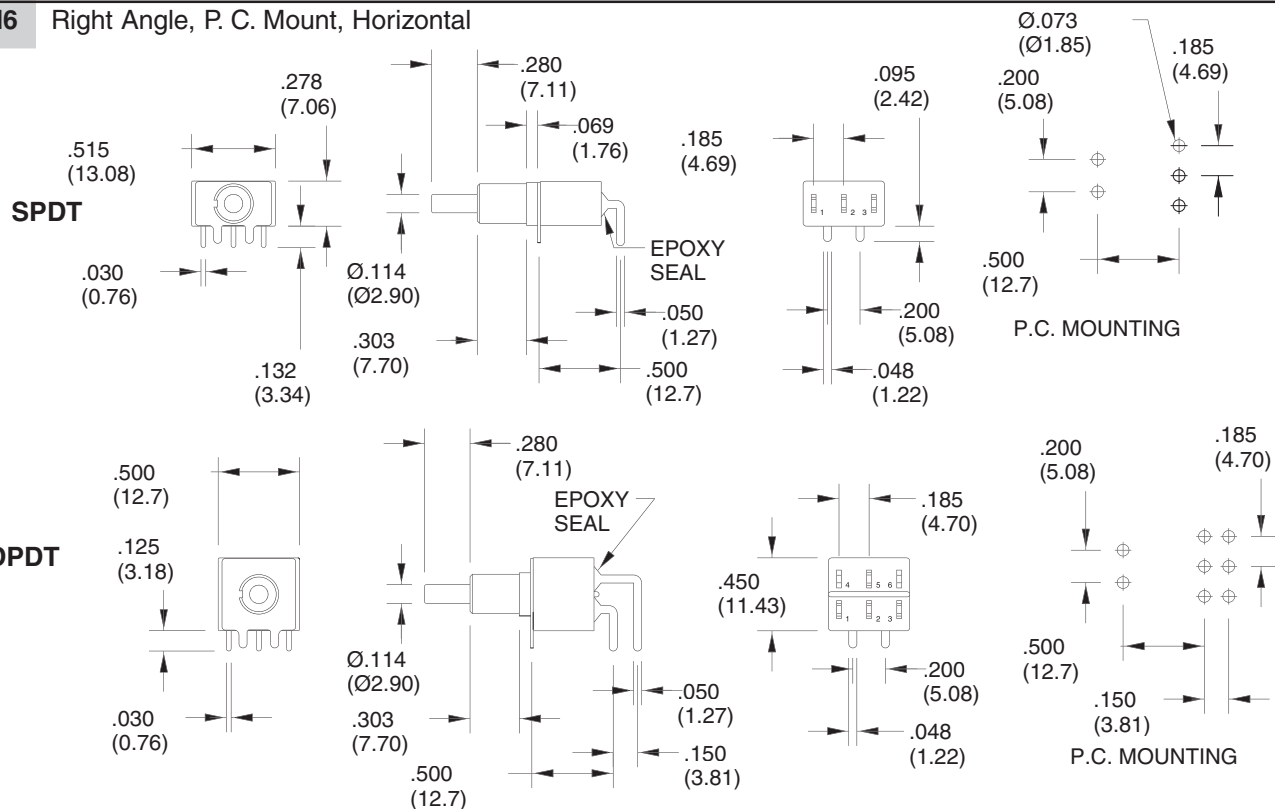


TERMINATION OPTIONS IN INCHES (AND MILLIMETERS)

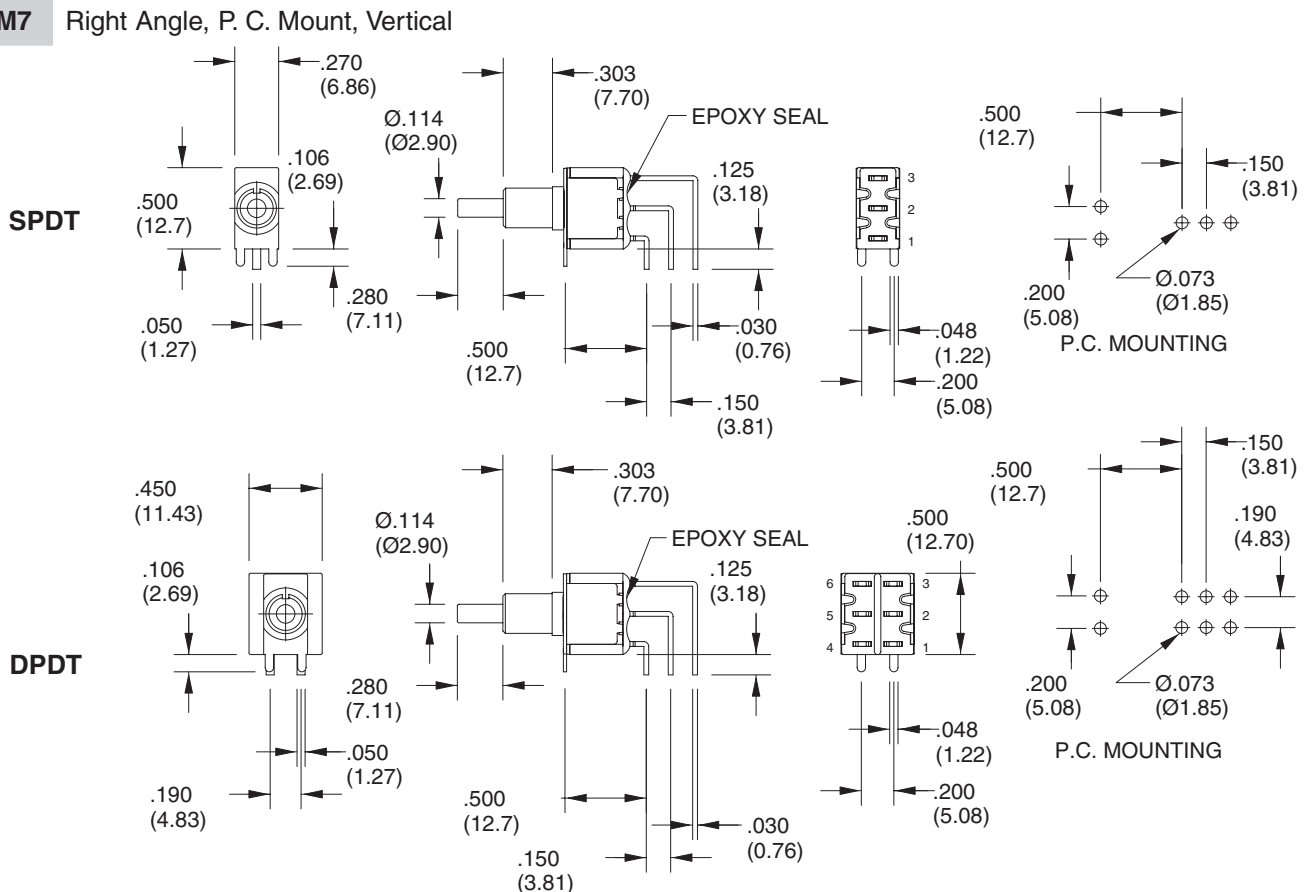


TERMINATION OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)

M6 Right Angle, P. C. Mount, Horizontal



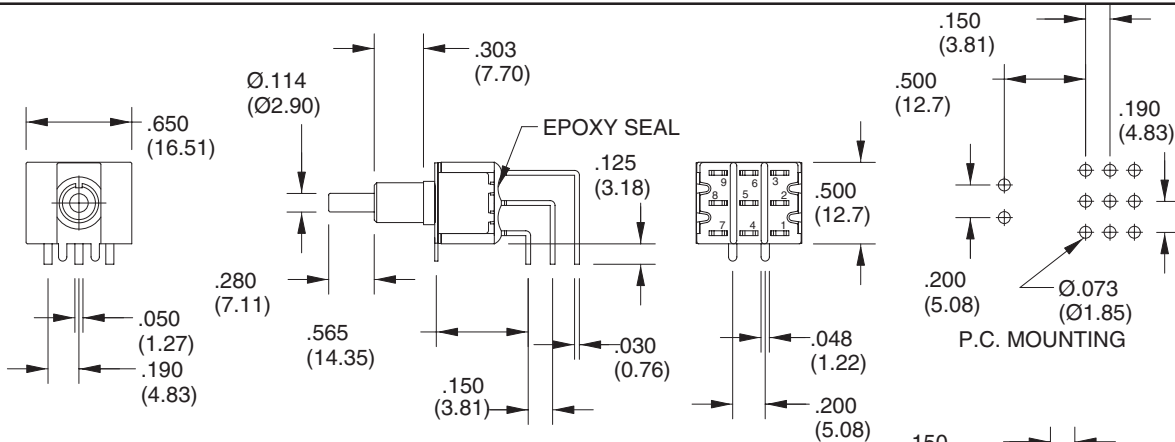
M7 Right Angle, P. C. Mount, Vertical



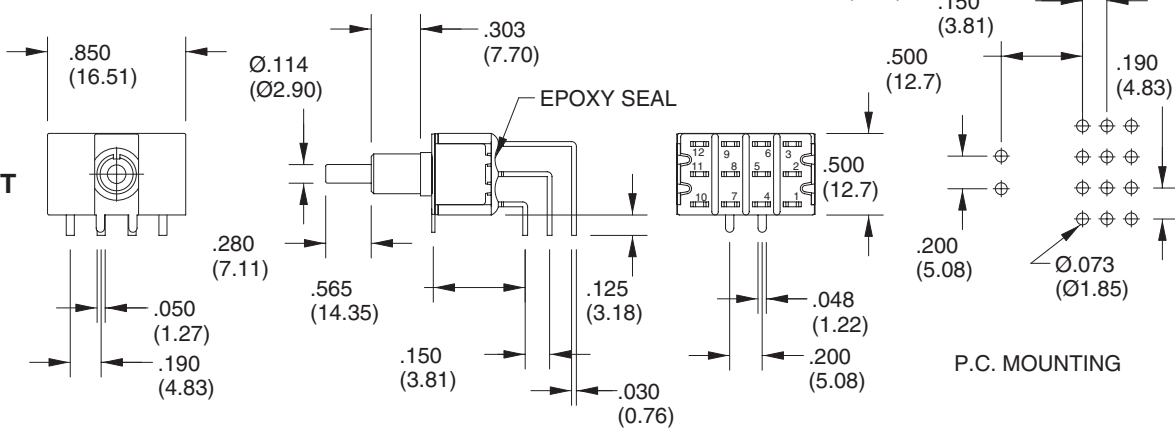
TERMINATION OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)

M7

3PDT

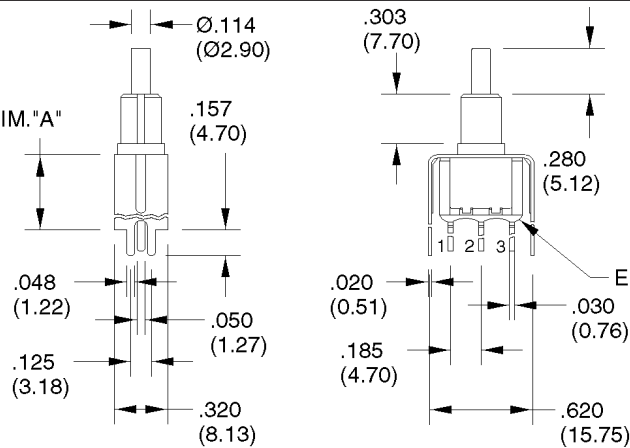


4PDT



V2-V3

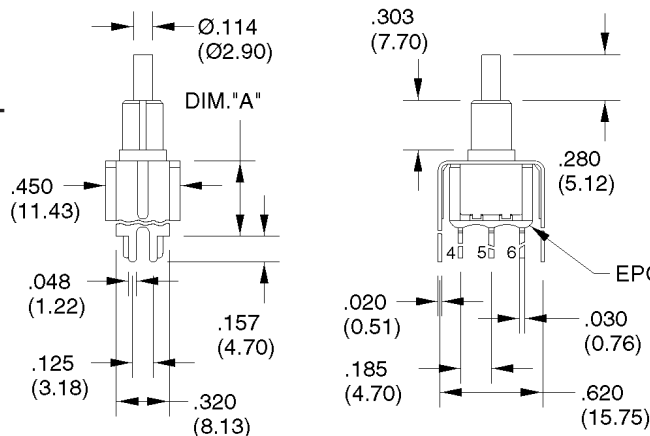
Vertical
Bracket,
P. C.
Mount
SPDT



OPTION CODE	DIM."A"
V2	.460 (11.68)
V3	.630 (16.00)

P.C. MOUNTING

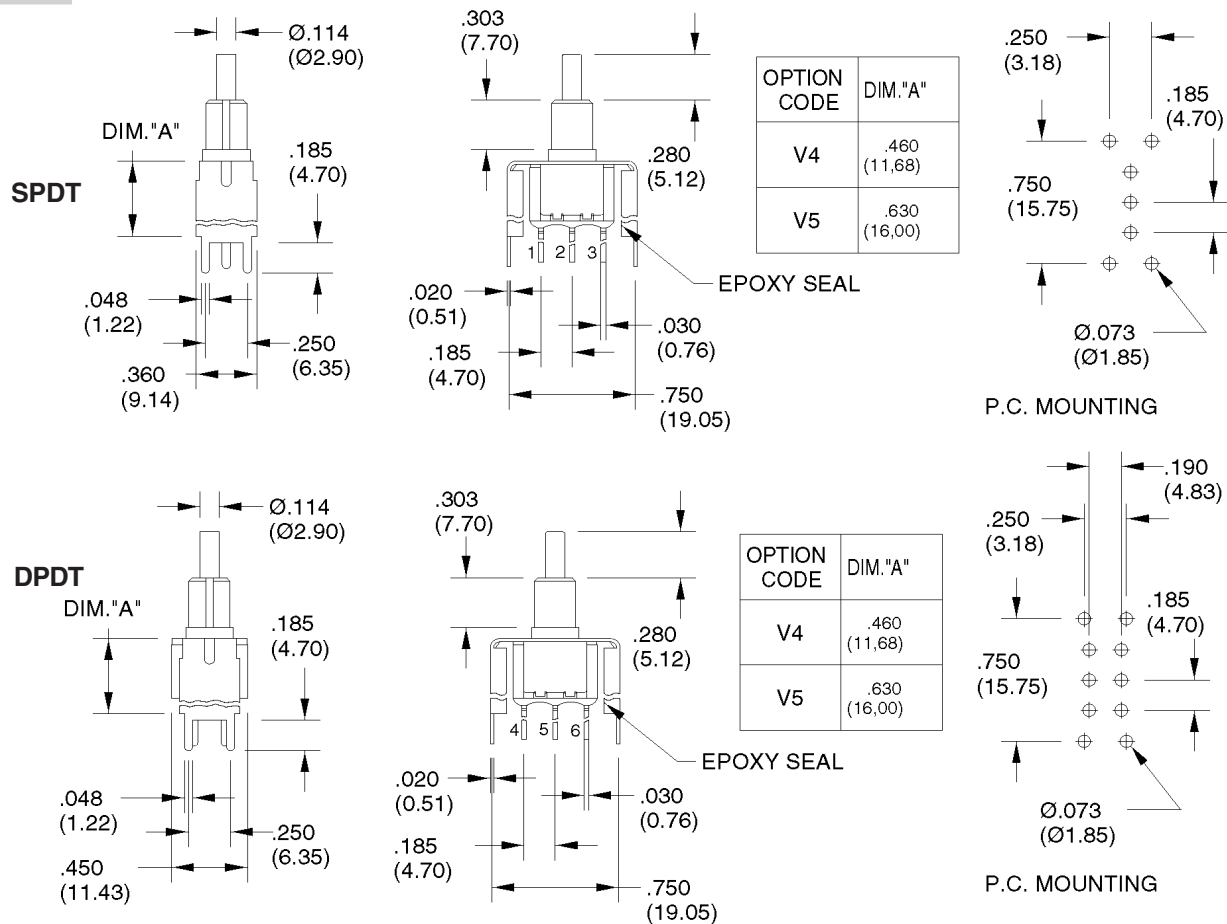
DPDT



OPTION CODE	DIM."A"
V2	.460 (11.68)
V3	.630 (16.00)

P.C. MOUNTING

V4-V5 Vertical Bracket, P. C. Mount



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

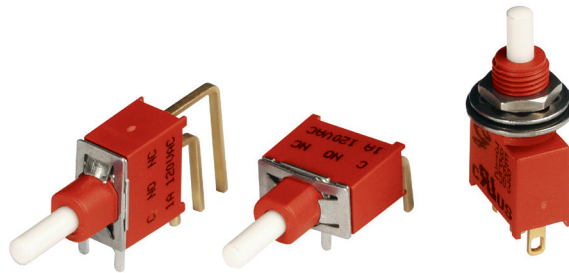
SERIES	MODEL NO.	PLUNGER	BUSHING	TERMINATION	CONTACT	SEAL
38D	SP1	1	B10	M1	Q	T
38D = Alternate Action Pushbutton Switches	Options: SP1, DP1, 3P1, 4P1 (see models for switching positions)	Options: 1, 2, 3, 4 (see plunger options)	Options: B10, B11, B20, B21, BD (see bushing options)	Options: M1, M2, M6, 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

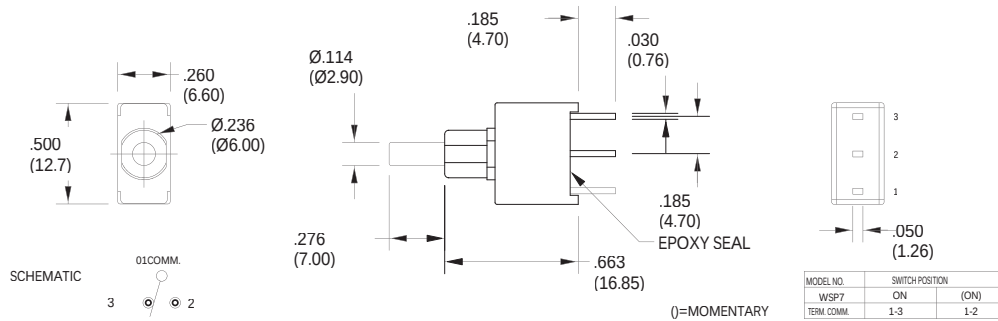
FEATURES

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

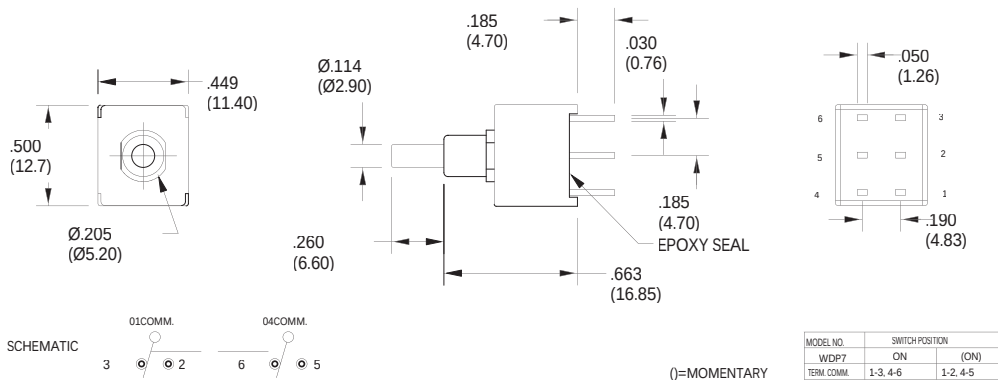


MODELS IN INCHES (AND MILLIMETERS)

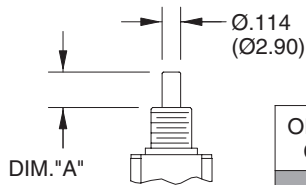
SPDT



DPDT

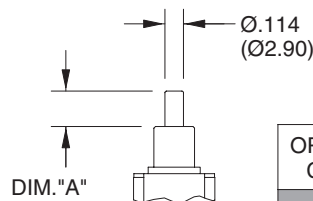


PLUNGER OPTIONS IN INCHES (AND MILLIMETERS)



FOR B1
BUSHING

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



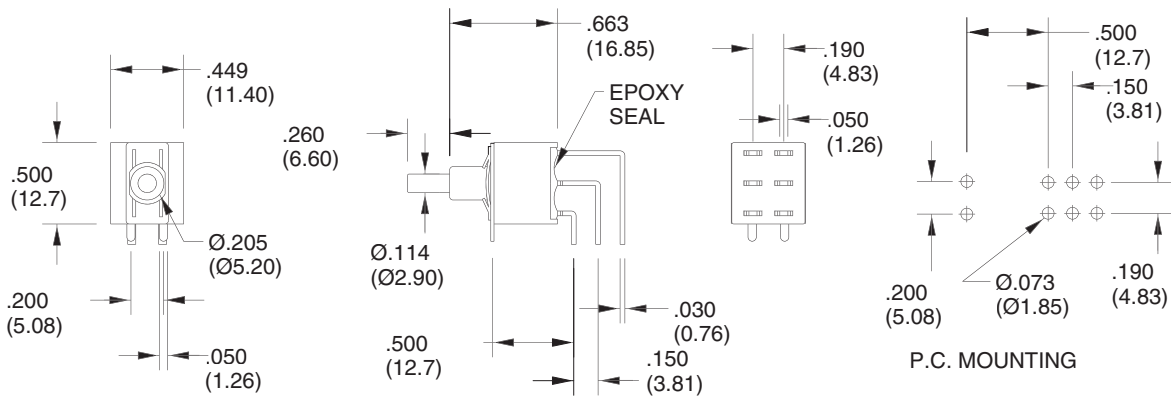
FOR B4
BUSHING

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

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

M7

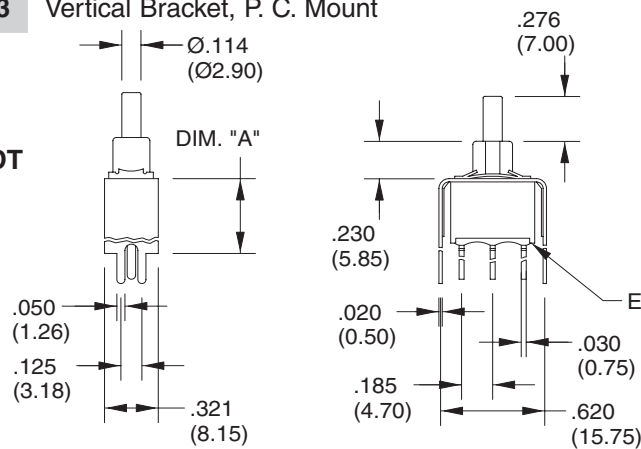
DPDT



V2-V3

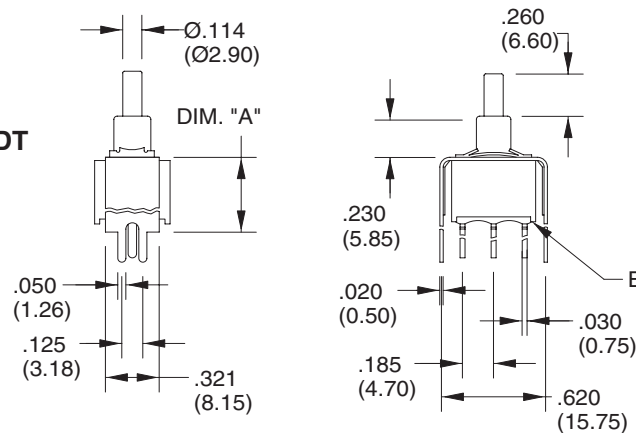
Vertical Bracket, P. C. Mount

SPDT



OPTION CODE	DIM. "A"
V2	.460 (11.68)
V3	.630 (16.00)

DPDT

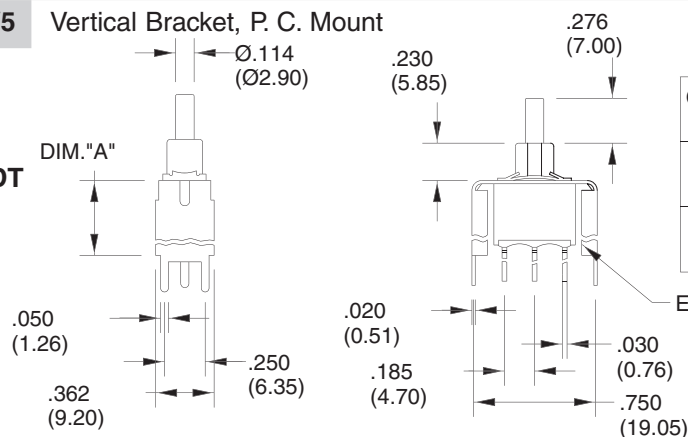


OPTION CODE	DIM. "A"
V2	.460 (11.68)
V3	.630 (16.00)

V4-V5

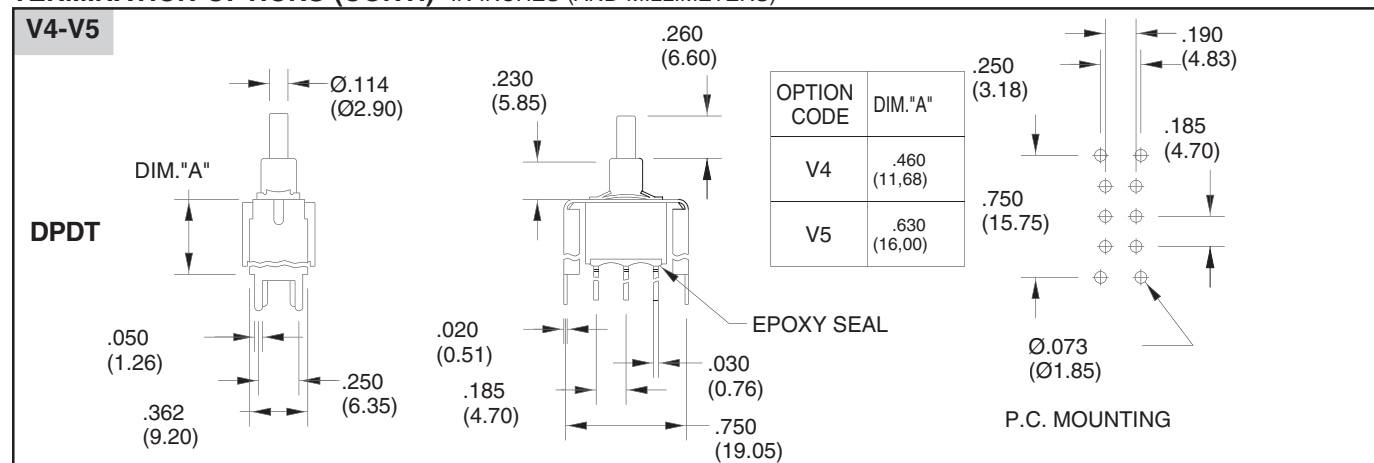
Vertical Bracket, P. C. Mount

SPDT



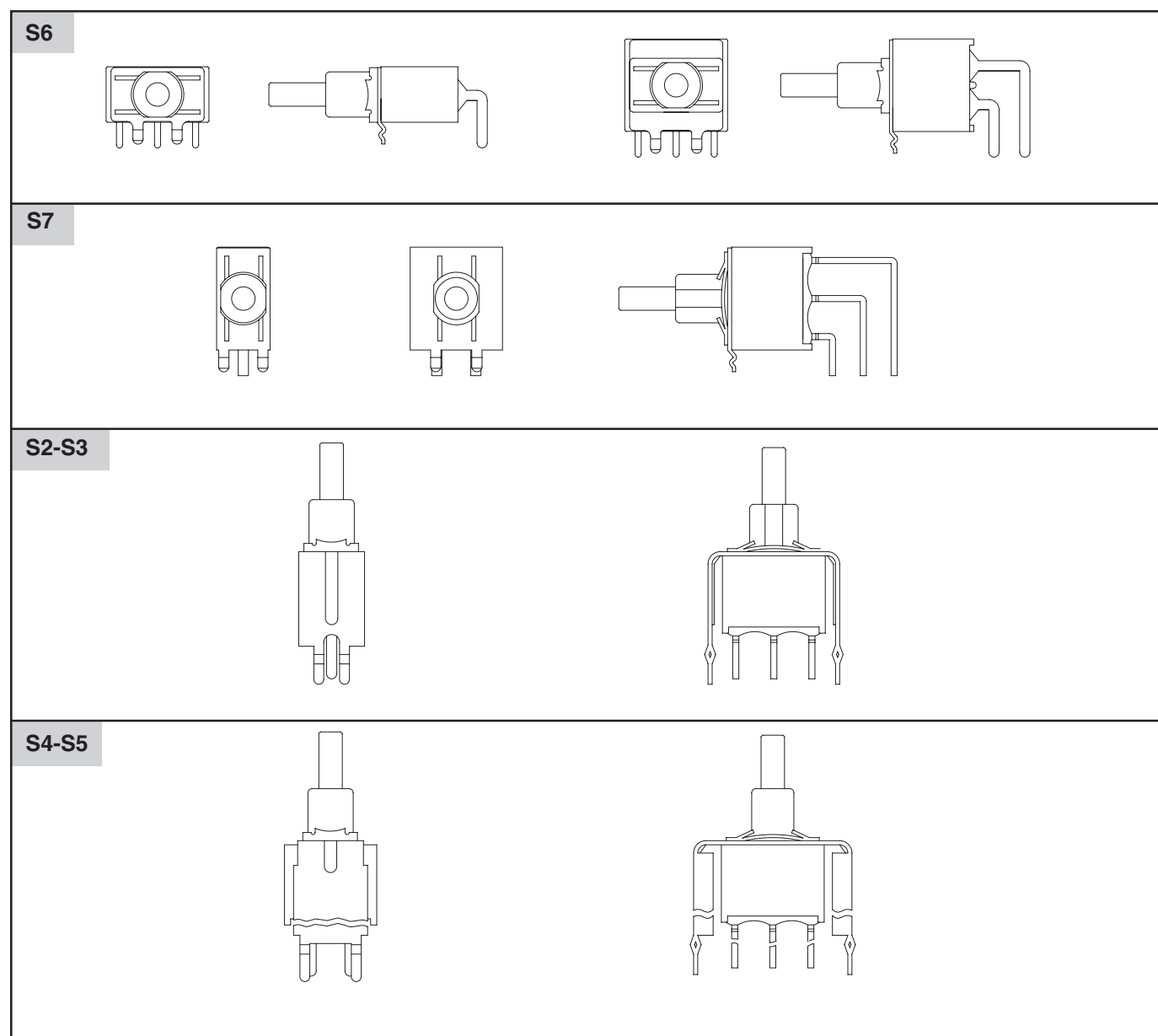
OPTION CODE	DIM. "A"
V4	.460 (11.68)
V5	.630 (16.00)

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)



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

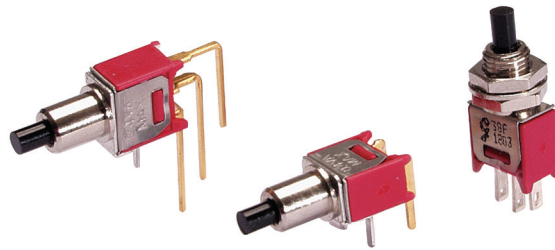
SERIES	MODEL NO.	PLUNGER	BUSHING	TERMINATION	CONTACT	SEAL
38E	WSP7	1	B1	M1	Q	T
38E = Sealed Snap Action Pushbutton Switches	Options: WSP7, WDP7 (see models for switching positions)	Options: 1, 2, 3 (see plunger options)	Options: B1, B4 (see bushing options)	Options: M1, M2, M6, M7, S2, S3, S4, S5, S6, 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

SERIES 38F

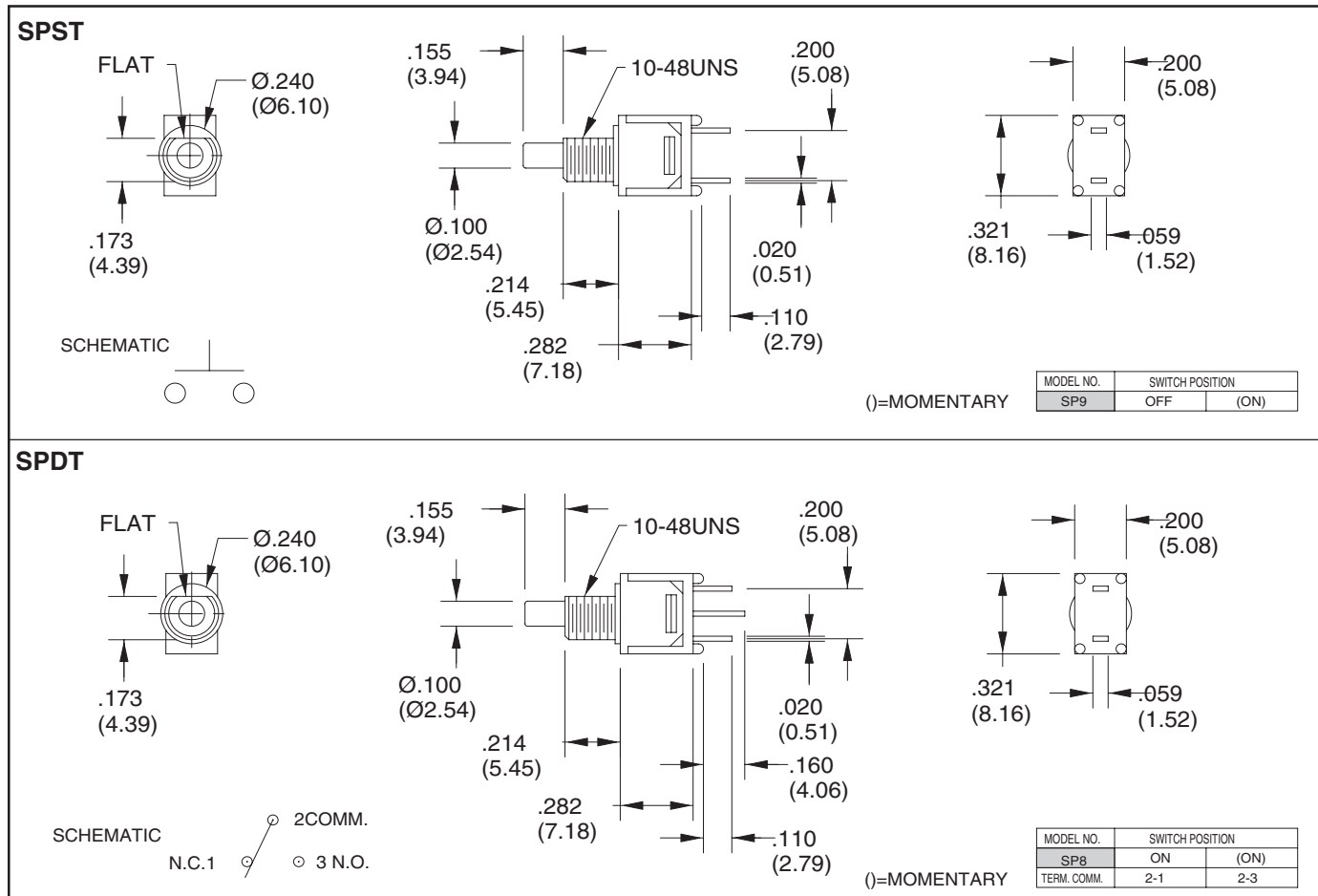
Sub-Miniature Pushbutton Switches

FEATURES

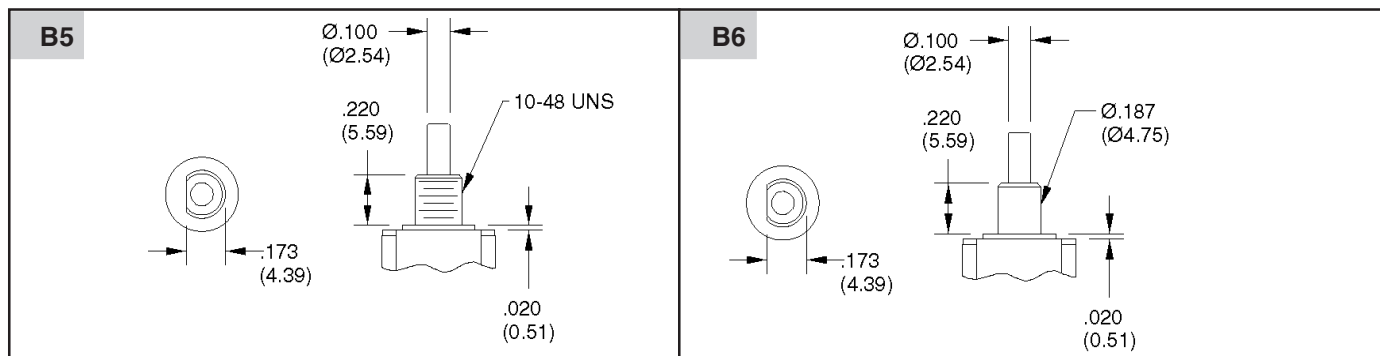
- Save Space and Weight
- SPDT and DPDT Circuitry
- Choice of Actuators, Bushings, and Terminations
- UL Recognized



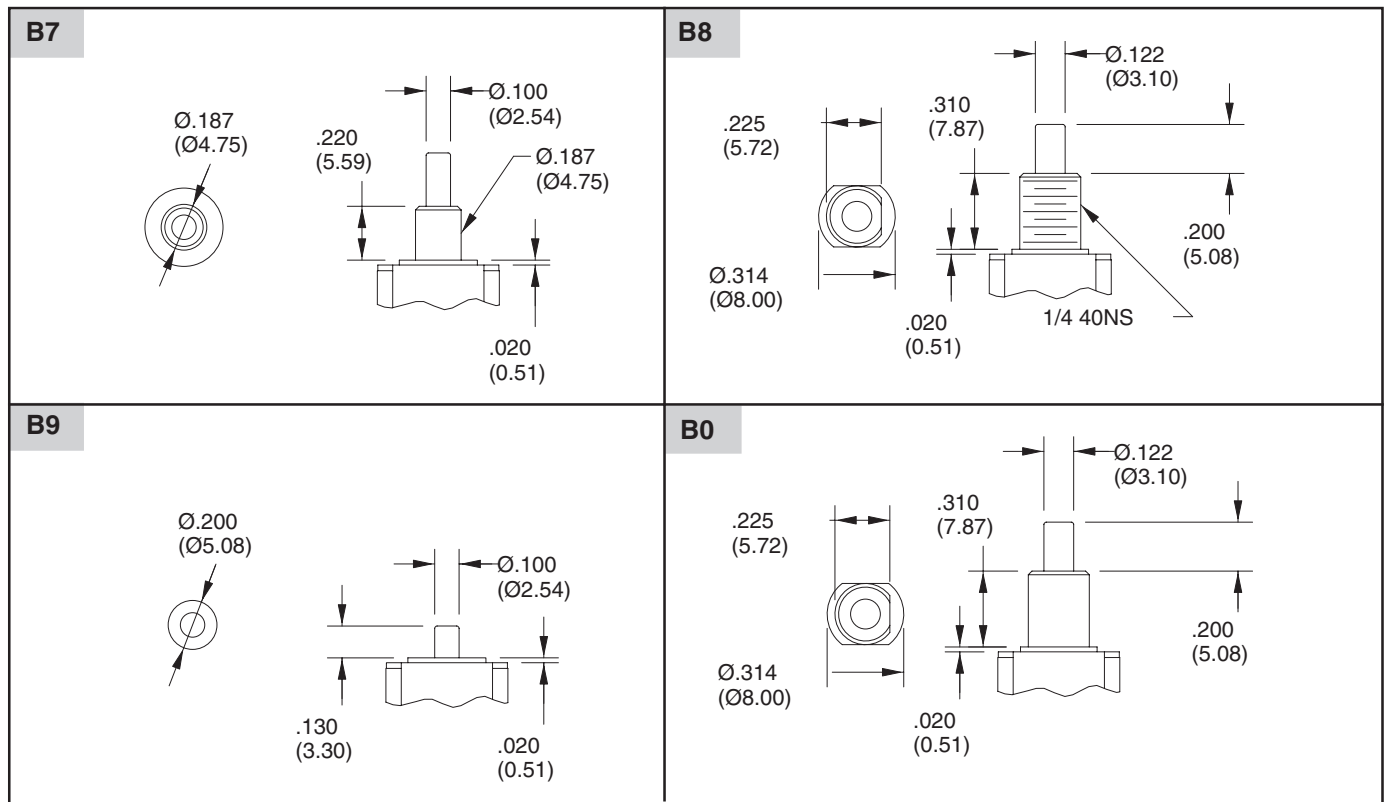
MODELS IN INCHES (AND MILLIMETERS)



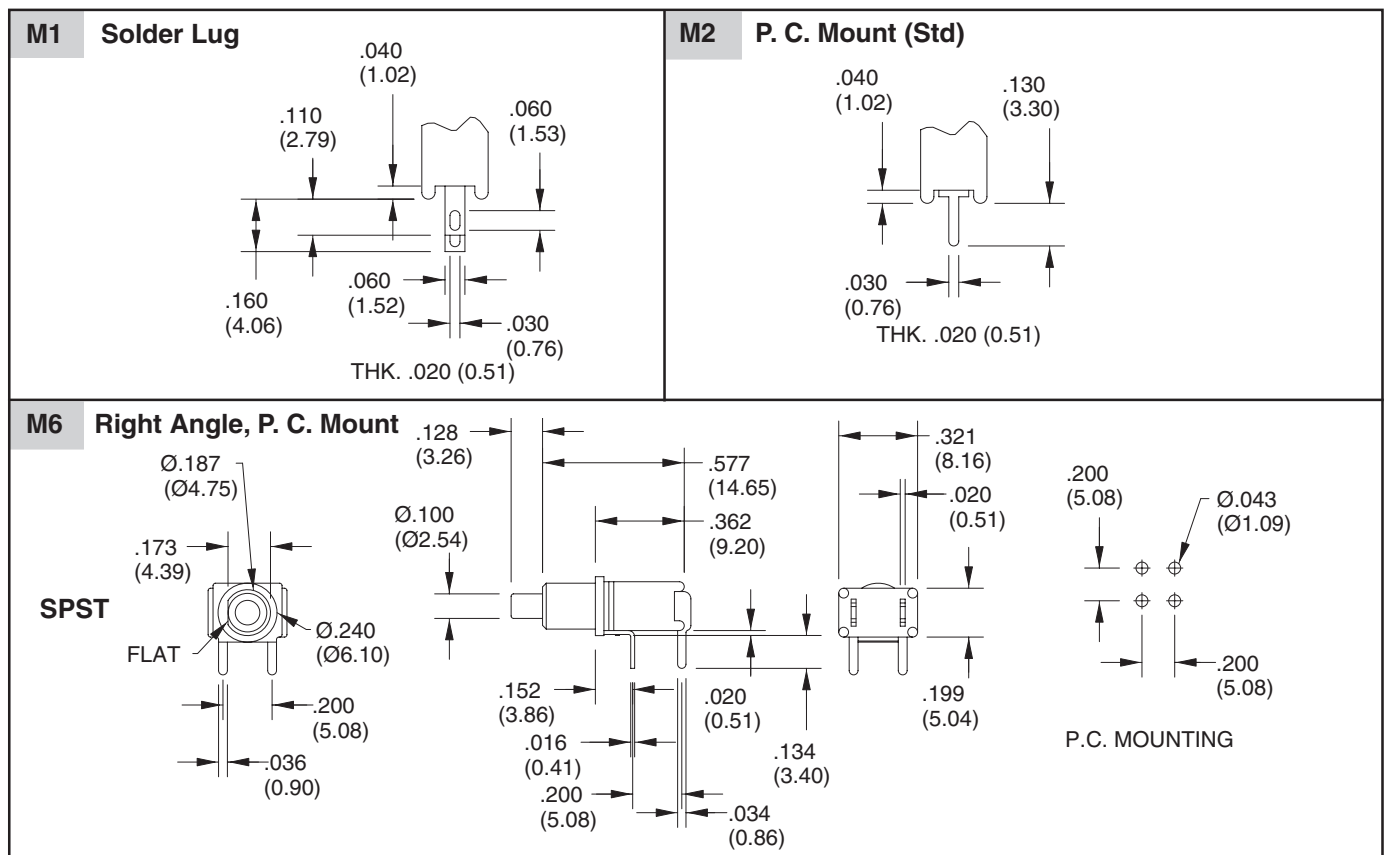
BUSHING OPTIONS IN INCHES (AND MILLIMETERS)



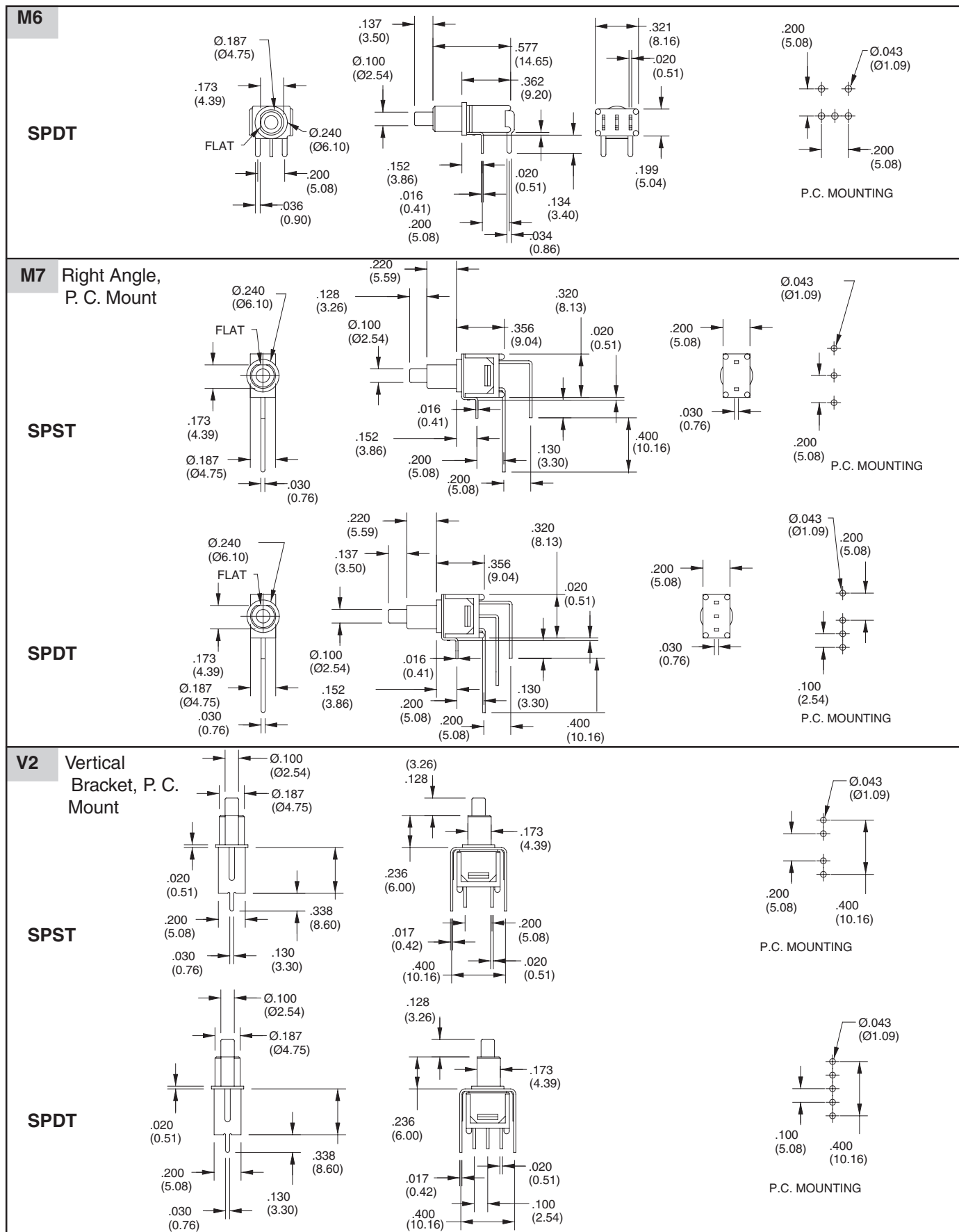
BUSHING OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)



TERMINATION OPTIONS IN INCHES (AND MILLIMETERS)

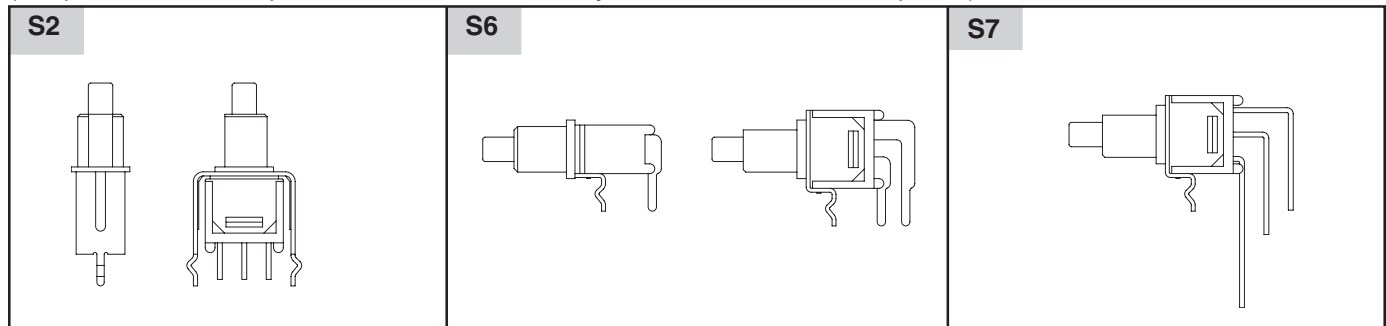


TERMINATION OPTIONS (CONT.) IN INCHES (AND MILLIMETERS)



Snap-in Termination Options

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



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

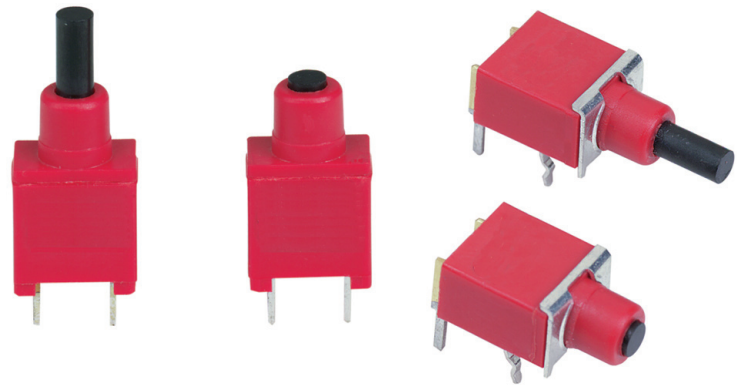
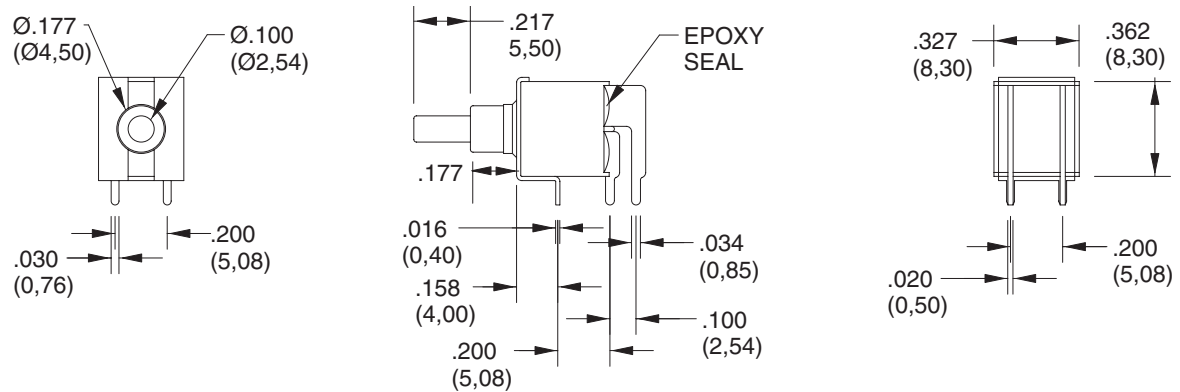
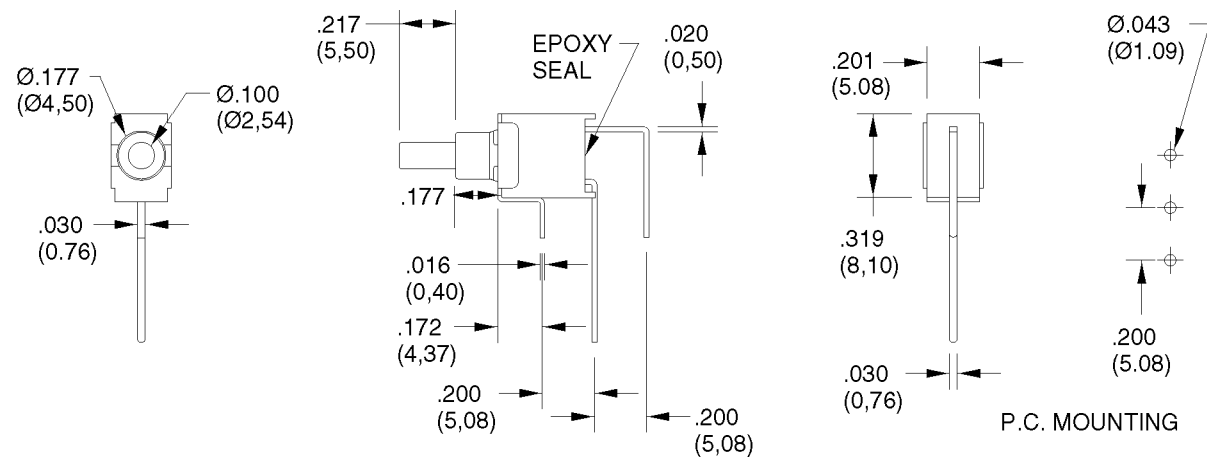
SERIES	MODEL NO.	BUSHING	TERMINATION	CONTACT	SEAL
38F	SP8	B5	M1	Q	T
38F = Sub-Miniature Pushbutton Switches	Options: SP8, SP9 (see models for switching positions)	Options: B5, B6, B7, B8, B9, B0 (see bushing options)	Options: M1, M2, M6, M7, V2, S2, S6, S7 (see termination options)	R = Copper alloy, 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**

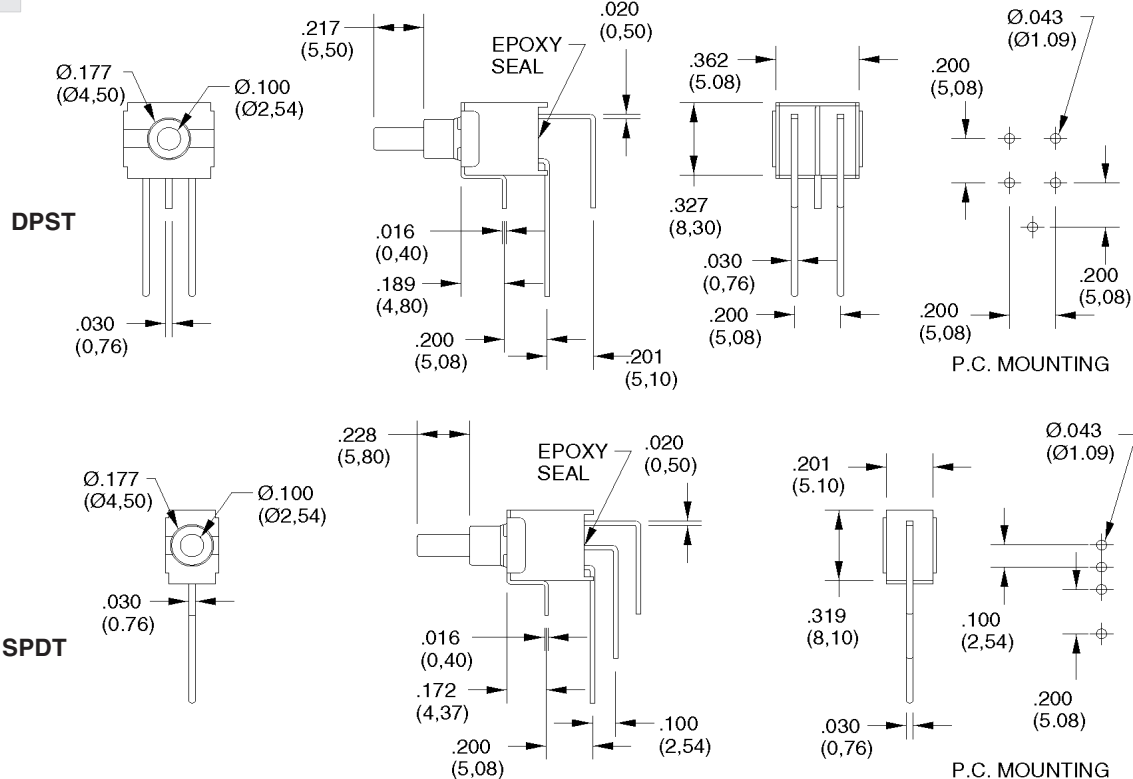
- Drop-In Replacement for Industry Standard
- Choice of Terminations
- Printed Circuit Board Mount
- SPST, DPST and SPDT Momentary Contact
- Sealed Per IP67

**DIMENSIONS** In inches (and millimeters)**M6****SPST****M7****SPST**

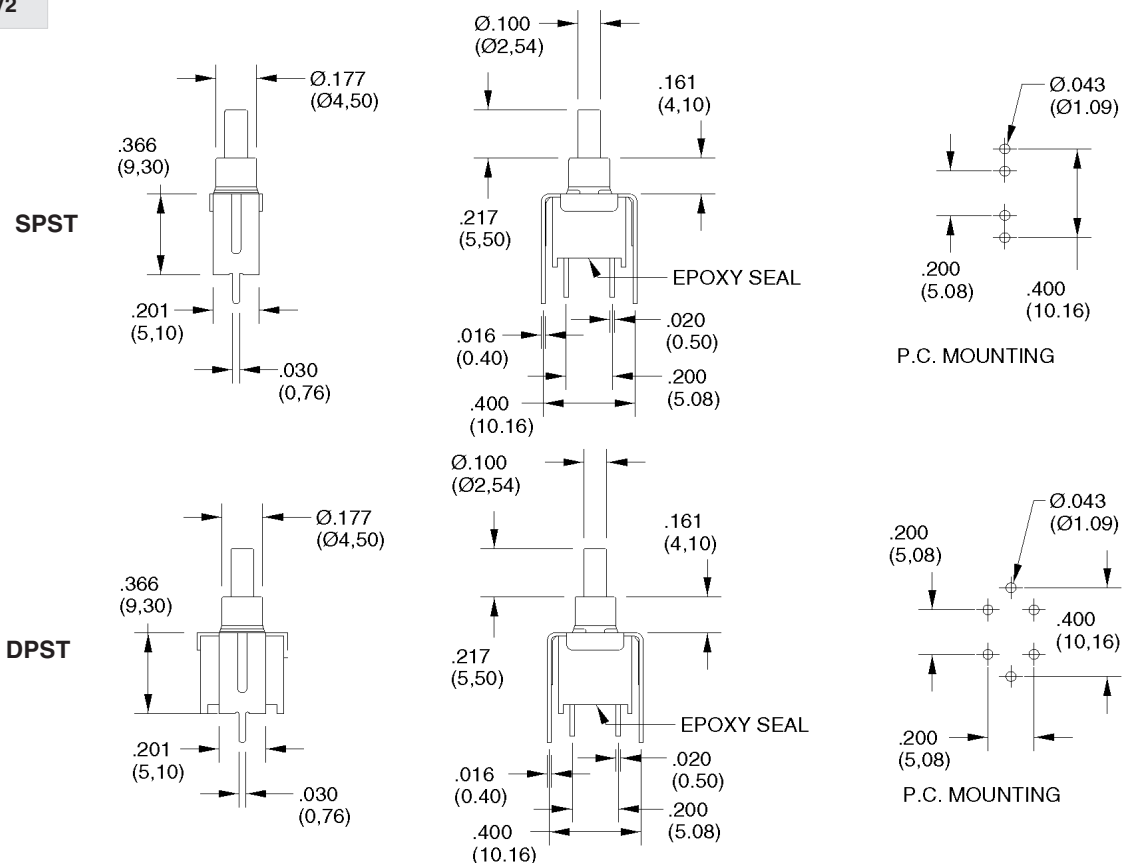
SERIES 38G

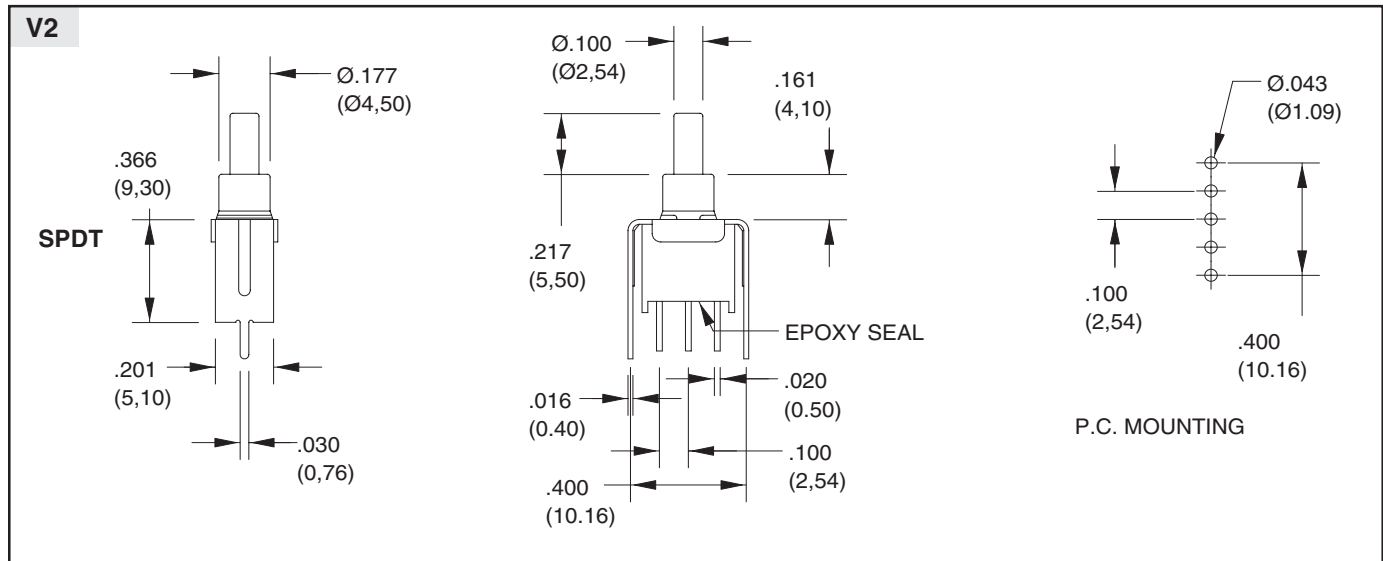
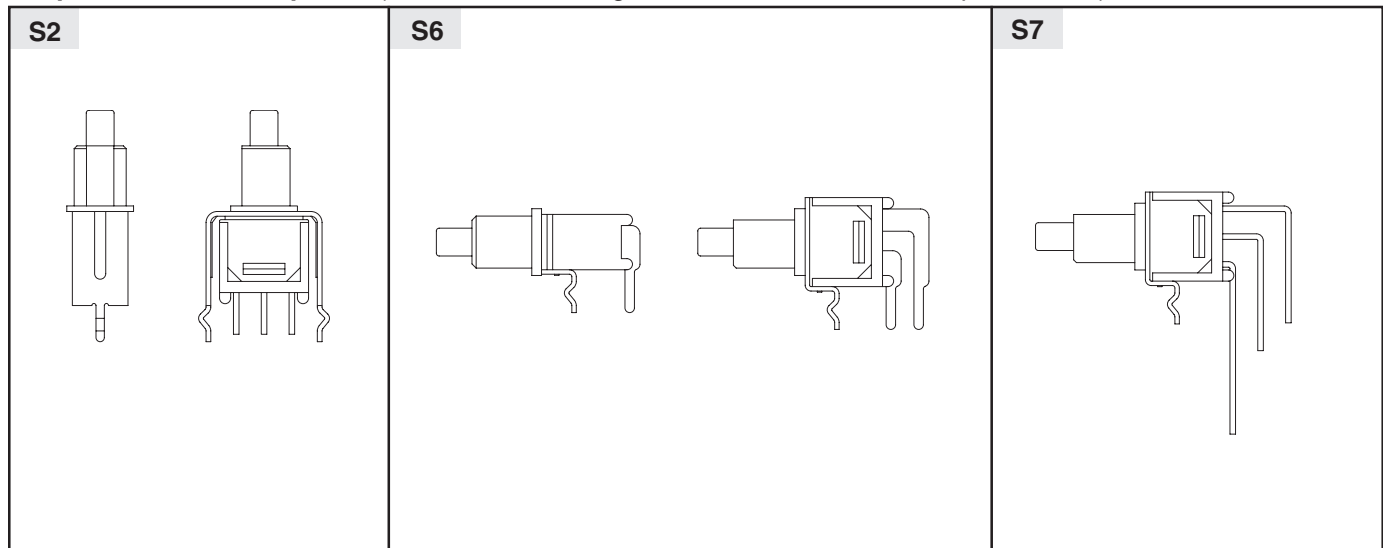
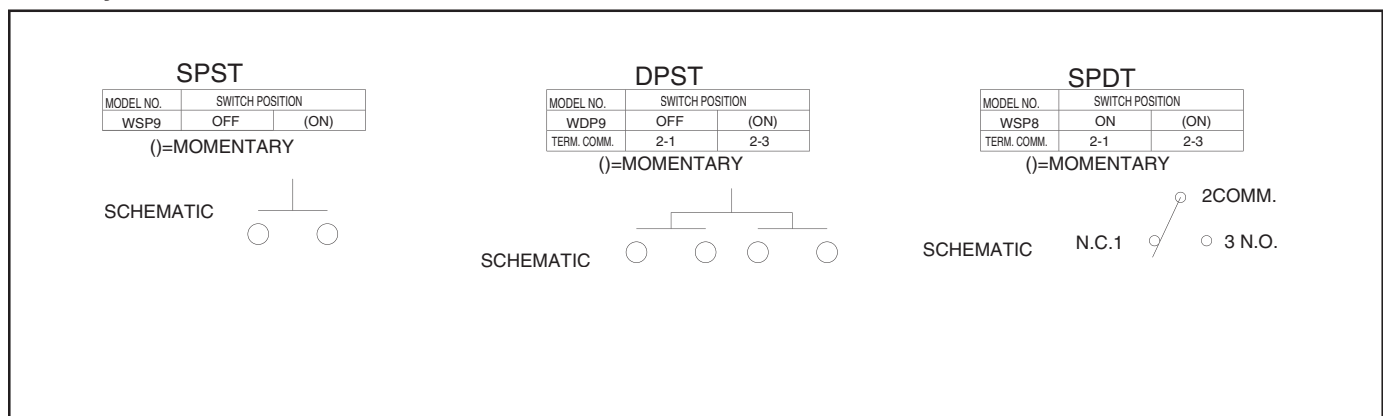
DIMENSIONS In inches (and millimeters)

M7



V2



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**

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)

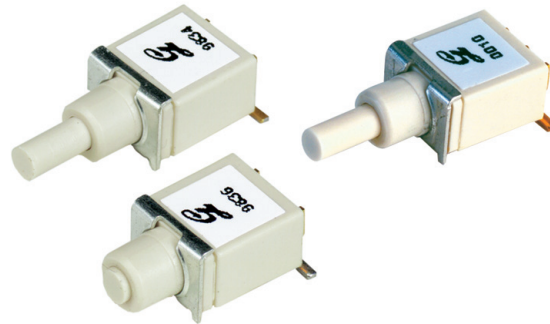
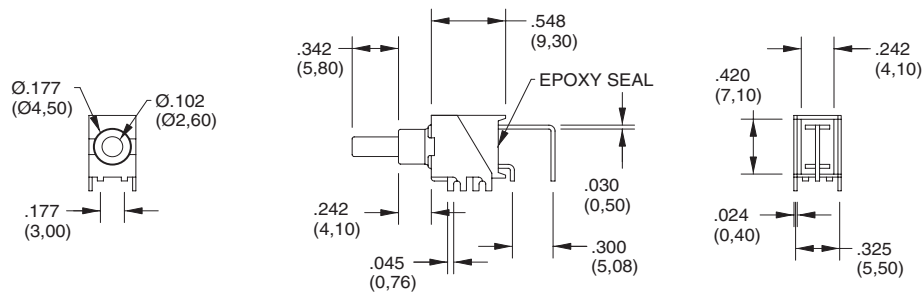
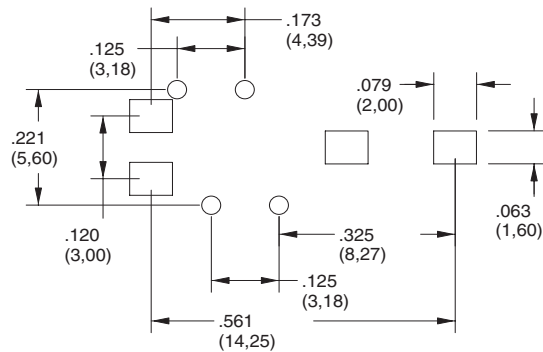
Plunger: Thermoplastic Polyester(UL 94V-0) (with internal o-ring seal)

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**

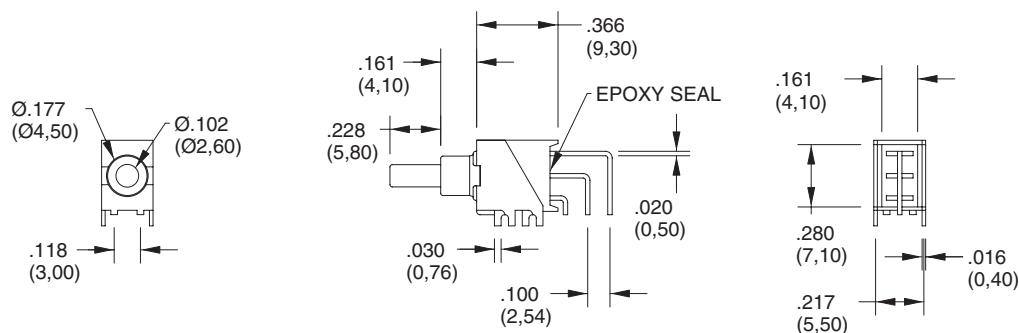
- Surface Mount Process Compatible
- Sealed Construction
- Solder-Coated Terminals
- Tape and Reel Packaging
- SPST and SPDT Momentary Contact
- Sealed Per IP67

**SERIES 38H****DIMENSIONS** In inches (and millimeters)**M7****SPST**

SERIES 38H

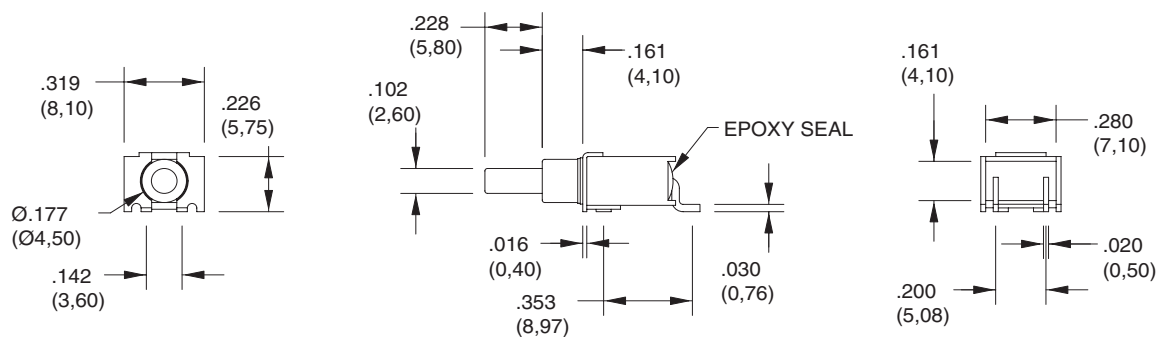
DIMENSIONS In inches (and millimeters)

M7



SPDT

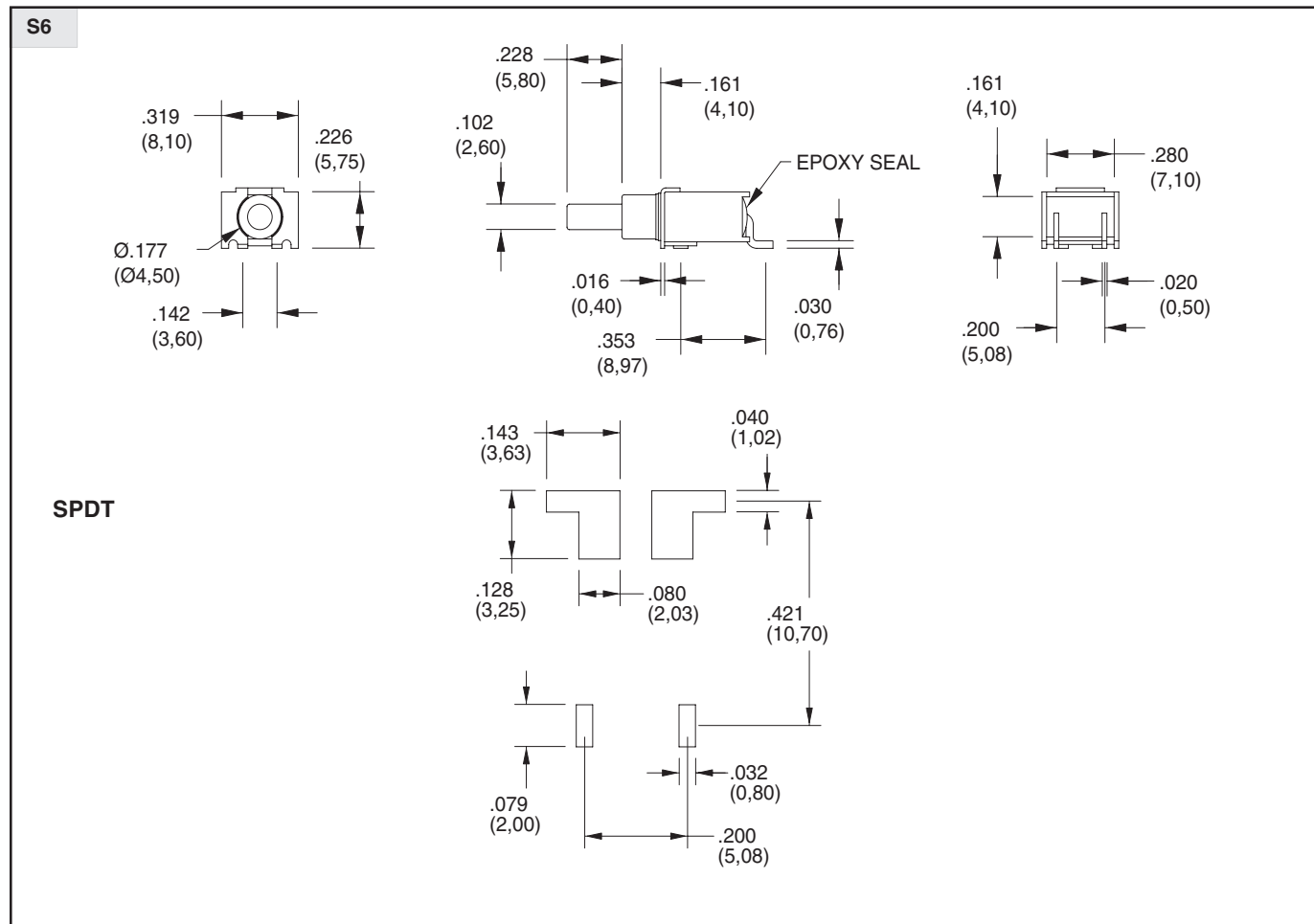
S6



SPST

SERIES 38H

DIMENSIONS In inches (and millimeters)



Circuitry

SPST

MODEL NO.	SWITCH POSITION	
WSP9	OFF	(ON)

()=MOMENTARY

SCHEMATIC

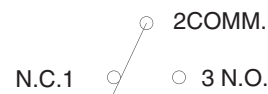


SPDT

MODEL NO.	SWITCH POSITION	
WSP8	ON	(ON)
TERM. COMM.	2-1	2-3

()=MOMENTARY

SCHEMATIC



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

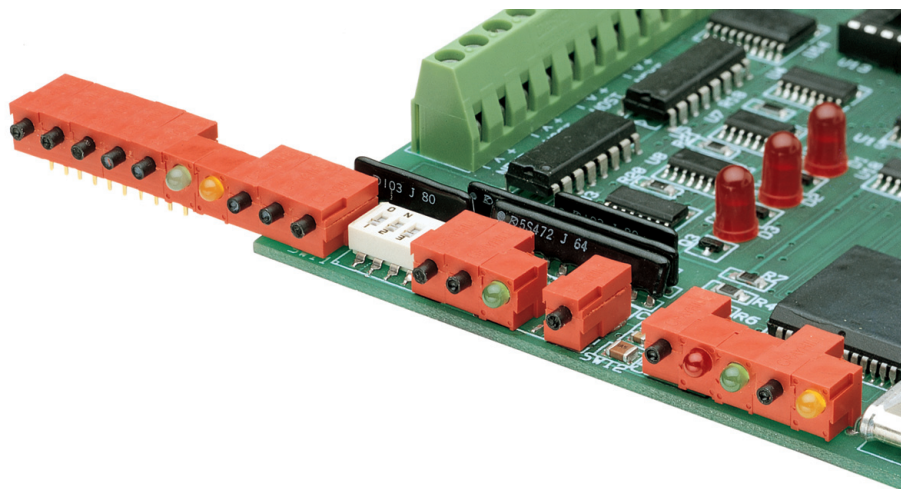
ORDERING INFORMATION

SERIES	MODEL NO.	TERMINATION	CONTACT	SEAL
38H	WSP8	M7	R	T
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

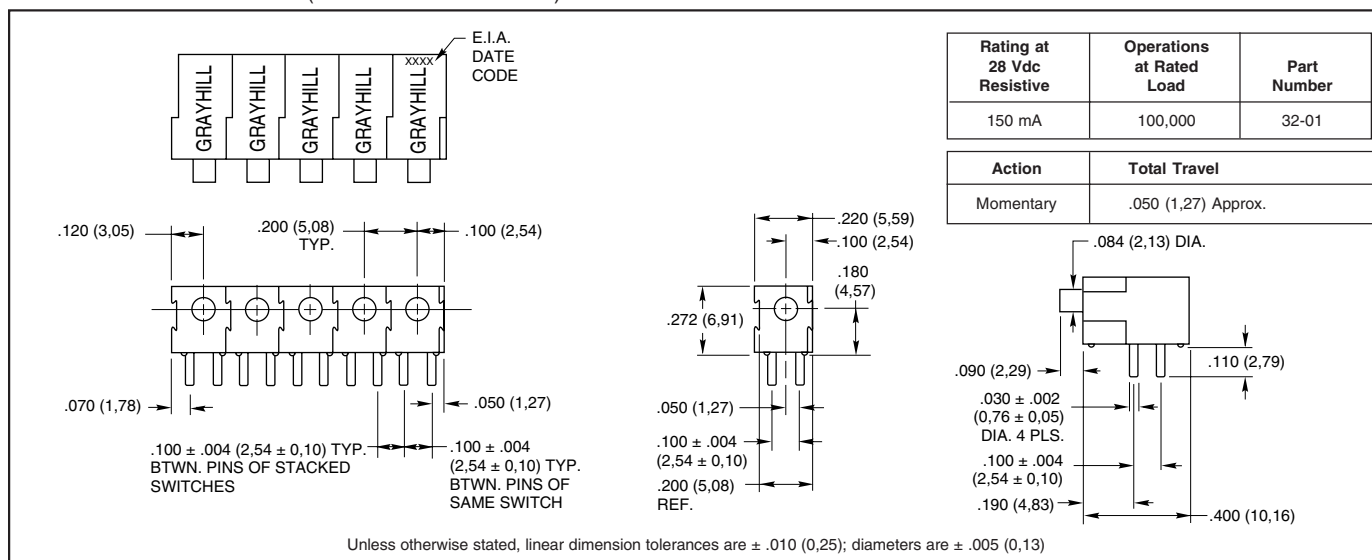
SERIES 32 SPST and SPDT, Stackable with LED

FEATURES

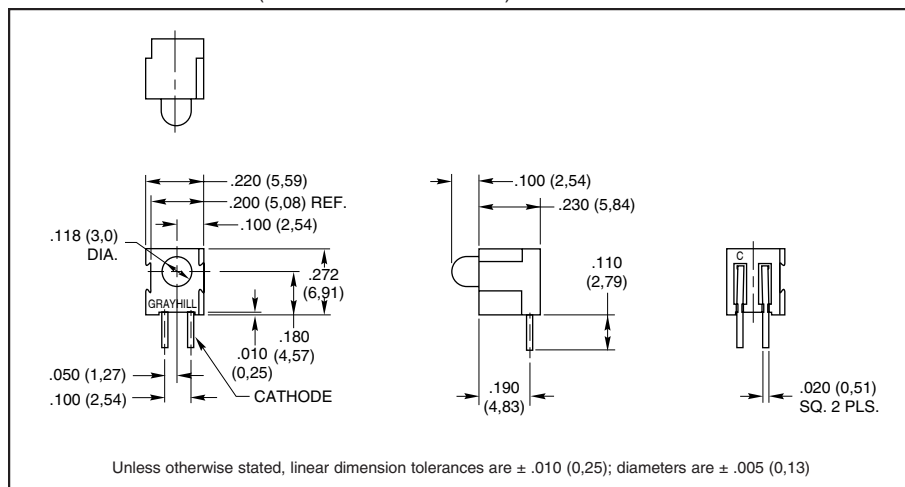
- Stackable, Provides Custom Switch Arrangements
- .200" Centers When Stacked
- SPST–N.O., SPST–N.C. Circuitry in the Same Package
- Process Compatible, Internally Sealed Plunger
- Status/Reset or Press-to-Test Functions with Companion LED



SWITCH DIMENSIONS (In inches and millimeters)

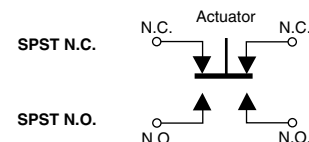


LED DIMENSIONS (In inches and millimeters)

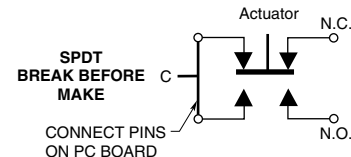


SWITCH CIRCUITRY

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

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.

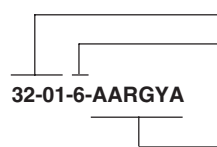
ORDERING INFORMATION: Individual Units

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



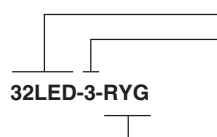
Basic switch part number (see Ordering Information)
Number of ganged elements (2 thru 6)

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.

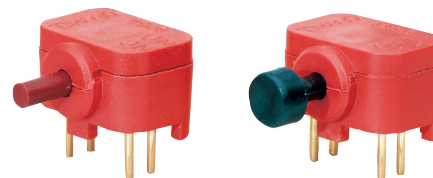
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 39

SPST and SPDT, 1/4 Amp

FEATURES

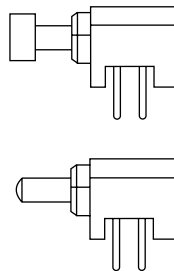
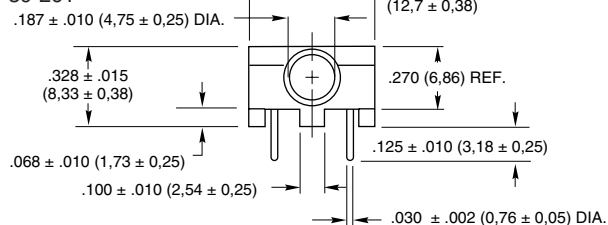
- Fully Protected During Flux Cleaning Operations



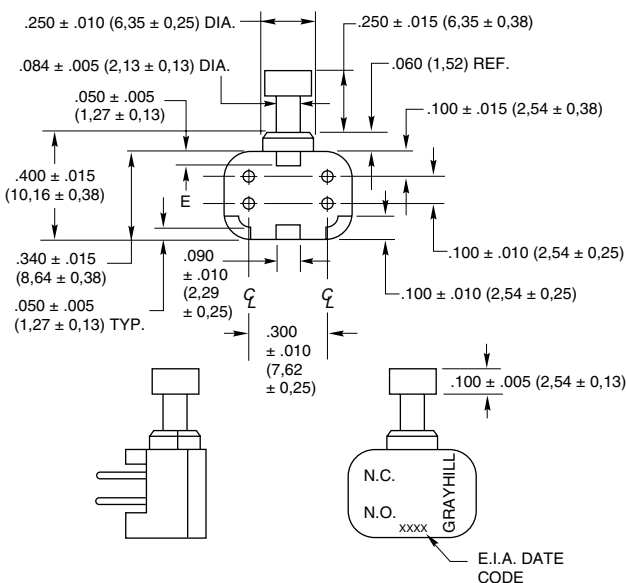
DIMENSIONS In Inches (and millimeters)

SPDT-PC Mount Large Button Style

39-261*

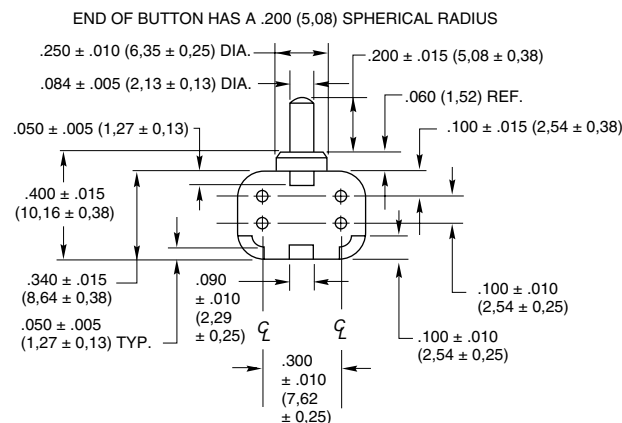


Rating at 28 Vdc Resistive	Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Partial Part Number
150 mA	1/4 Amp	1/8 Amp	500,000	39-251* 39-261*
Action		Total Travel	Actuating Force (oz.)	
Momentary		.090 + .010/- .015 (2,29 + 0,25/- 0,38)	10 ± 3 oz.	



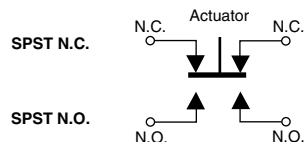
Small Button Style

39-251*

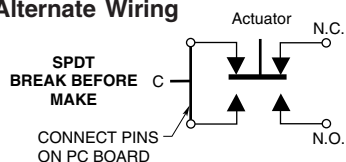


CIRCUITRY

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

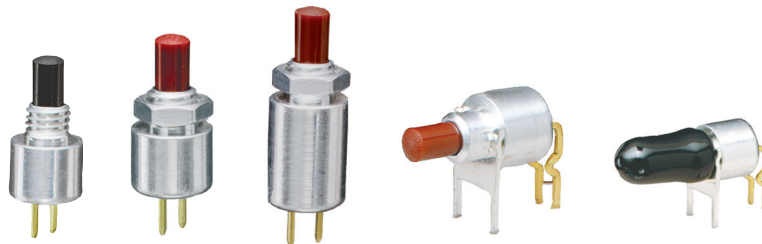
*Complete Part Number	Description
39-251 RED	Small Red Button, SPDT
39-251 BLK	Small Black Button, SPDT
39-261 RED	Large Red Button, SPDT
39-261 BLK	Large Black Button, SPDT

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

SERIES 39 SPST, 150 mA

FEATURES

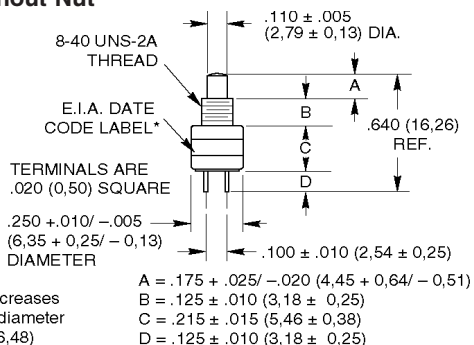
- 1/4" Diameter
- Up to 1,000,000 Cycles of Operation
- PC Mount



DIMENSIONS In Inches (and millimeters)

SPST-Normally Open, Without Nut

39-405*

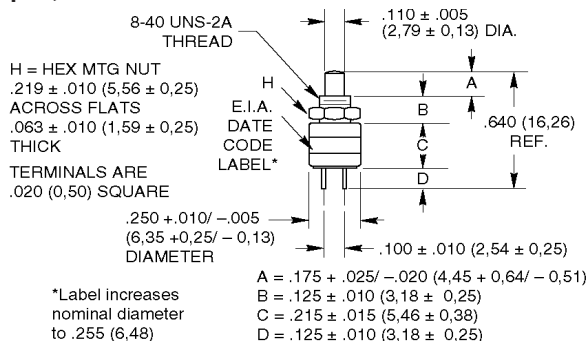


Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	1,000,000	39-405 RED 39-405 BLK	Red Black

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

SPST-Normally Open, With Nut

39-401*

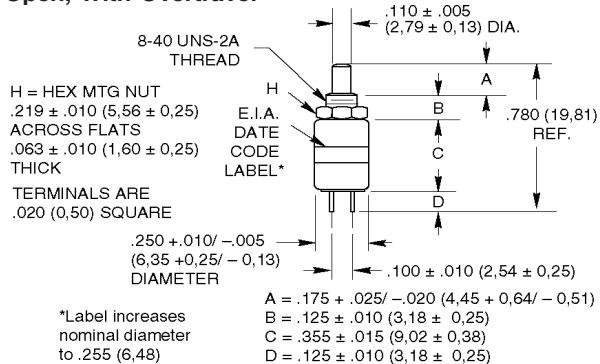


Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	1,000,000	39-401 RED 39-401 BLK	Red Black

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

SPST-Normally Open, With Overtravel

39-424*



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

SERIES 39 Miniature Limit

FEATURES

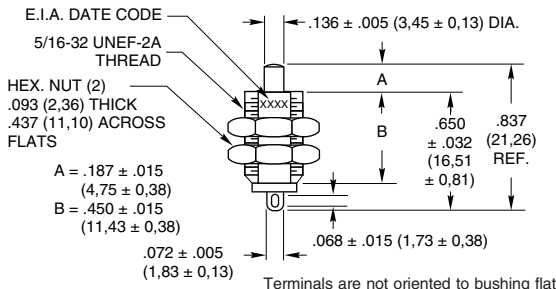
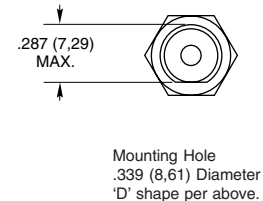
- Adjustable Location Setting
- Plunger Sealed Version

DIMENSIONS In Inches (and millimeters)



SPST-Normally Open, With Overtravel

39-101



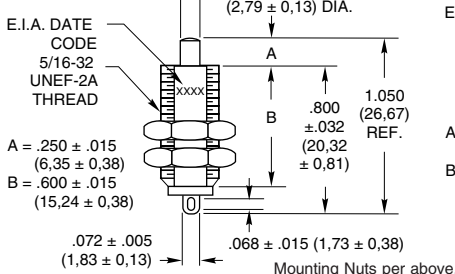
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1/2 Amp	1/4 Amp	500,000	39-101	Nat. Nylon

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

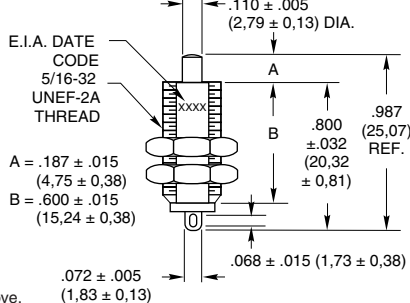
39-102

39-103



SPST-Normally Open, With Overtravel, Sealed Actuator

39-701

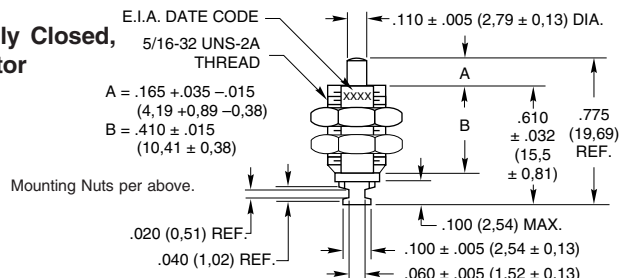


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
150 mA	75 mA	30,000	39-102	Nat. Nylon
150 mA	75 mA	100,000	39-701	Nat. Nylon
1/2 Amp	1/4 Amp	30,000	39-103	Nat. Nylon

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

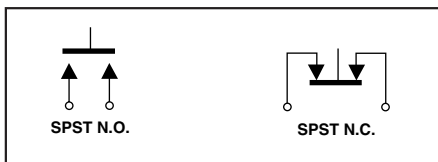
39-702



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.

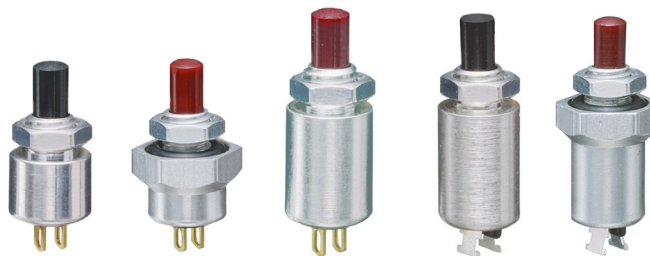
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 39

SPST, 150 mA to 1/2 Amp

FEATURES

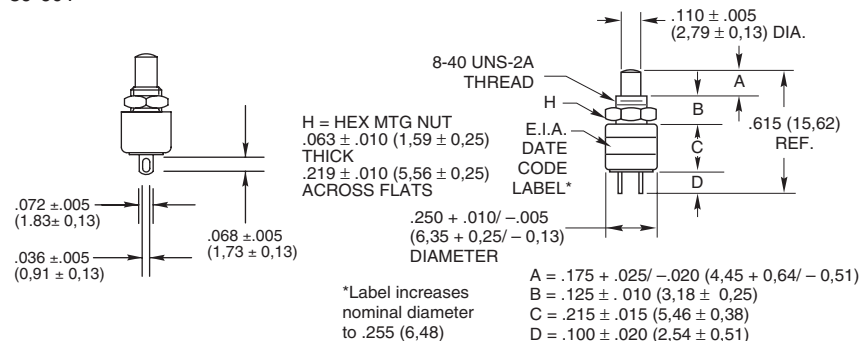
- Requires an Absolute Minimum of Space
- Molded-In Terminals in SPST-N.O.
- Solder Lug Terminals



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

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

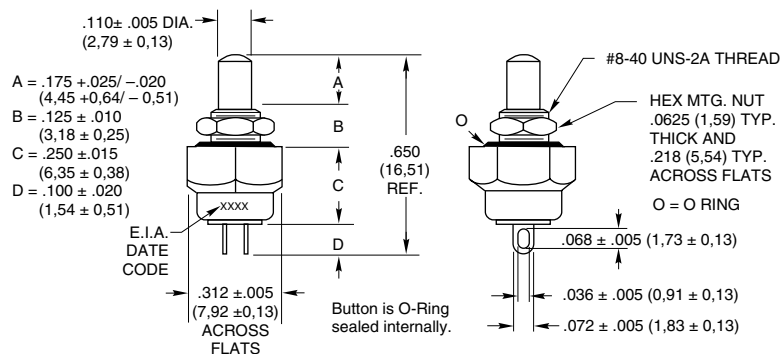
Standard

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

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*

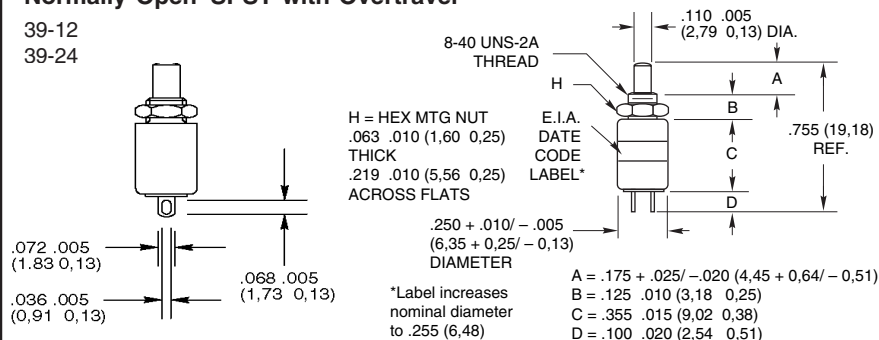


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1/2 Amp	1/4 Amp	250,000	39-351 RED 39-351 BLK	Red Black

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

Normally Open-SPST with Overtravel

39-12
39-24



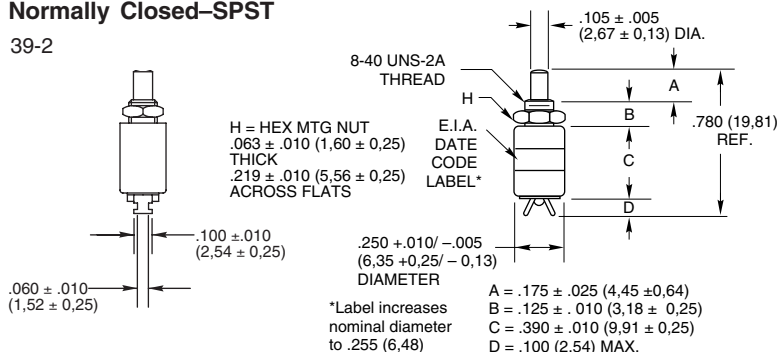
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Complete Part Number	Button Color
1/2 Amp	1/4 Amp	100,000	39-12 39-24	Red Black

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

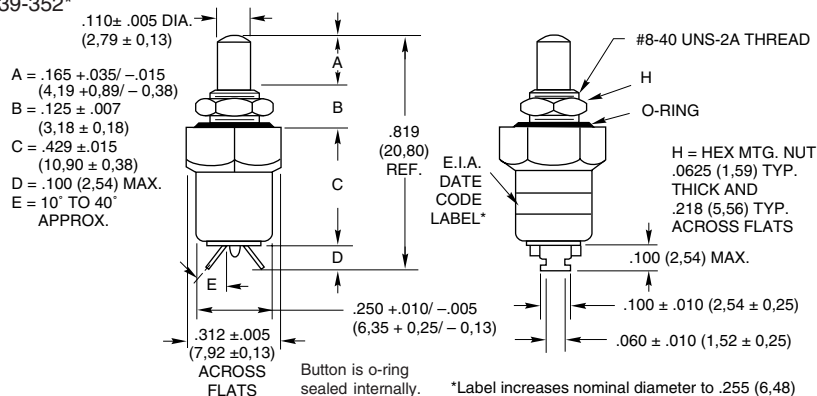


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Cap Color
1/4 Amp	1/8 Amp	250,000	39-2	Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.042 ± .010 (1.07 ± 0.25)	+ 4 4 - 2	.172 (4.37) DIA.

Normally Closed–SPST with Sealed Bushing and Button

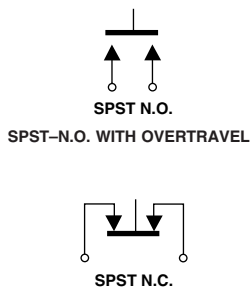
39-352*



Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
¼ Amp	⅓ 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

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.

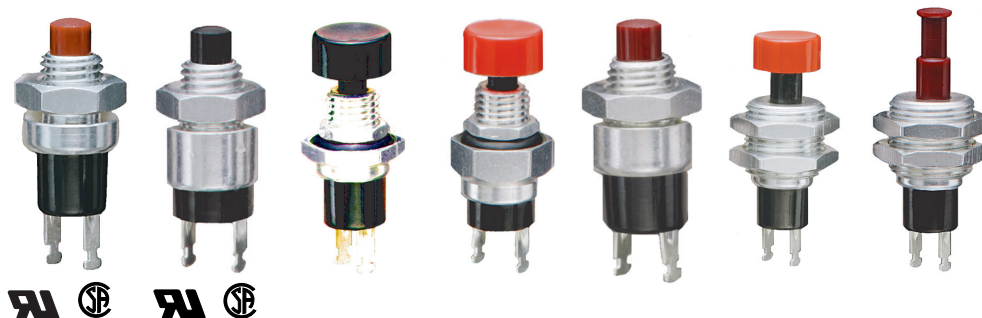
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 30

SPST, 1 and 5 Amp

FEATURES

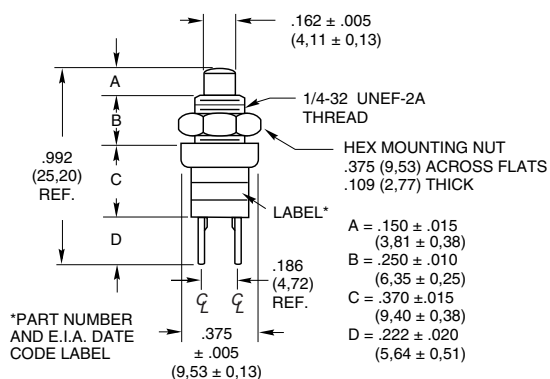
- Reliable
- Economical
- Large Selection
- UL Recognized
- CSA Certified
- Sealed Bushing and Pushbutton Option



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 ± .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 ± .010 (1.57 ± 0.25)	10 ± 4	17/64" (6.75)	

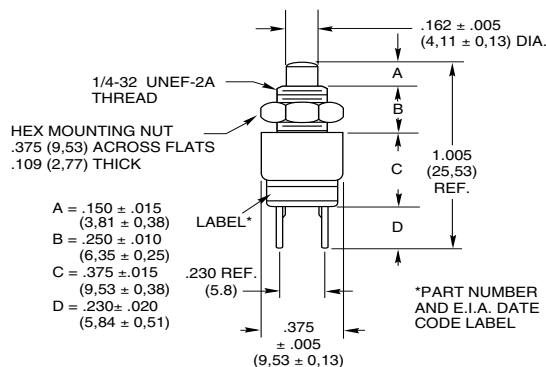
UL Recognized

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 ± .010 (1.57 ± 0.25)	10 ± 4	17/64" (6.75)	

DIMENSIONS In Inches (and millimeters)

Normally Closed–SPST and UL Recognized

30-2
30-2UL
30-6
30-6UL



Normally Closed–SPST

Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1 Amp	1/2 Amp	1,000,000	30-2 30-6	Black Red

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.065 + .010/ - .015 (1,65 + 0,25/ - 0,38)	8 ± 4	17/64" (6,75)

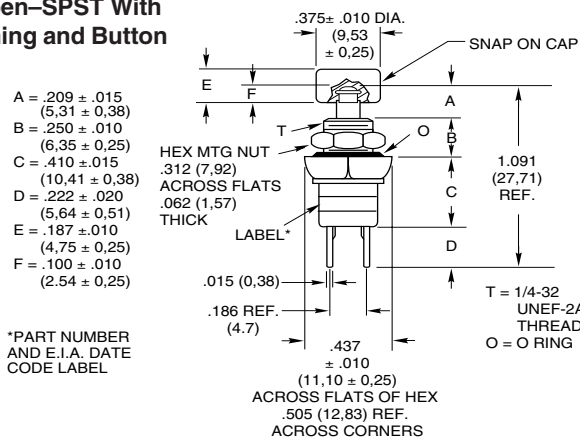
UL Recognized

Rating at 120 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
5 Amp	—	6,000	30-2UL 30-6UL	Black Red

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.065 + .010/ - .015 (.165 + 0.25/ - 0.38)	8 ± 4	17/64" (.675)

Normally Open–SPST With Sealed Bushing and Button

30-251*

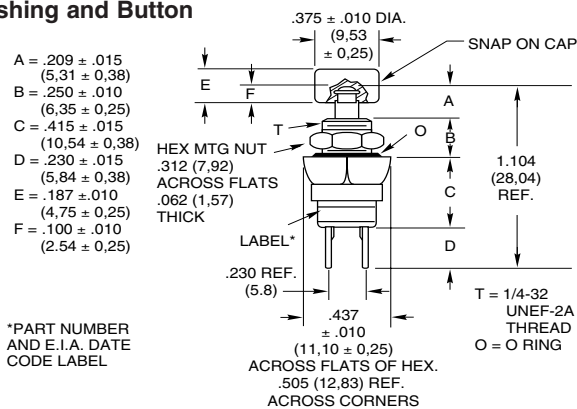


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1 Amp	½ Amp	250,000	30-251 RED 30-251 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.062 ± .020 (1,57 ± 0,51)	30 ± 8	17/64" (6,75)

Normally Closed–SPST With Sealed Bushing and Button

30-252*



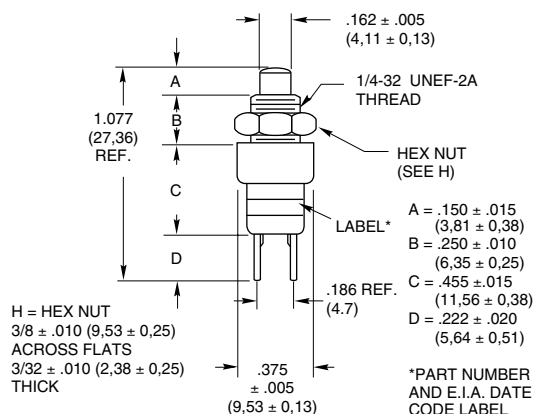
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1 Amp	½ Amp	250,000	30-252 RED 30-252 BLK	Red Black

Action	Total Travel	Actuating Force (oz.)	Mtg. Hole
Momentary	.065 ± .010 (1,65 ± 0,25)	12 ± 4	17/64" (6,75)

DIMENSIONS In Inches (and millimeters)

Normally Open-SPST With Overtravel

30-15
30-37

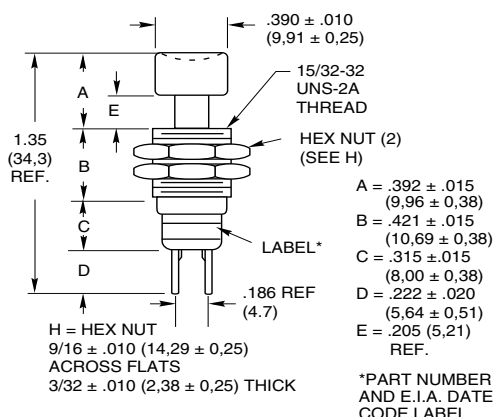


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Button Color
1 Amp	1/2 Amp	500,000	30-15 30-37	Red Black

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*

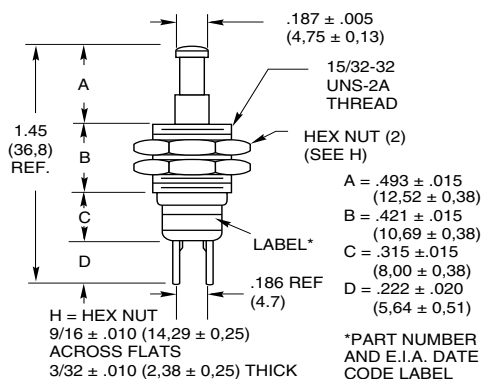


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1 Amp	1/2 Amp	200,000	30-17 RED 30-17 BLK	Red Black

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*



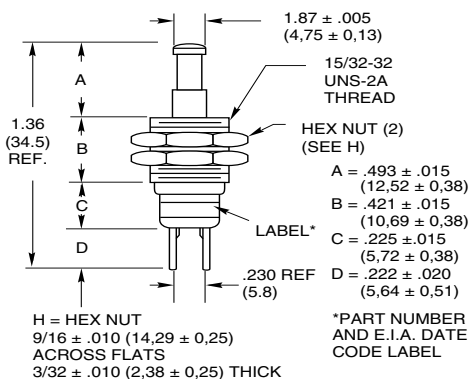
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
1 Amp	1/2 Amp	100,000	30-16 RED 30-16 BLK	Red Black

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 (.368 ± 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

ACCESSORIES



Button Guard
10C1015-1



Decorative Mounting Nuts

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.

STANDARD OPTIONS

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

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

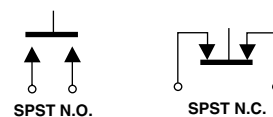
Button Cap: Nylon for 30-17; Polyethylene for 30-251 and 30-252.

Detent Balls: Carbon steel, nickel-plated

Terminal Type: Solder lug

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

CIRCUITRY



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.

SERIES 04 4PST

FEATURES

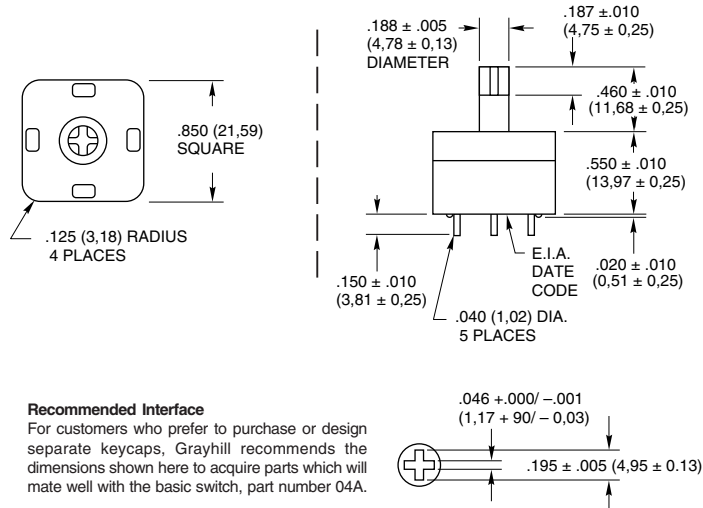
- Joy Stick Action
- Position Locator On CRT Screens
- Moves Cursor On Menu Display



DIMENSIONS In Inches (and millimeters)

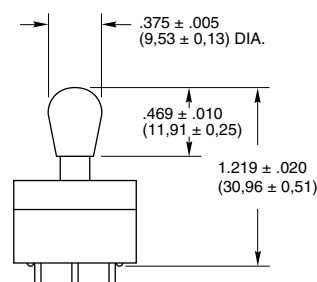
Basic Switch

04A



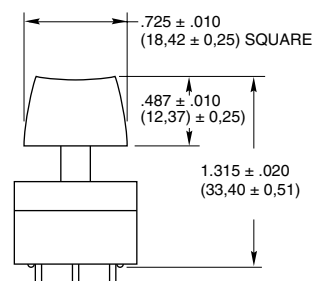
Bat Handle

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

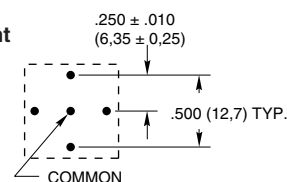
Spring: Tinned music wire

Keycap: ABS or equivalent

Bat-Handle: ABS

CIRCUITRY

Footprint



ORDERING INFORMATION

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

*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.

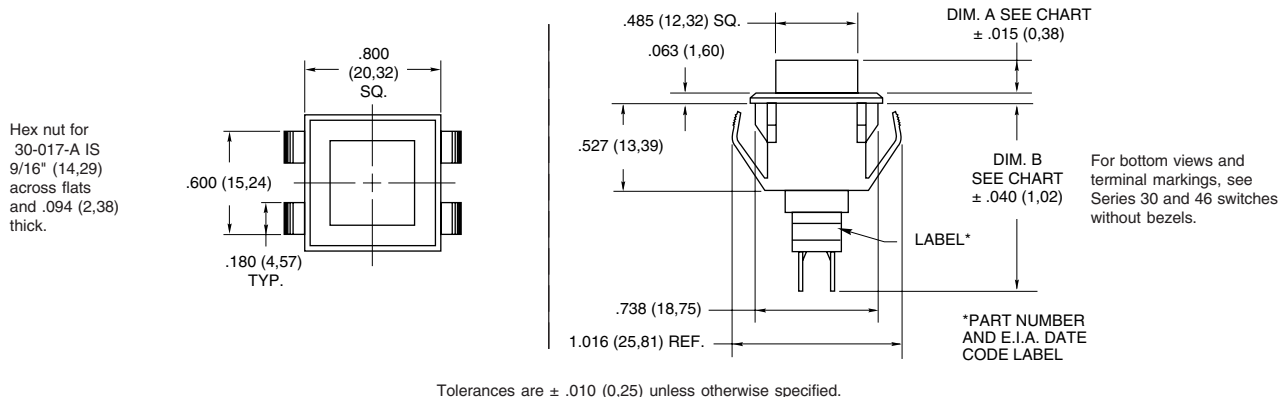
SERIES 30 and 46 Snap-in Panel Mount

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

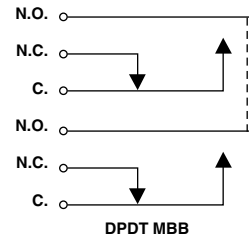
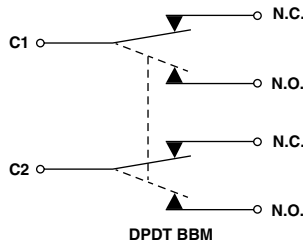
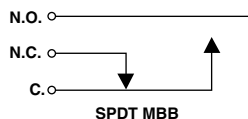
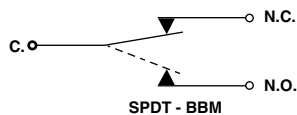


DIMENSIONS In Inches (and millimeters)



CIRCUITRY

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



ADDITIONAL DIMENSIONS AND PART NUMBERS

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

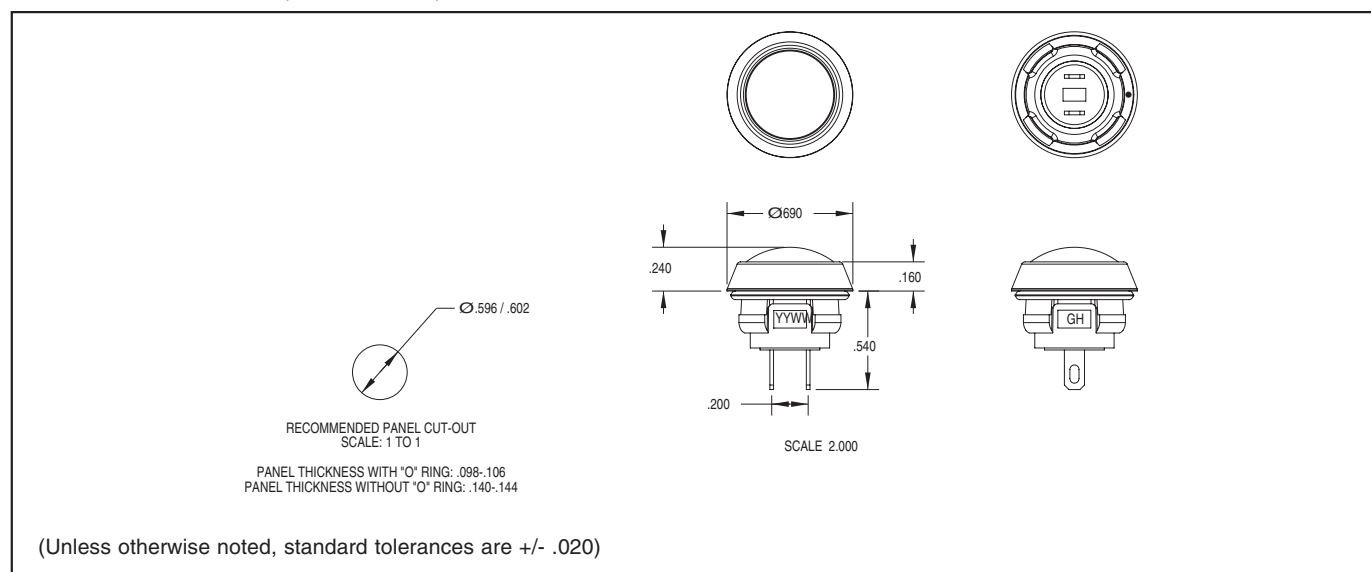
Snap-in Panel Mounting

FEATURES

- Convenient Snap-in Panel Mounting
- Choice of 6 Button Colors
- SPST (Momentary Contact)
- Gold Plated Contacts
- Sealed
- Butt Contact System



DIMENSIONS In inches (and millimeters)



MATERIAL

- Button, Housing, Base and Plunger: Nylon, 45% Glass-filled
- Terminal: Brass, gold-plated over nickel
- Shorting Bar: Brass, gold-plated over nickel
- Internal Seal: Silicon Rubber
- O-ring Seal: Silicon
- Spring: Tinned music wire
- Travel: .090 Nominal
- Travel Before Make: .035 Nominal

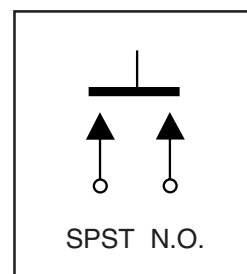
RATINGS

- 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: 25m Ω max on new switch
- Insulation: 1,000 megohms minimum

ORDERING INFORMATION

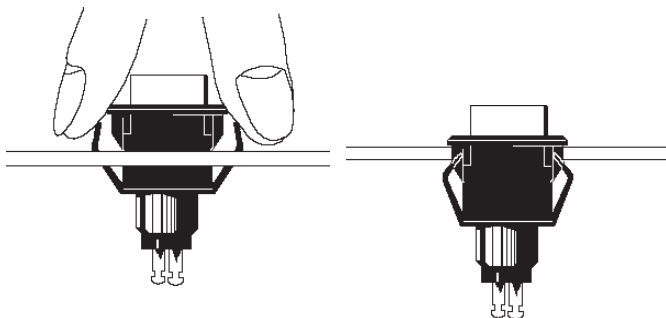
Part Number	Description
30-100	Black
30-101	Red
30-102	Green
30-103	Yellow
30-104	Orange
30-105	White

CIRCUITRY



MOUNTING

Easy Snap-In Mounting



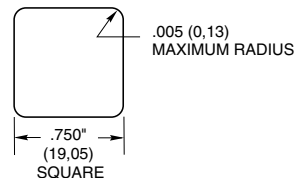
Just snap into pre-cut panel hole.

Plastic wings lock switch in place.

PANEL CUTOUT

Recommended Panel Cut

Switch will fit panels .049" (1,24) to .125" (3,18) thick. Recommended panel thickness is 18 gauge.



SPECIFICATIONS

Life Limiting Criteria—Series 30 & 46

Contact Resistance: Less than 25 milliohms on a new switch

Voltage Breakdown: 1,000 Vac between mutually insulated parts

Insulation Resistance: 1,000 megohms minimum

Ratings—Series 30

Current Rating:

30-601 150 mA, 5 Vdc resistive and 20 mA, 20 Vdc resistive

All others 1 A, 115 Vac resistive, or 0.5 A, 220 Vac resistive

Life Expectancy:

30-015 500,000 operations

30-017 200,000 operations

All others 1,000,000 operations

Ratings—Series 46

Current Rating: 250 mA, 115 Vac resistive or 125 mA, 220 Vac resistive

Life Expectancy: 250,000 operations

Materials and Finishes—Series 30

Bezel: Nylon

Button Cap: ABS plastic

Switch Bushing: Brass, tin zinc

Base: Thermoset plastic

Spring: Tinned music wire

Plunger: Polycarbonate

Shorting Bar:

30-601 Brass, gold-plated over nickel

All Others Brass with fine silver contact area

Base Contacts:

30-601 Brass, gold-plated over nickel

30-002 Brass with fine silver contact area

All Others Bronze with fine silver contact area

Terminals:

30-002 Brass, silver-plated

30-601 Bronze, gold-plated over nickel

All Others Bronze, silver-plated

Nut: Provided only on 30-017; allows button height adjustment. Brass, zinc trivalent chromate-plated.

Materials and Finishes—Series 46

Bezel: Nylon

Button Cap: ABS plastic

Switch Bushing: Brass, zinc trivalent chromate-plated.

Base: Thermoset plastic

Spring: Tinned music wire

Plunger: 46-402/502 Nickel-plated brass

All Others Polycarbonate

Shorting Bar: Phosphor bronze, silver-plated

Base Contacts: Phosphor bronze with silver contact area

Terminals: Phosphor bronze, tin/silver plating

Covers (46-200/201): Brass, zinc trivalent chromate-plated

STANDARD OPTIONS

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

LEGENDING OPTION

Contact Grayhill

A button legend can be printed in epoxy ink which bonds to the surface of the button cap. Any type style or design which can be photographed can be used to produce the legend.

There is a per-button printing charge. A nominal set up charge per legend applies to orders of 1 to 99 pieces. Non-standard legends are subject to one time artwork and tooling charges. Consult Grayhill for help with actual legend.

ORDERING INFORMATION

Use the partial part number you have selected from the Dimensions and Part Number chart, and add the button color suffix. Example:

Color: 01, 03, 04, 05, 06, 07
46-200-A-03

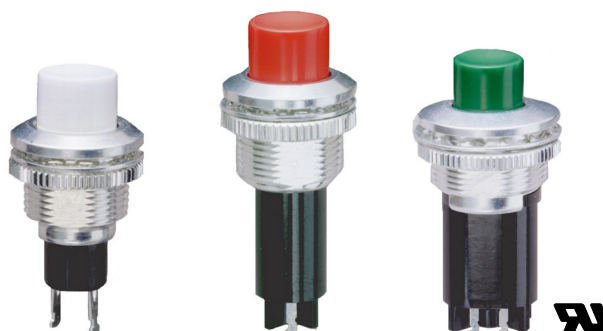
01 = White 03 = Red 04 = Green
05 = Blue 06 = Yellow 07 = Black

SERIES 30 and 46

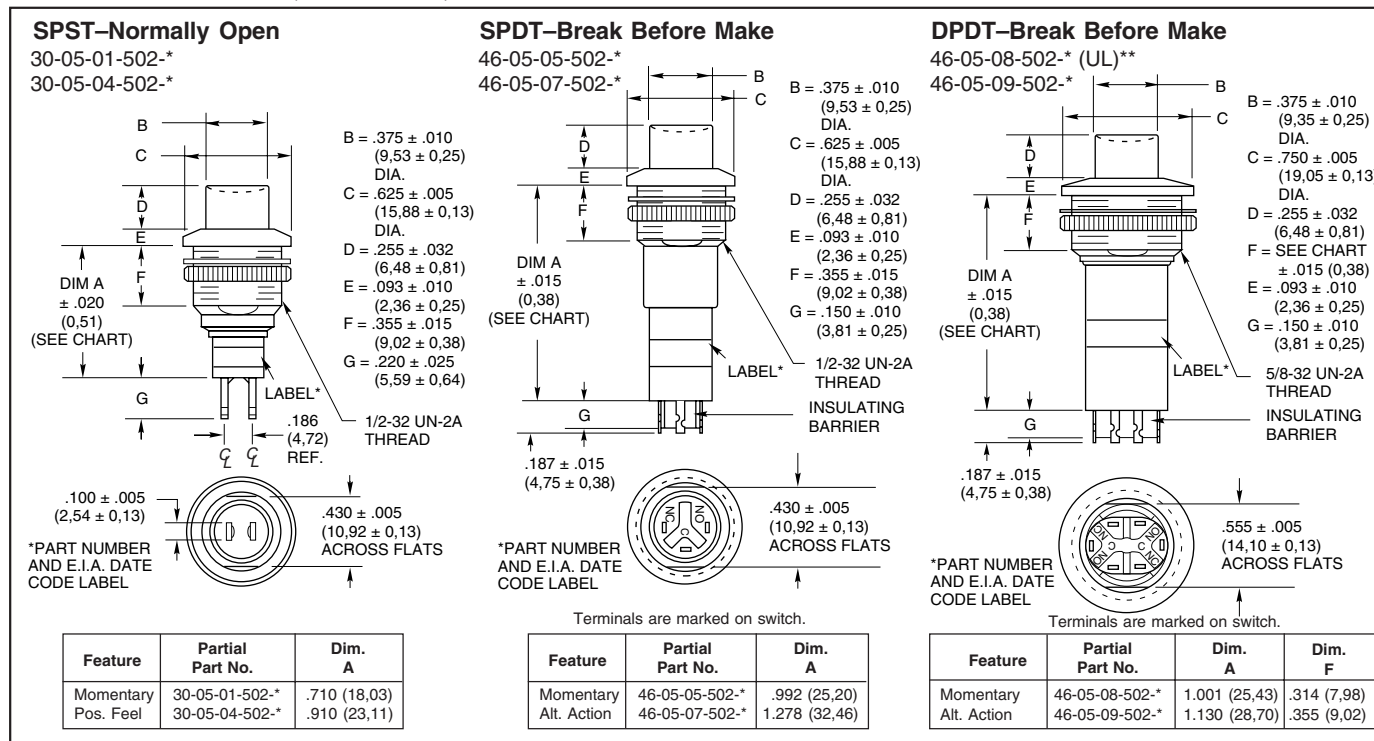
Decorator Line

FEATURES

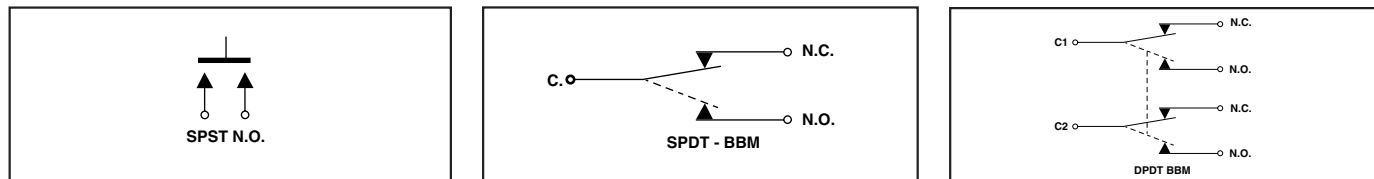
- Attractive Front Panel Bezels (6 choices)
- Space-Saving: Only 5/8" Diameter (SPST & SPDT) and 3/4" Diameter (DPDT) Round Bezels
- SPST with Option of Positive Feel
- SPDT, DPDT with Momentary Contact or Alternate Action
- Sturdy Metal Sleeve or Bushing and Nut Provide Secure Mounting
- UL Recognized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



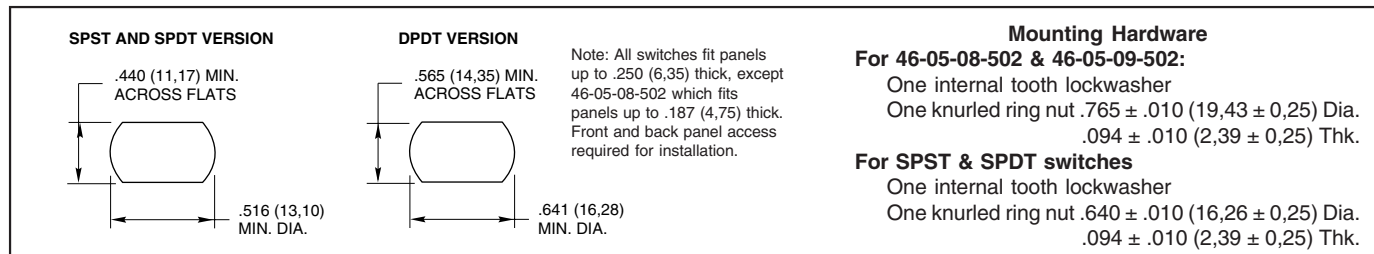
DIMENSIONS In Inches (and millimeters)



CIRCUITRY



RECOMMENDED PANEL CUTOUT AND MOUNTING HARDWARE

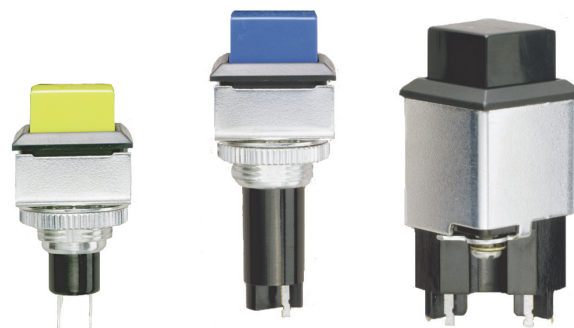


*Partial part number; complete part number by adding a dash for button color: white -01; red -03; green -04; blue -05; yellow -06 or black -07, see Ordering Information.
** Contact Grayhill for part number.

SERIES 30 and 46 Decorator Line

FEATURES

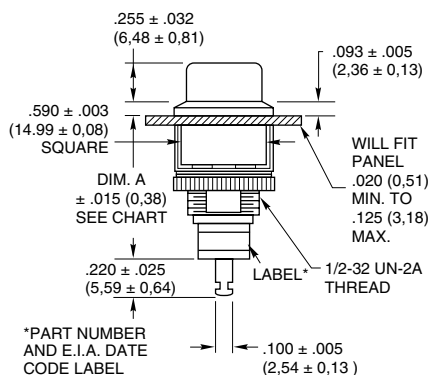
- Attractive Front Panel Bezels (6 choices)
- Space-Saving: Only 11/16" Square
- SPST with Option of Positive Feel
- SPDT, DPDT with Momentary Contact or Alternate Action
- Sturdy Metal Sleeve or Bushing and Nut Provide Secure Mounting



DIMENSIONS In Inches (and millimeters)

SPST—Normally Open

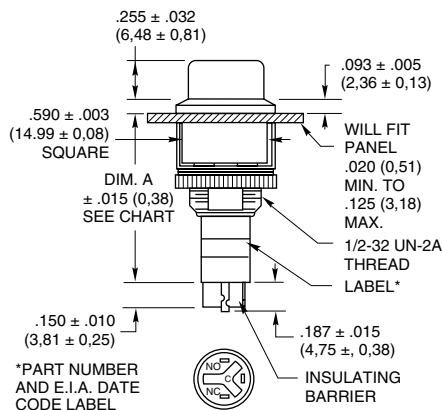
30-01-01-500-*
30-01-04-500-*



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-*

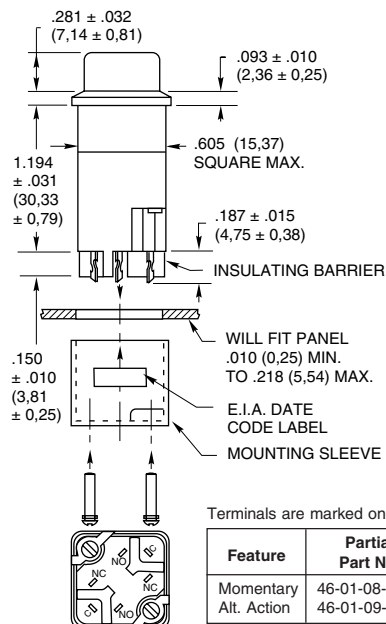


Terminals are marked on switch.

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

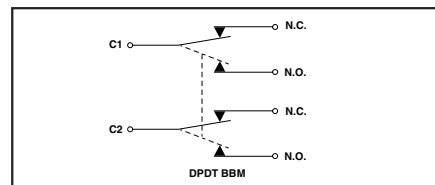
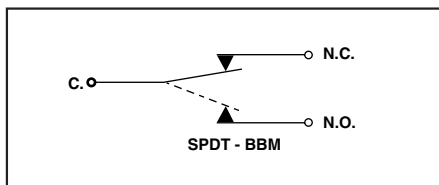
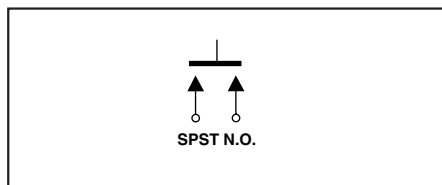
46-01-08-500-*
46-01-09-500-*



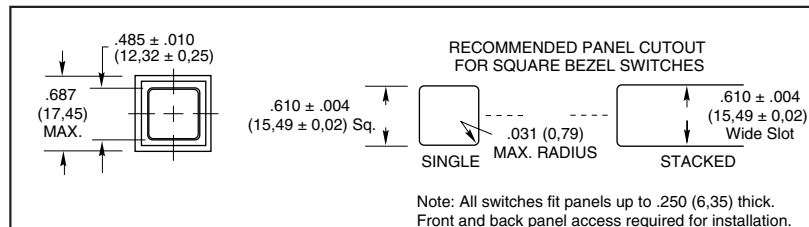
Terminals are marked on switch.

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

CIRCUITRY



FRONT VIEWS AND MOUNTING



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.

*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

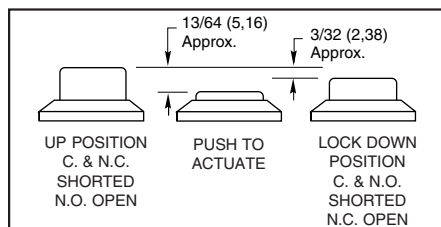
Plunger: Polyphenylene sulfide (PPS) for 30-01-01-500-X and 46-01-05-500-X. Nickel-plated brass for 46-01-07-500-X, 46-05-07-502-X, 46-01-09-500-X and 46-05-09-502-X. Zinc trivalent chromate-plated brass for 46-01-08-500-X. Polycarbonate for all others.

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

	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
Contacts	Butt type	Wiping type
Rating at 115 Vac Res.	1 Amp	0.25 Amp
Rating at 220 Vac Res.	0.5 Amp	0.125 Amp
Circuitry	SPST-N.O. (Standard); SPST-N.O. (w/Overtravel), SPST-N.O. (w/Positive Feel)	SPDT, DPDT Break Before Make
Life Expectancy	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
Contact Resistance	25 milliohms or less on a new switch	
Voltage Breakdown	1000 Vac between mutually insulated parts	
Insulation Resistance	1000 megohms minimum	
Operating Temperature	-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.)

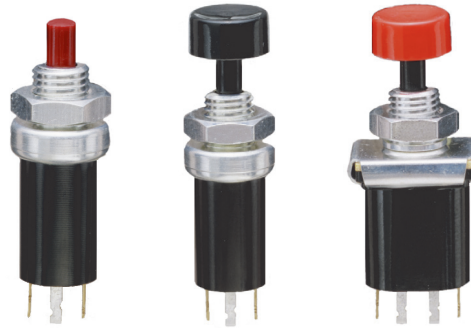
Grayhill Type Identification No.	Character Height (Typ.)	Sample Style and Sizes	Square Button Character and Line Limitation		Round Button Character and Line Limitation	
4GH088	.083 (2,1)	ABCDEFGHIJ	6 Char. 2 Lines	TAB LOCATE	3 Char. 1 Line	OFF
1GH125	.138 (3,5)	ABCDEFGHIJ	5 Char. 1 Lines	INDEX	3 Char. 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

SERIES 46

SPST and DPDT, 1/4 Amp

FEATURES

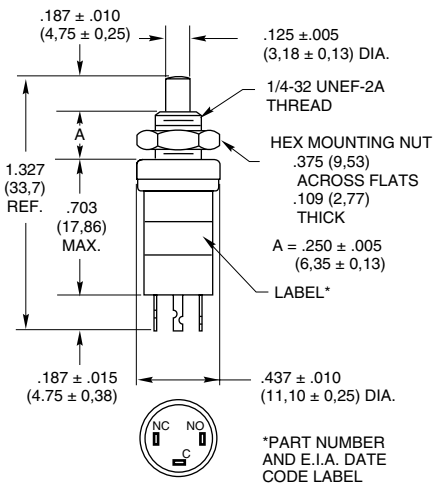
- Long Wipe Contact Assures High Reliability
- 250,000 Cycles of Operation



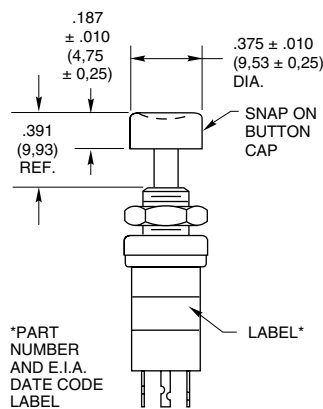
DIMENSIONS In Inches (and millimeters)

Single Pole/Double Throw

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

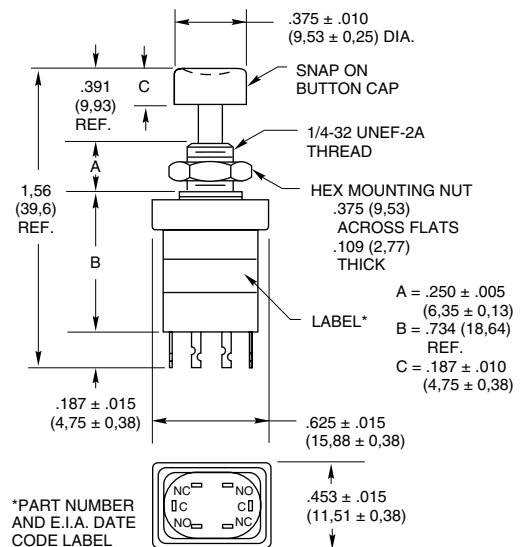


46-102* (BBM)
46-111* (MBB)



Double Pole/Double Throw

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



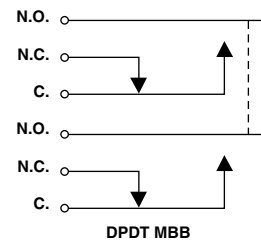
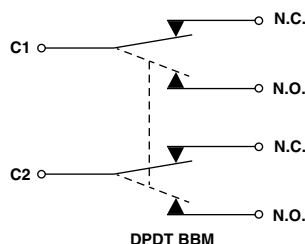
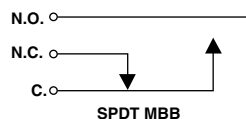
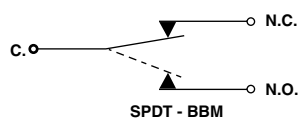
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button or Cap Color
1/4 Amp	1/8 Amp	250,000	46-101 RED 46-101 BLK 46-102 RED 46-102 BLK 46-110 RED 46-110 BLK 46-111 RED 46-111 BLK	Red Black Red Black Red Black Red Black

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 46-200 BLK 46-201 RED 46-201 BLK	Red Black Red 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

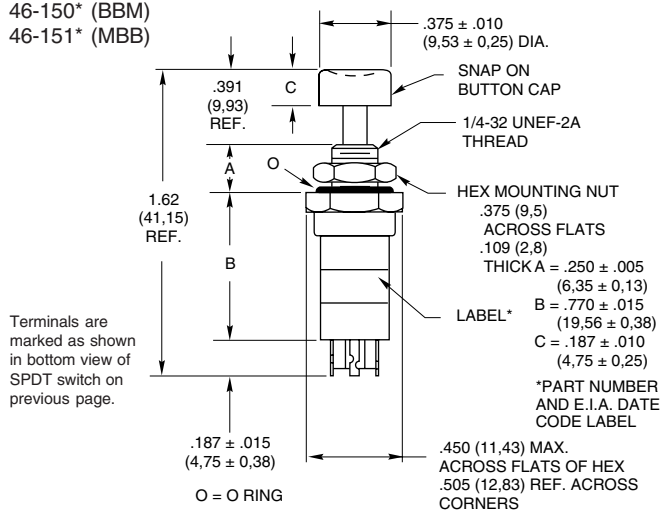
- Bushing and Button Seal
- Environmentally Sealed



DIMENSIONS In Inches (and millimeters)

Sealed Bushing and Button Single Pole/Double Throw

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

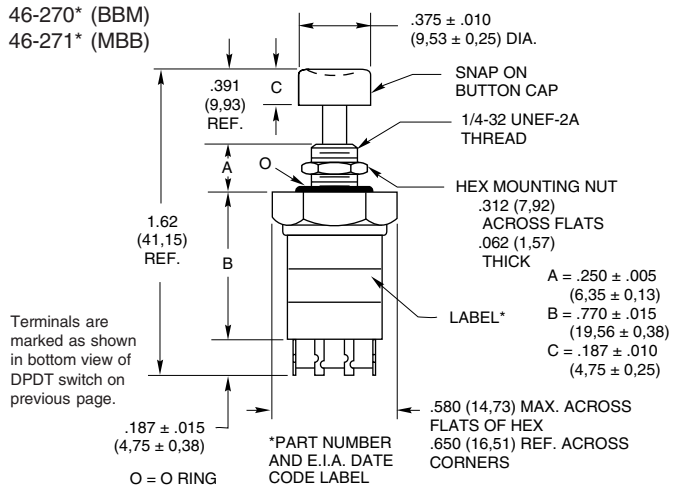


Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	*Complete Part Number	Cap Color
1/4 Amp	1/8 Amp	100,000	46-150 RED 46-150 BLK 46-151 RED 46-151 BLK	Red Black Red Black

Action	Total Travel	Bottoming Force (oz.)	Mtg. Hole
Momentary	.180 (4.57) Min.	24 ± 4	17/64" (6.75)

Sealed Bushing and Button Double Pole/Double Throw

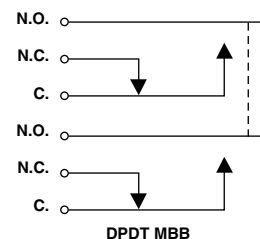
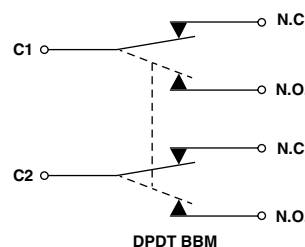
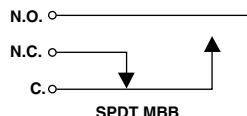
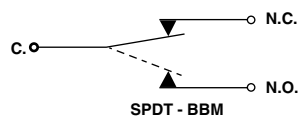
46-270* (BBM)
46-271* (MBB)



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 46-270 BLK 46-271 RED 46-271 BLK	Red Black Red Black

Action	Total Travel	Bottoming Force (oz.)	Mtg. Hole
Momentary	.180 (4.57) Min.	48 ± 4	17/64" (6.75)

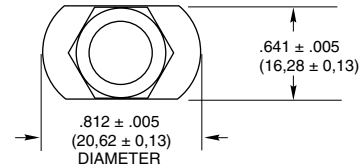
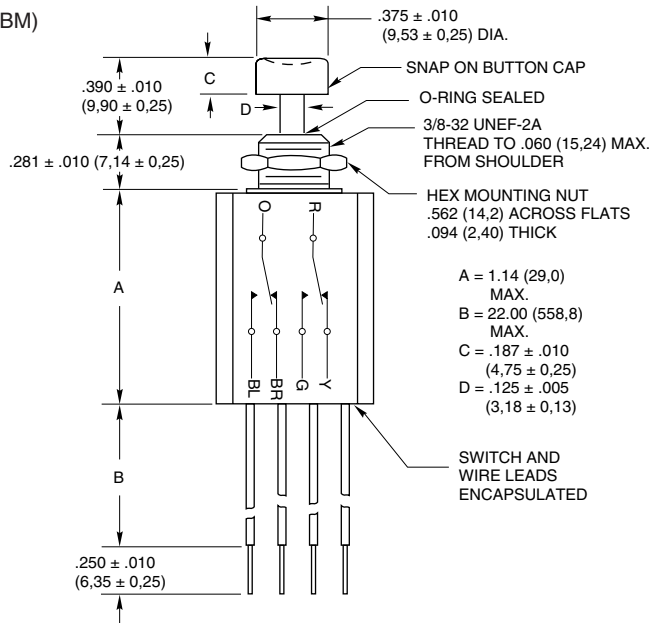
CIRCUITRY



DIMENSIONS In Inches (and millimeters)

Environmentally Sealed Double Pole/Double Throw

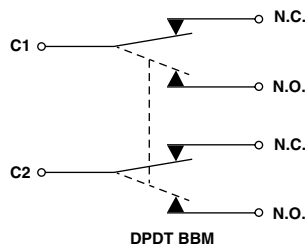
46-260* (BBM)



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)

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

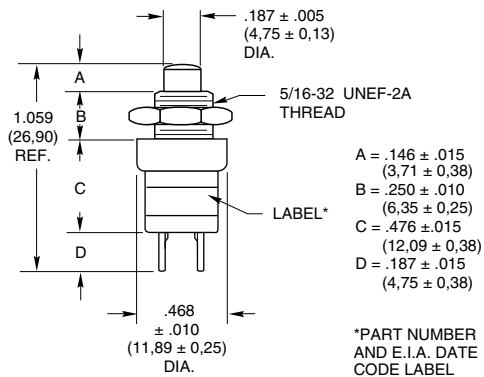
- Momentary Contact
- 100,000 Cycles of Operation



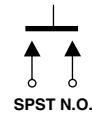
DIMENSIONS In Inches (and millimeters)

Normally Open-SPST

23-1
23-4



CIRCUITRY



ACCESSORY



Decorative Mounting Nut
Part No. 23C1024

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.

Materials and Finishes

Mounting Nut and Cover Bushing: Brass, tin zinc

Base: Phenolic per MIL-M-14, Type CFG.

Button: Polycarbonate

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: $.095 \pm .010$ (2,41 $\pm$ 0,25)

Overtravel: $.005$ (0,13) minimum

Actuating Force: 16 $\pm$ 4 ounces

Mounting Hole: 21/64" (8,33)

ORDERING INFORMATION

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

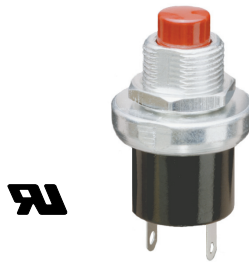
Available From Your Local Grayhill Distributor.

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

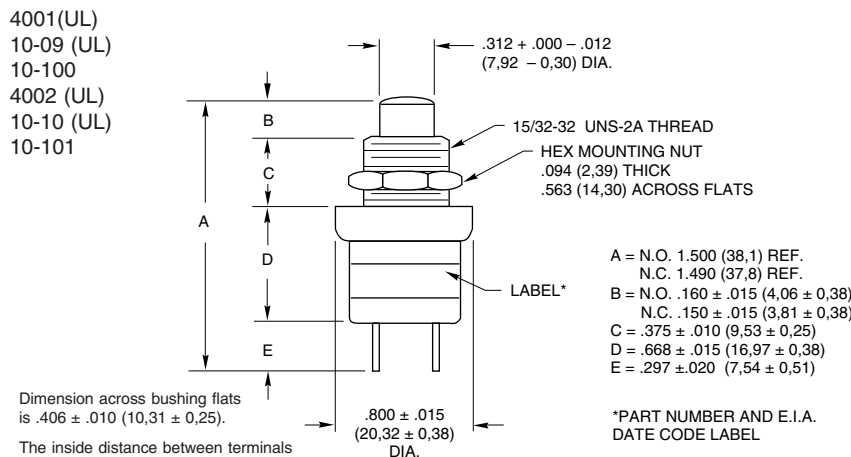
SERIES 10 SERIES 4000 SPST, 1 and 3 Amp

FEATURES

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

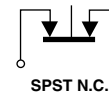
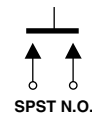


DIMENSIONS In Inches (and millimeters)



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
Underwriters Laboratory Recognized						
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

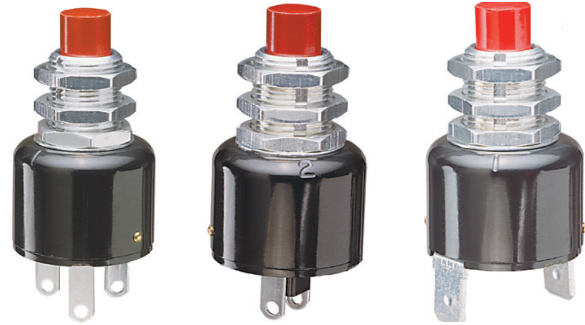
Description & Button Color	Part No.
SPST, N.O., Red	4001
SPST, N.O., Black	10-09
SPST, N.O., UL, Red	4001UL
SPST, N.O., UL, Black	10-09 UL
SPST, N.O., Positive Feel, Red	10-100
SPST, N.C., Positive Feel, Black	10-101
SPST, N.C., Red	10-10
SPST, N.C., Black	4002
SPST, N.C., UL, Red	10-10 UL
SPST, N.C., 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.

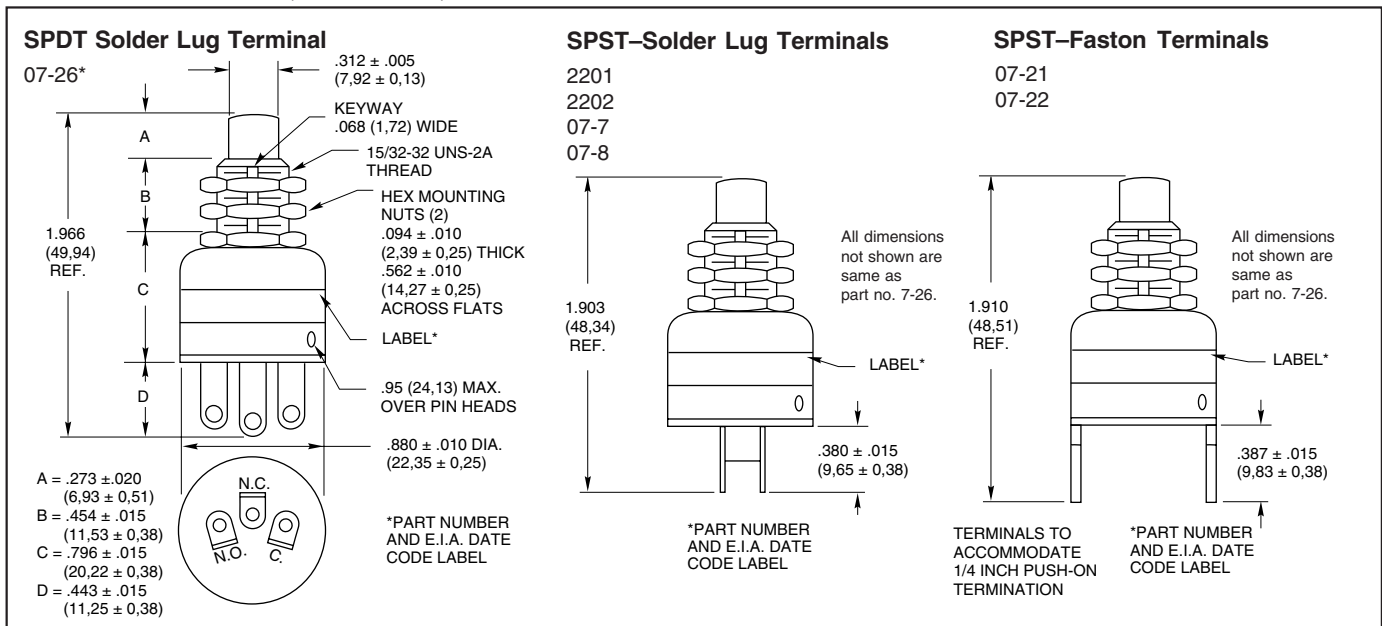
SERIES 07 SERIES 2000 SPST and SPDT, 10 Amp

FEATURES

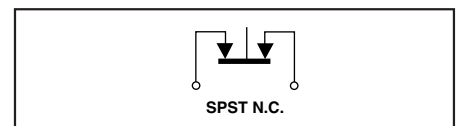
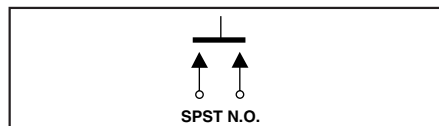
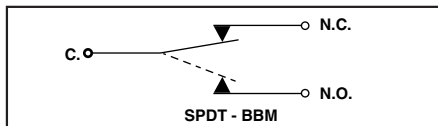
- Momentary Contact
- Extremely Fast Make-and-Break
- Audible Click
- 25,000 Cycles of Operation



DIMENSIONS In Inches (and millimeters)



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

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

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

ACCESSORIES



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

Available from your local Grayhill Distributor.

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

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

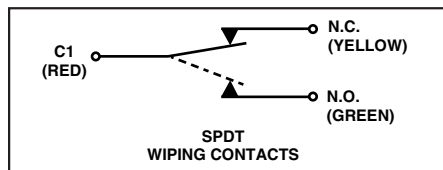
Use the Selector Charts at the beginning of the section to select a series. Use the pages listed there or referenced here to select a switch.

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.

CIRCUITRY: Series 46



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)	—

*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.

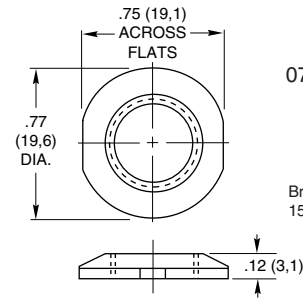
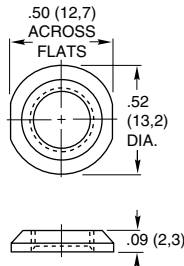
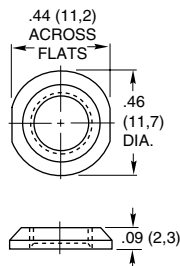
ACCESSORIES

For Pushbutton Switches

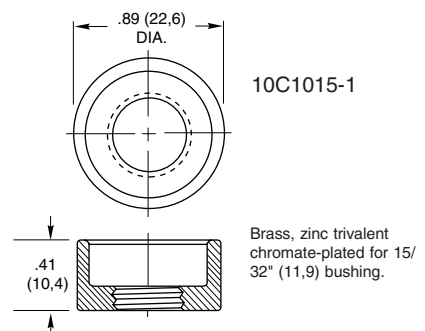
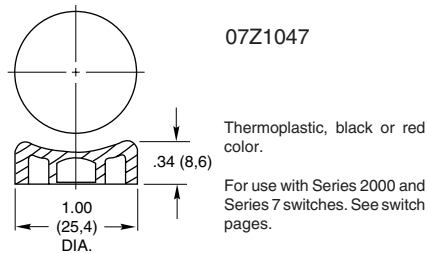
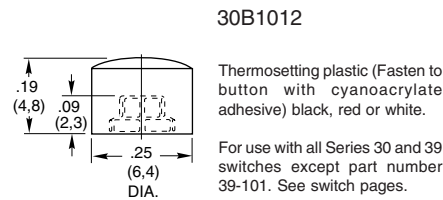


DIMENSIONS In Inches (and millimeters)

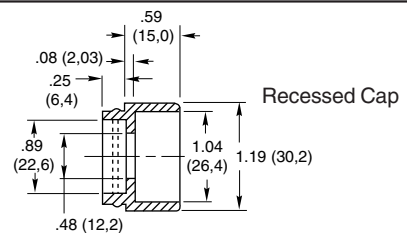
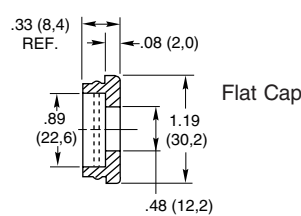
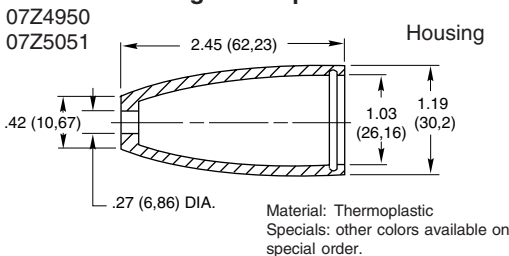
Decorative Mounting Nuts



Button Caps and Guard



Remote Switching Accessories Pendant Housing and Caps



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.

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.

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