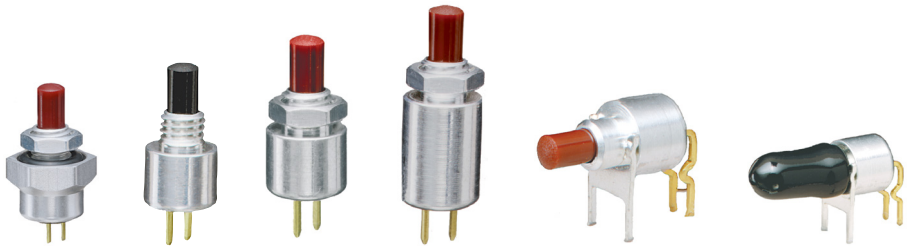
SERIES 39
SPST, 150 mA

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



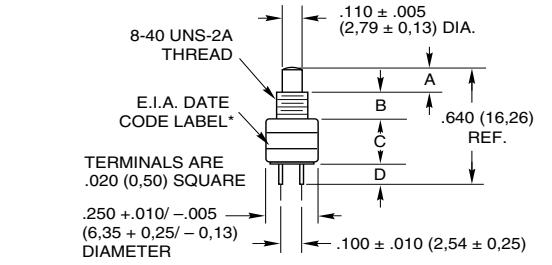
DIMENSIONS in inches (and millimeters)

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

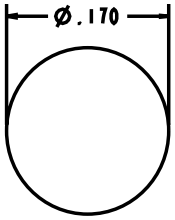
Action	Total Travel	Actuating Force (oz.)
Momentary	.035 ± .015 (0,89 ± 0,38)	4^{+4}_{-2}



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

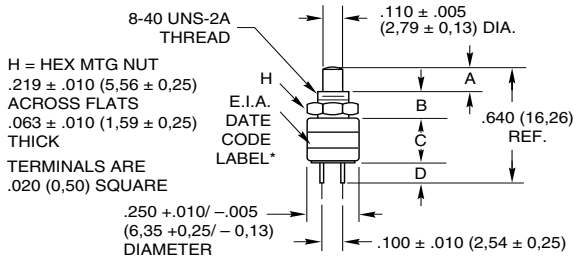
A = .175 + .025/ –.020 (4,45 + 0,64/ – 0,51)
B = .125 ± .010 (3,18 ± 0,25)
C = .215 ± .015 (5,46 ± 0,38)
D = .125 ± .010 (3,18 ± 0,25)

Recommended Panel Cutout



SPST–Normally Open, with Nut

39-401*



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

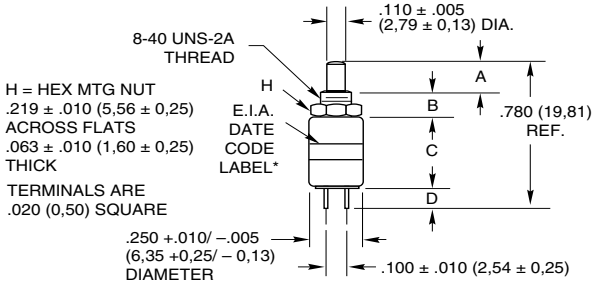
A = .175 + .025/ –.020 (4,45 + 0,64/ – 0,51)
B = .125 ± .010 (3,18 ± 0,25)
C = .215 ± .015 (5,46 ± 0,38)
D = .125 ± .010 (3,18 ± 0,25)

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

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

SPST–Normally Open, with Overtravel

39-424*



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

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

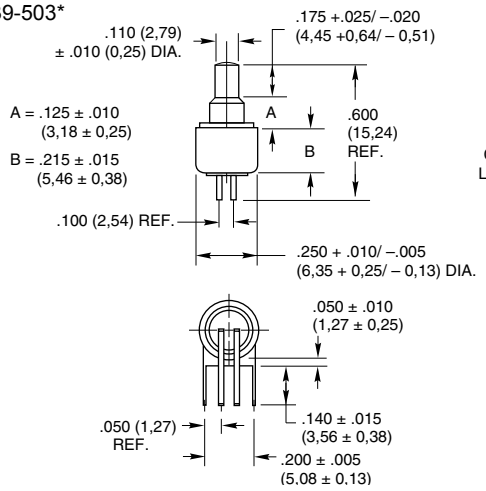
Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	100,000	39-424 RED 39-424 BLK	Red Black

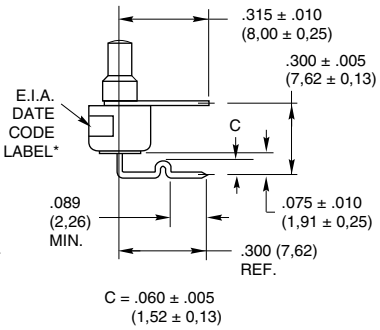
Action	Total Travel	Over Travel	Actuating Force (oz.)
Momentary	.130 ± .025 (3,30 ± 0,64)	.015 (0,38) Min.	5 ± 3

DIMENSIONS in inches (and millimeters)

Right Angle, SPST–Normally Open

39-501*
39-503*

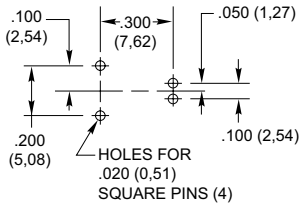




*Label increases nominal diameter to .255 (6,48)

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

Mounting Footprint

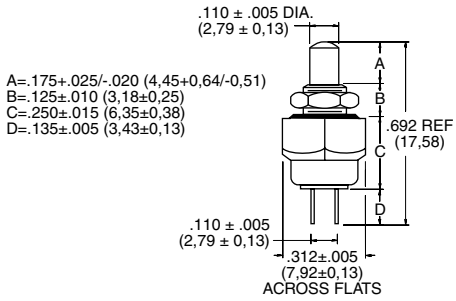


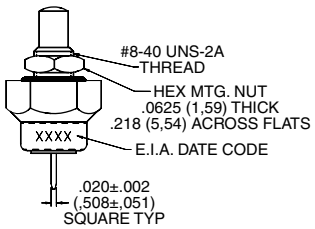
Rating at 28 Vdc Resistive	Operations at Rated Load	*Complete Part Number	Button Color
150 mA	1,000,000	39-501 RED	Red
		39-501 BLK	Black
		39-503 RED	Red
		39-503 BLK	Black

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

SPST–Normally Open, with Panel and Button Seal

39-138*





Rating at 115 Vac Resistive	Operations at Rated Load	*Complete Part Number	Button Color
½ Amp	250,000	39-138 RED	Red
		39-138 BLK	Black

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

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

* Note: Solder process temperatures should not expose main switch body to temperatures higher than 270F. (132C). Reflow soldering is not recommended. Contact Grayhill for more specific details.

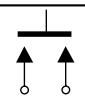
Materials and Finishes

Bushing/Housing: Aluminum, clear anodized for 39-138; Brass, tin zinc for all others
Standoff: (39-501 and 39-503) Brass, tin plated over nickel
Base and Button: Thermoplastic
Shorting Bar: Brass, gold-plated over nickel plate for 39-501and 39-503; fine silver, gold-plated for others
Terminals: Fine silver, gold-plated for 39-138; Brass, gold-plated over nickel for all others
Spring: Tinned music wire
Mounting Nut: (39-401 and 39-424) Brass, zinc trivalent chromate-plated

ORDERING INFORMATION

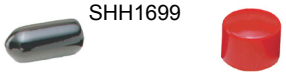
Part No.	Type & Button Color
39-401 RED	N.O., Red
39-401 BLK	N.O., Black
39-405 RED	N.O., No Nut, Red
39-405 BLK	N.O., No Nut, Black
39-424 RED	N.O., Overtravel, Red
39-424 BLK	N.O., Overtravel, Black
39-501 RED	N.O., Right Angle, Red
39-501 BLK	N.O., Right Angle, Black
39-503 RED	39-501 Red & Cap Seal
39-503 BLK	39-501 Blk & Cap Seal
39-138 RED	39-351 PC Mount & Seal
39-138 BLK	39-351 PC Mount & Seal

CIRCUITRY



SPST–N.O.

ACCESSORIES



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

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

Pushbutton Engineering Information

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.

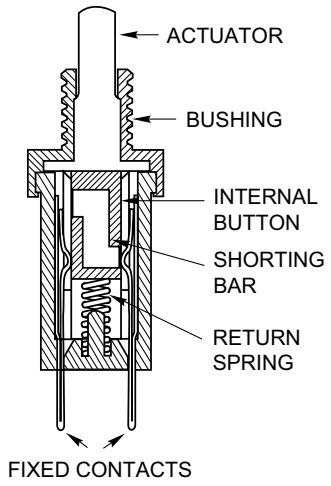
Butt Contacts have less wear than wiping contacts and therefore, have a longer life. They are also smaller. Butt contacts are not self-cleaning, so their contact resistance can vary from operation to operation.

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.

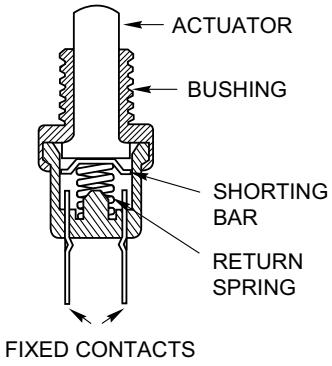
The rapid rate of make and break means that these switches are appropriate for high current loads. They usually have a slight wiping action and contact surfaces made of precious metals to minimize their disadvantages.

Internal Views of Pushbutton Switches

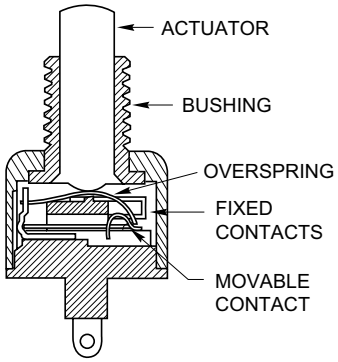
Wiping Contact



Butt Contact



Snap Action



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.

Butt Contact

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

Wiping Contact

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

Snap Action Contact

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

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

** 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).