

Distinctive Characteristics

Antirotation design, standard on noncylindrical levers, mates toggle and bushing; bottom of toggle has two flattened sides which fit into a complementary opening inside bushing.

Antijamming design protects contacts from damage due to excessive downward force on actuator.

High torque bushing construction prevents rotation or separation from frame during installation.

High insulating barriers increase isolation of circuits in multipole devices and provide added protection to contact points.

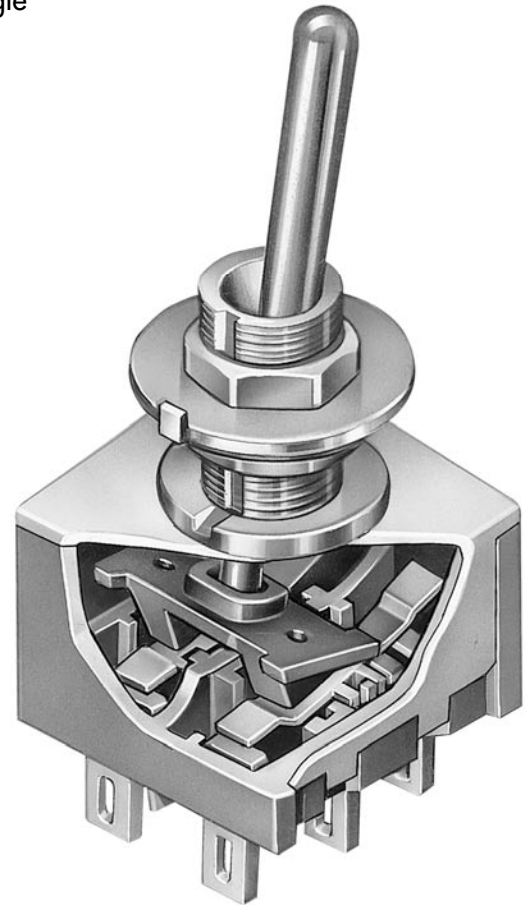
Molded diallyl phthalate case has a UL flammability rating of 94V-0.

Epoxy sealed terminals prevent entry of solder flux and other contaminants.

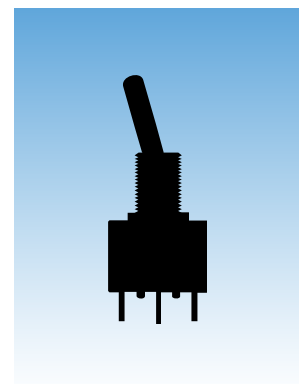
Prominent external insulating barriers increase insulation resistance and dielectric strength.

Interlocked actuator block, lever, and interior guide prevent switch failure due to biased lever movement.

Clinching of frame to case well above base and terminals provides 1,500V dielectric strength.



Actual Size



General Specifications

Electrical Capacity (Resistive Load)

Power Level (code W): 6A @ 125V AC & 3A @ 250V AC
 4A @ 30V DC for On-None-On & On-None-Off; 3A @ 30V DC for all other circuits

Logic Level (code G): 0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)

Logic/Power Level (code A): Combines W & G ratings

Note: Find additional explanation of dual rating & operating range in Supplement section.

Other Ratings

Contact Resistance: 10 milliohms maximum for silver; 20 milliohms maximum for gold

Insulation Resistance: 1,000 megohms minimum @ 500V DC

Dielectric Strength: 1,000V AC minimum between contacts for 1 minute minimum;
 1,500V AC minimum between contacts and case for 1 minute minimum

Mechanical Life: 100,000 operations minimum; 50,000 operations minimum for flat, locking, & splashproof devices

Electrical Life: 25,000 operations minimum for silver; 50,000 operations minimum for gold;
 50,000 operations minimum for silver at 3A @ 125V AC

Nominal Operating Force: 3.92N for Single Pole; 4.41N for Double Pole; 6.86N for Three Pole; 7.85N for Four Pole

Angle of Throw: 25°

Materials & Finishes

Toggle:	Brass with chrome plating	Frame:	Stainless steel
Bushing:	Brass with nickel plating	Support Bracket:	Steel with tin plating
Case:	Diallyl phthalate resin (UL94V-0)		
Movable Contactor:	Phosphor bronze with silver or gold plating		
Movable Contacts:	Silver alloy (code W); copper with gold plating (code G); or silver alloy with gold plating (code A)		
Stationary Contacts:	Silver with silver plating (code W); copper or brass with gold plating (code G); or silver with gold plating (code A)		
Terminals:	Copper or brass with silver plating; or copper or brass with gold plating		

Environmental Data

Operating Temp Range: -30°C through +85°C (-22°F through +185°F)

Humidity: 90 ~ 95% humidity for 96 hours @ 40°C (104°F)

Vibration: 10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning in 1 minute; 3 right angled directions for 2 hours

Shock: 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

Sealing: Panel seal bushing options B3 & D3 meet IP67 of IEC60529 Standards

Installation

Mounting Torque: 3.0Nm (26.55 lb•in) double nut for large bushing;
 1.5Nm (13 lb•in) double nut & 0.7Nm (6 lb•in) single nut for all other bushings

Processing

Soldering: Wave Soldering (PC version) for Gold: See Profile A in Supplement section.
 Manual Soldering for Gold: See Profile A in Supplement section.
 Wave Soldering (PC version) for Silver: See Profile B in Supplement section.
 Manual Soldering for Silver: See Profile B in Supplement section.
 Note: Lever must be in OFF (center) position while soldering.

Cleaning: These devices are not process sealed. Hand clean locally using alcohol based solution.

Standards & Certifications

Flammability Standards: UL94V-0 for case

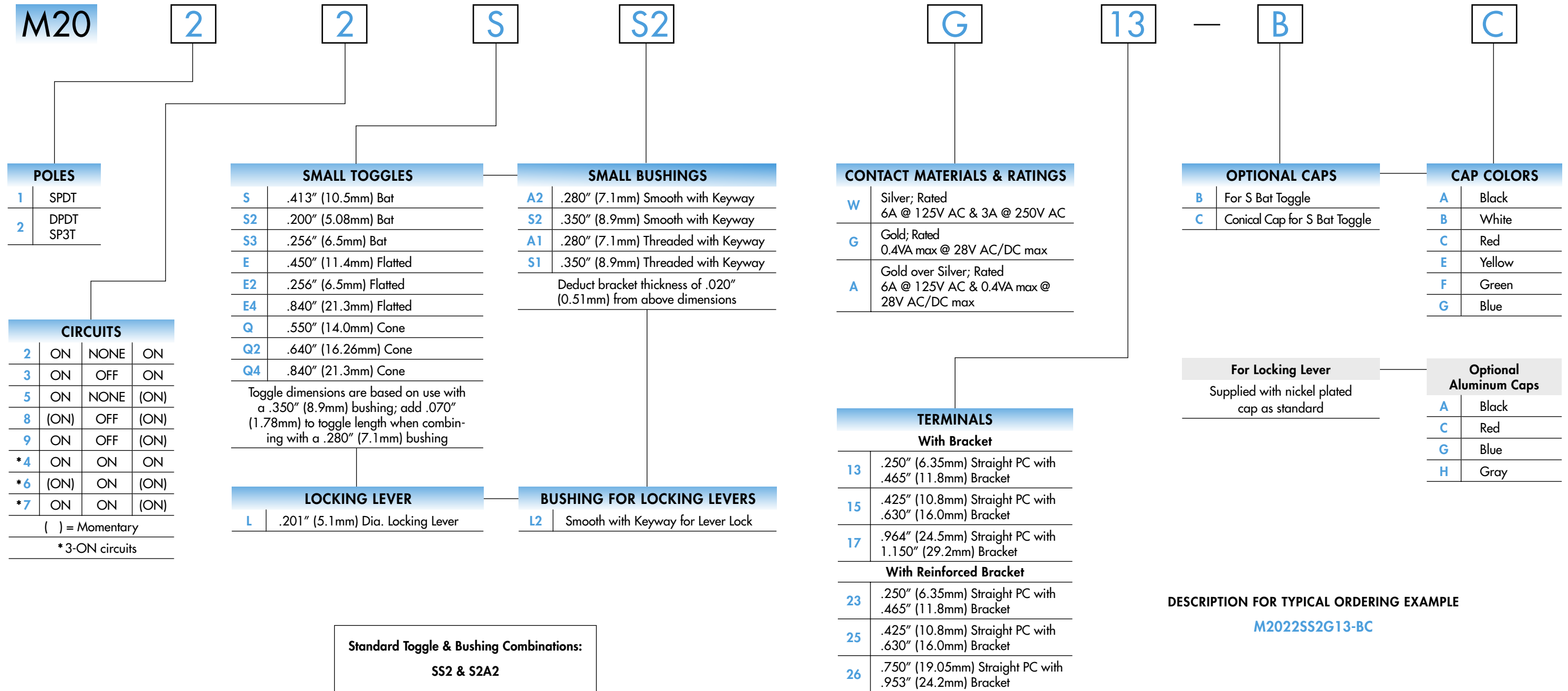
UL Recognized: All models recognized at 6A @ 125V AC, 3A @ 250V AC or 0.4VA maximum @ 28V DC maximum; UL File No. WOYR2.E44145; add "/U" to end of part number to order UL mark on switch.

C-UL Recognized: All models recognized at 6A @ 125V AC, 3A @ 250V AC or 0.4VA maximum @ 28V DC maximum; C-UL File No. WOYR8.E44145; add "/C-UL" to end of part number to order C-UL mark on switch.

CSA Certified: All models recognized at 6A @ 125V AC or 3A @ 250V AC or 0.4VA maximum @ 28V maximum; CSA File No. 023535-0-000; add "/C" to end of part number to order CSA mark on switch.



TYPICAL SWITCH ORDERING EXAMPLE



POLES

1	SPDT
2	DPDT SP3T

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)
*4	ON	ON	ON
*6	(ON)	ON	(ON)
*7	ON	ON	(ON)

() = Momentary
* 3-ON circuits

SMALL TOGGLES

S	.413" (10.5mm) Bat
S2	.200" (5.08mm) Bat
S3	.256" (6.5mm) Bat
E	.450" (11.4mm) Flatted
E2	.256" (6.5mm) Flatted
E4	.840" (21.3mm) Flatted
Q	.550" (14.0mm) Cone
Q2	.640" (16.26mm) Cone
Q4	.840" (21.3mm) Cone

Toggle dimensions are based on use with a .350" (8.9mm) bushing; add .070" (1.78mm) to toggle length when combining with a .280" (7.1mm) bushing

LOCKING LEVER

L	.201" (5.1mm) Dia. Locking Lever
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SMALL BUSHINGS

A2	.280" (7.1mm) Smooth with Keyway
S2	.350" (8.9mm) Smooth with Keyway
A1	.280" (7.1mm) Threaded with Keyway
S1	.350" (8.9mm) Threaded with Keyway

Deduct bracket thickness of .020" (0.51mm) from above dimensions

BUSHING FOR LOCKING LEVERS

L2	Smooth with Keyway for Lever Lock
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CONTACT MATERIALS & RATINGS

W	Silver; Rated 6A @ 125V AC & 3A @ 250V AC
G	Gold; Rated 0.4VA max @ 28V AC/DC max
A	Gold over Silver; Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max

TERMINALS

With Bracket	
13	.250" (6.35mm) Straight PC with .465" (11.8mm) Bracket
15	.425" (10.8mm) Straight PC with .630" (16.0mm) Bracket
17	.964" (24.5mm) Straight PC with 1.150" (29.2mm) Bracket
With Reinforced Bracket	
23	.250" (6.35mm) Straight PC with .465" (11.8mm) Bracket
25	.425" (10.8mm) Straight PC with .630" (16.0mm) Bracket
26	.750" (19.05mm) Straight PC with .953" (24.2mm) Bracket

OPTIONAL CAPS

B	For S Bat Toggle
C	Conical Cap for S Bat Toggle

For Locking Lever

Supplied with nickel plated cap as standard

CAP COLORS

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue

Optional Aluminum Caps

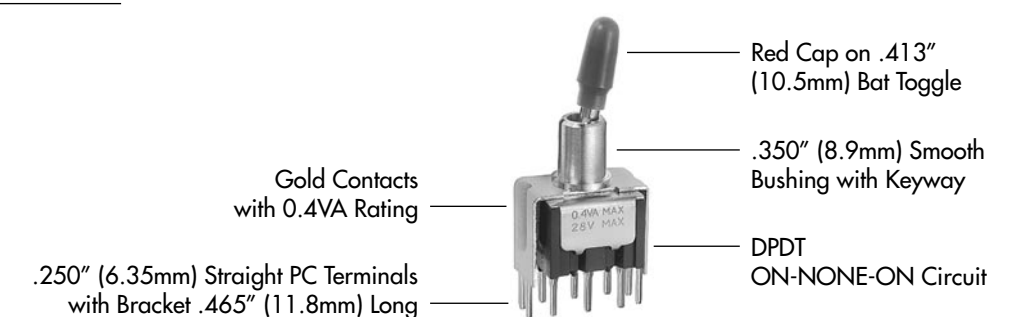
A	Black
C	Red
G	Blue
H	Gray

Standard Toggle & Bushing Combinations:
S2 & S2A2

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2022SS2G13-BC

IMPORTANT:
Switches are supplied without UL, C-UL & CSA marking unless specified. Specific models & ratings noted on General Specifications page.



POLES & CIRCUITS

Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Down <small>Keyway</small>	Center	Up	Down <small>Keyway</small>	Center	Up	
SP	M2012 M2013 M2015 M2018 M2019	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	2-3 <small>Keyway</small>	OPEN	2-1	SPDT
DP	M2022 M2023 M2025 M2028 M2029	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	2-3 5-6 <small>Keyway</small>	OPEN	2-1 5-4	DPDT

For 3 Throw (3-On)

Pole	Model	Connected Terminals & Schematics			External Connection
		Down	Center	Up	
SP	M2024 M2026 M2027	ON (ON) ON 	ON ON ON 	ON (ON) (ON) 	The SP3T model utilizes a double pole base. External connection must be made during field installation.

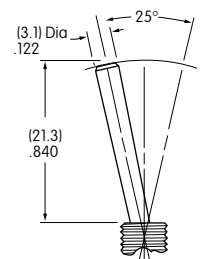
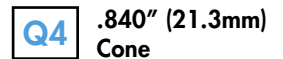
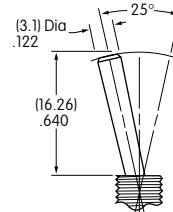
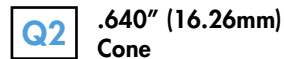
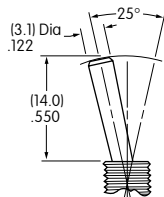
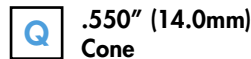
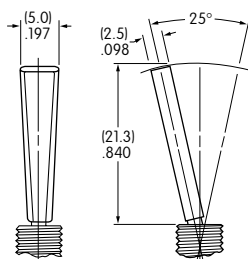
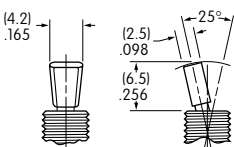
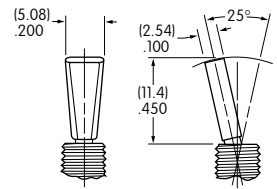
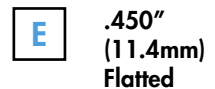
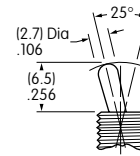
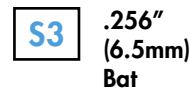
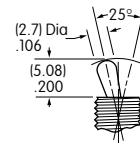
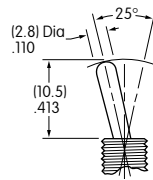
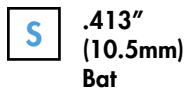
SMALL TOGGLES

Important:

Toggle length changes based on bushing selected. All illustrations are shown with .350" (8.9mm) long bushing. When using a .280" (7.1mm) long bushing, toggle length increases .070" (1.78mm).

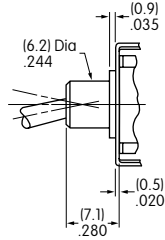
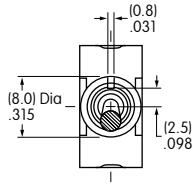
Standard Material & Finish:

Brass with Bright Chrome
Contact factory for optional finishes.

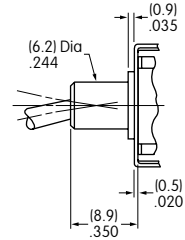
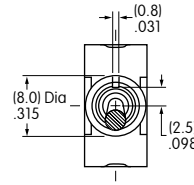


SMALL BUSHINGS

A2 .280" (7.1mm)
Smooth with Keyway

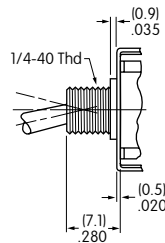
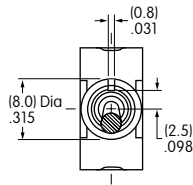


S2 .350" (8.9mm)
Smooth with Keyway

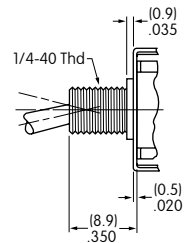
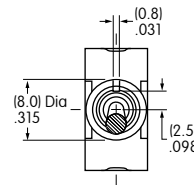


When using this bushing, toggle length is increased by .070" (1.78mm).

A1 .280" (7.1mm)
Threaded with Keyway



S1 .350" (8.9mm)
Threaded with Keyway

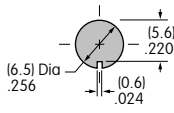


When using this bushing, toggle length is increased by .070" (1.78mm). Maximum Panel Thickness with Standard Hardware: .031" (0.8mm)

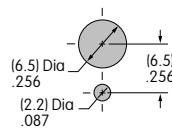
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

Panel Cutouts

For A2, S2, A1, or S1 Bushing with Keyway



For A1 or S1 Bushing with Locking Ring



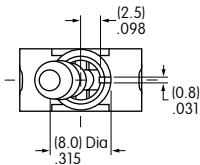
Standard Hardware:

- 2 Hex Nuts (AT513H)
- 1 Lockwasher (AT509)
- 1 Locking Ring (AT507H)

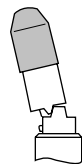
For dimensions, see Accessories & Hardware section.

LOCKING LEVER & BUSHING

LL2 Smooth with Keyway



Cap for Locking Lever



Supplied with Cap AT427
Material & Finish:

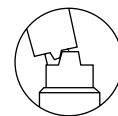
Brass with Nickel Plating

Lever Material & Finish:

Brass with Chrome Plating

Locking Mechanism

on-none-on

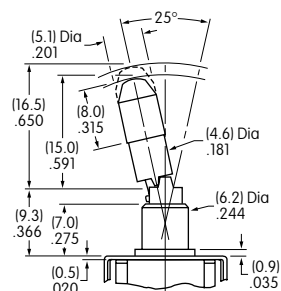


2 positions lock

on-none-(on)



1 position locks



Color Codes for Optional Anodized Aluminum Caps



Black



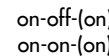
Blue



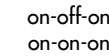
Red



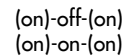
Gray (natural aluminum)



on-off-(on)
on-on-(on)
2 positions lock



on-off-on
on-on-on
3 positions lock



(on)-off-(on)
(on)-on-(on)
1 position locks

CONTACT MATERIALS & RATINGS

W

Silver over Silver

Power Level

6A @ 125V AC & 3A @ 250V AC

G

Gold over Brass or Copper

Logic Level

0.4VA maximum @ 28V AC/DC maximum

Note: See Supplement section to find complete explanation of operating range.

A

Gold over Silver

Power Level
or Logic Level

6A @ 125V AC
or 0.4VA maximum @ 28V AC/DC maximum

Note: This dual rated option is suitable when two or more identical switches are used in logic and in power circuits within the same application. See Supplement section to find complete explanation of dual rating and operating range.

TERMINALS

Straight PC Mount with Bracket

Straight PC Mount with Reinforced Bracket

13

.250" (6.35mm)
Terminal with
.465" (11.8mm)
Bracket

15

.425" (10.8mm)
Terminal with
.630" (16.0mm)
Bracket

17

.964" (24.5mm)
Terminal with
1.150" (29.2mm)
Bracket

23

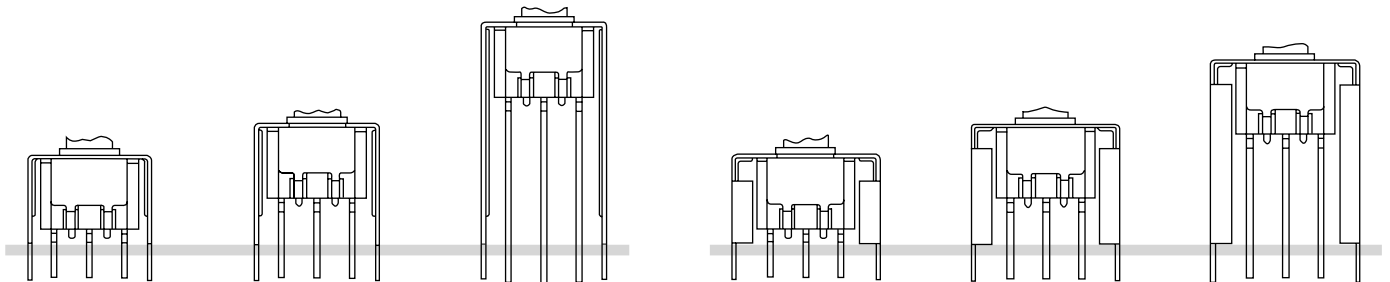
.250" (6.35mm)
Terminal with
.465" (11.8mm)
Bracket

25

.425" (10.8mm)
Terminal with
.630" (16.0mm)
Bracket

26

.750" (19.05mm)
Terminal with
.953" (24.2mm)
Bracket



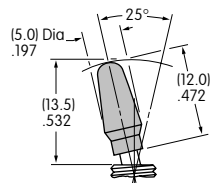
PCB footprints are on the following Typical Switch Dimension page.

OPTIONAL CAPS & CAP COLORS

B

AT415
for S Bat Toggle

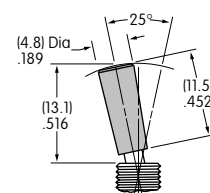
Material:
Polyethylene



C

AT444
Conical Cap for
S Bat Toggle

Material:
Polyethylene



Cap Colors
Available:

A

Black

B

White

C

Red

E

Yellow

F

Green

G

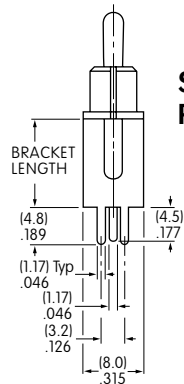
Blue

TYPICAL SWITCH DIMENSIONS

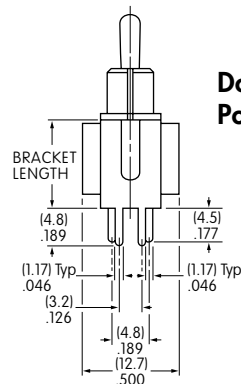
Straight PC • Bracket



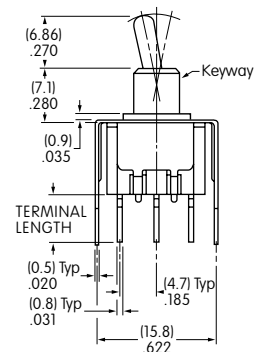
M2012S2A2G13



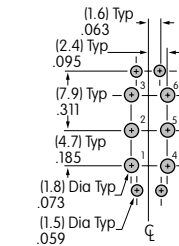
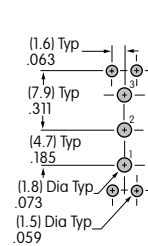
Single Pole



Double Pole



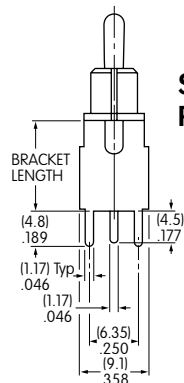
Terminal Code:	Terminal Length:	Bracket Length:
13	.250" (6.35mm)	.465" (11.8mm)
15	.425" (10.8mm)	.630" (16.0mm)
17	.964" (24.5mm)	1.150" (29.2mm)



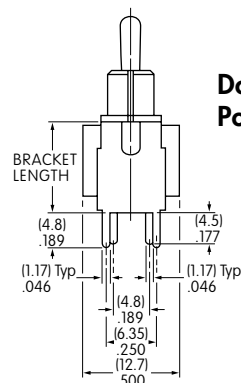
Straight PC • Reinforced Bracket



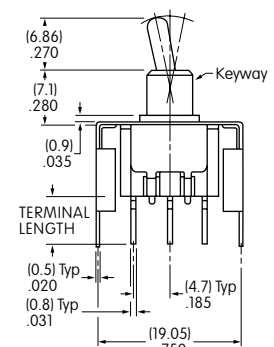
M2012S2A2G23



Single Pole



Double Pole



Terminal Code:	Terminal Length:	Bracket Length:
23	.250" (6.35mm)	.465" (11.8mm)
25	.425" (10.8mm)	.630" (16.0mm)
26	.750" (19.05mm)	.953" (24.2mm)

