General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver): 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 (gold): 0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Logic/Power Level (gold over silver): Combines silver & gold 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
Angle of Throw: 25°

Materials & Finishes

Toggle: Brass with chrome plating
Bushing: Brass with nickel 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
Frame: Stainless steel
Support Bracket: Brass with tin 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/s^2) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)
Sealing: Splashproof bushing options B3, D3, D8, L3, & L8, which have o-rings inside & outside the bushing, 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: **File No. E44145 - Recognized only when ordered with marking on switch.**
Add "/U" or "/CUL" before dash in part number to order UL recognized switch.
All models recognized at 6A @ 125V AC, 3A @ 250V AC or 0.4VA maximum @ 28V DC maximum.
CSA: **File No. 023535_0_000 - Certified only when ordered with marking on switch.**
Add "/C" before dash in part number to order CSA certified switch.
All models certified at 6A @ 125V AC or 3A @ 250V AC or 0.4VA maximum @ 28V maximum.

Distinctive Characteristics

Antirotation design, standard on noncylindrical levers, mates toggle and bushing; bottom of toggle has two flatted 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.

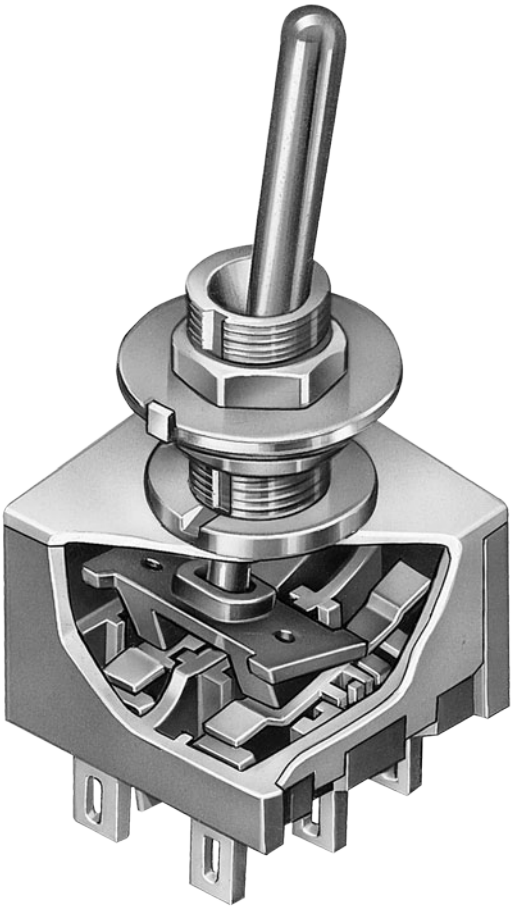
Molded diallyl phthalate case has a UL flammability rating of 94V-0.

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

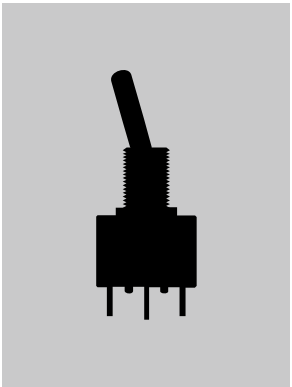
Prominent external insulating barriers increase insulation resistance and dielectric strength.

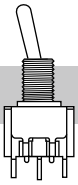
Interlocked actuator block, lever, and interior guide prevent switch failure due to biased lever movement.

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

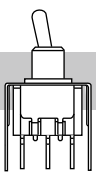


Actual Size

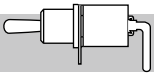




Bushing Mount Page A48



Bracket PC Mount Page A60



Angle PC Mount Page A66

TYPICAL SWITCH

M20 2 2 S S2

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

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

Locking Lever

L	.201″ (5.1mm) Dia. Locking Lever

Bushing For Locking Levers

L2	Smooth with Keyway for Lever Lock

Standard Toggle & Bushing Combinations:

SS2 & S2A2

IMPORTANT:

Switches are supplied without UL, cULus & CSA marking unless specified. **UL, cULus & CSA recognized only when ordered with marking on the switch.** Specific models, ratings, & ordering instructions are noted on General Specifications page.

ORDERING EXAMPLE

G 13 — B C

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

Cap for Locking Lever

No Code	Nickel Plated Supplied with Switch
A	Black
C	Red
G	Blue

Cap Colors

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

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2022SS2G13-BC

Red Cap on .413″ (10.5mm) Bat Toggle

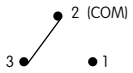
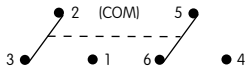
.350″ (8.9mm) Smooth Bushing with Keyway

DPDT ON-NONE-ON Circuit

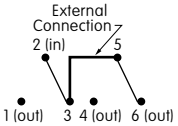
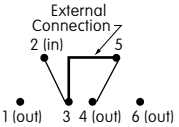
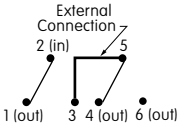
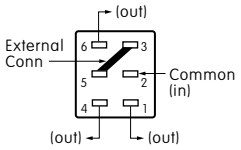
Gold Contacts with 0.4VA Rating

.250″ (6.35mm) Straight PC Terminals with Bracket .465″ (11.8mm) Long

POLES & CIRCUITS

Pole	Model	Toggle Position ( ) = Momentary: Down	Center	Up	Connected Terminals: Down	Center	Up	Throw & Schematics
		Keyway			Keyway			Note: Terminal numbers are not actually on the switch.
SP	M2012 M2013 M2015 M2018 M2019	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	2-3	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	OPEN	2-1 5-4	DPDT 

For 3 Throw (3-On)

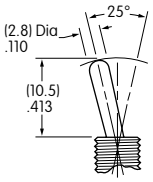
Pole	Model	Connected Terminals & Schematics: Down	Center	Up	External Connection
SP	M2024 M2026 M2027	ON (ON) ON	ON ON ON	ON (ON) (ON)	**The SP3T model utilizes a double pole base.**
					External connection must be made during field installation. 
		2-3 5-6	2-3 5-4	2-1 5-4	

SMALL TOGGLES

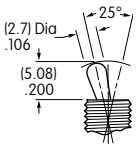
Important:
Toggle length changes based on bushing selected. All illustrations are shown with .350" (8.9mm) long bushing. When using a .280" (7.1mm) long bushing, toggle length increases .070" (1.78mm).

Standard Material & Finish:
Brass with Bright Chrome
Contact factory for optional finishes.

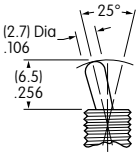
S .413" (10.5mm) Bat



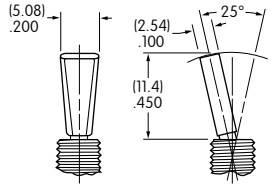
S2 .200" (5.08mm) Bat



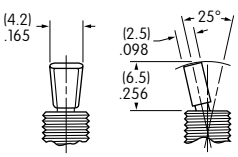
S3 .256" (6.5mm) Bat



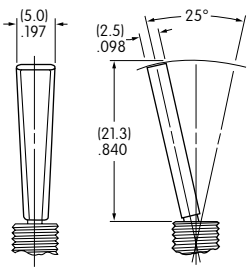
E .450" (11.4mm) Flatted



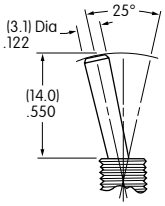
E2 .256" (6.5mm) Flatted



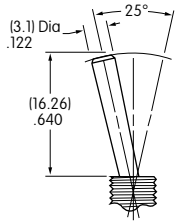
E4 .840" (21.3mm) Flatted



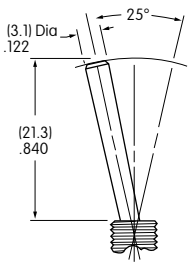
Q .550" (14.0mm) Cone



Q2 .640" (16.26mm) Cone

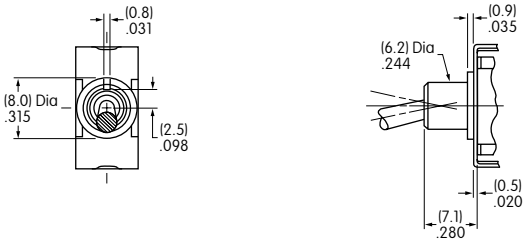


Q4 .840" (21.3mm) Cone



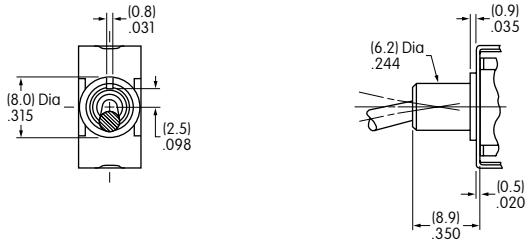
SMALL BUSHINGS

A2 .280" (7.1mm) Smooth with Keyway

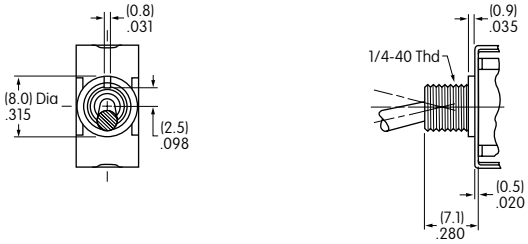


When using this bushing, toggle length is increased by .070" (1.78mm).

S2 .350" (8.9mm) Smooth with Keyway

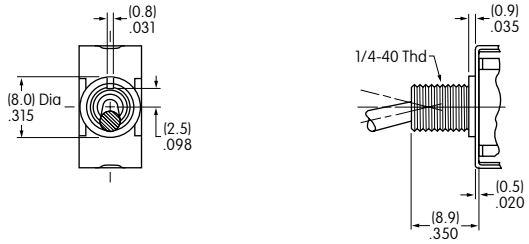


A1 .280" (7.1mm) Threaded with Keyway



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

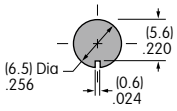
S1 .350" (8.9mm) Threaded with Keyway



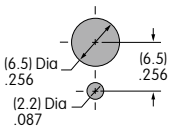
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

Panel Cutouts

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



For A1 or S1 Bushing with Locking Ring



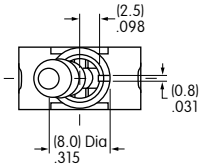
Standard Hardware:

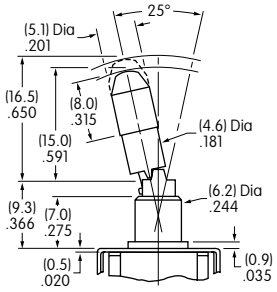
2 Hex Nuts (AT513H)
1 Lockwasher (AT509)
1 Locking Ring (AT507H)

For dimensions, see Accessories & Hardware section.

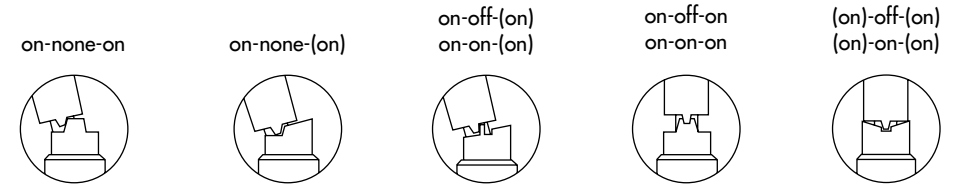
LOCKING LEVER & BUSHING

LL2 Smooth with Keyway



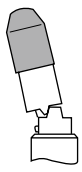


Locking Mechanism



2 positions lock | 1 position locks | 2 positions lock | 3 positions lock | 1 position locks

No Code



Cap for Locking Lever

Supplied with Cap AT427
Material & Finish:
Brass with Nickel Plating

Lever Material & Finish:
Brass with Chrome Plating

Color Codes for Optional Anodized Aluminum Caps

A Black
C Red
G Blue

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

13
.250" (6.35mm) Terminal with .465" (11.8mm) Bracket

15
.425" (10.8mm) Terminal with .630" (16.0mm) Bracket

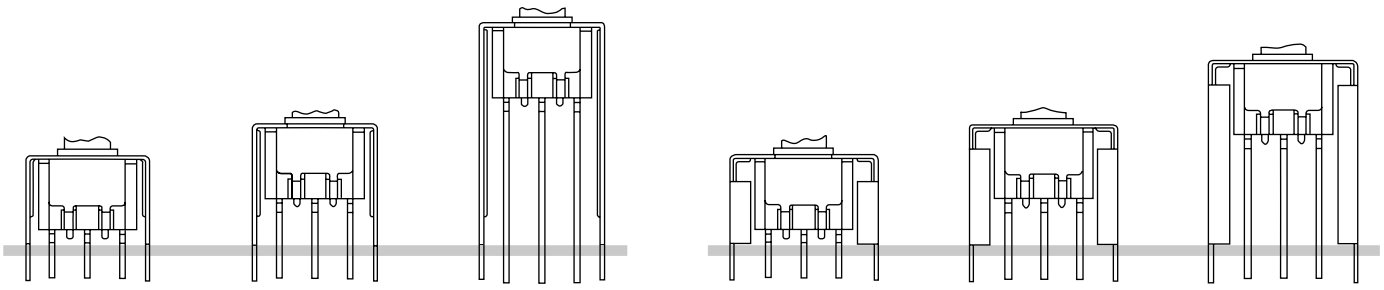
17
.964" (24.5mm) Terminal with 1.150" (29.2mm) Bracket

Straight PC Mount with Reinforced 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

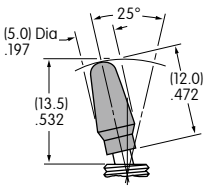


PCB footprints are on the following Typical Switch Dimension page.

OPTIONAL CAPS & CAP COLORS

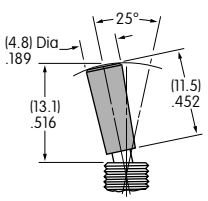
B **AT415 for S Bat Toggle**

Material:
Polyethylene



C **AT444 Conical Cap for S Bat Toggle**

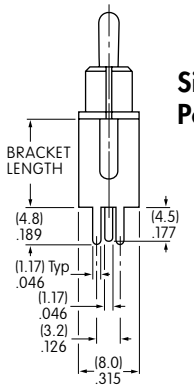
Material:
Polyethylene

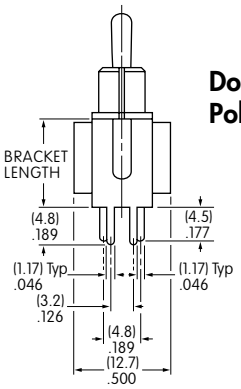


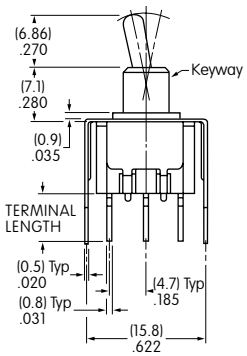
Cap Colors Available: A Black, B White, C Red, E Yellow, F Green, G Blue

TYPICAL SWITCH DIMENSIONS

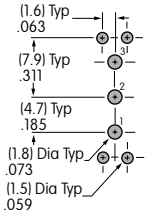
Straight PC • Bracket

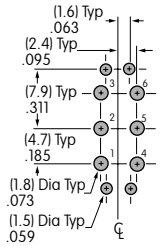






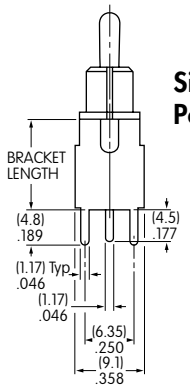
M2012S2A2G13

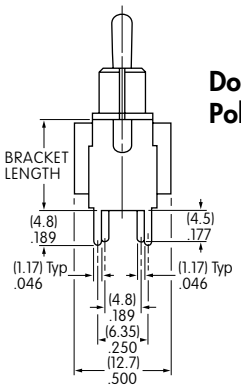


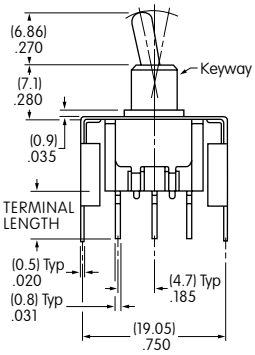


Terminal Code:	Terminal Length:	Bracket Length:
13	.250″ (6.35mm)	.465″ (11.8mm)
15	.425″ (10.8mm)	.630″ (16.0mm)
17	.964″ (24.5mm)	1.150″ (29.2mm)

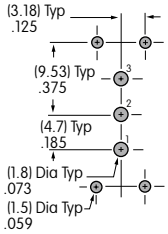
Straight PC • Reinforced Bracket

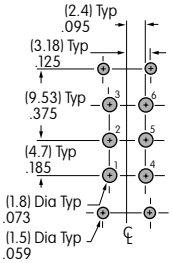






M2012S2A2G23





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)