

A 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/s²) 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 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.

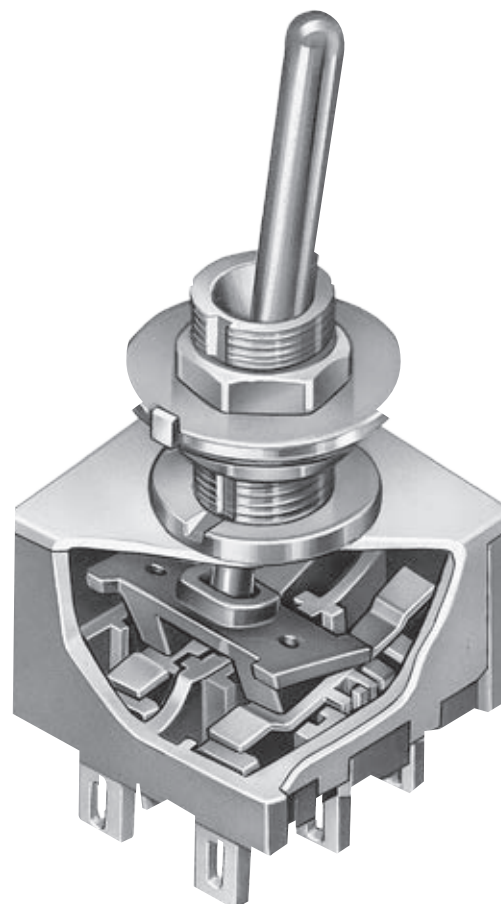
Molded diallyl phthalate case has a UL flammability rating of 94V-0.

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

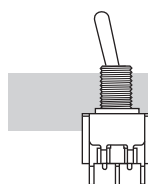
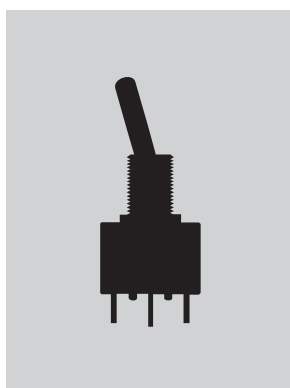
Prominent external insulating barriers increase insulation resistance and dielectric strength.

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.

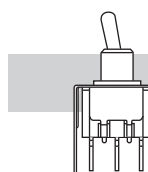


Actual Size



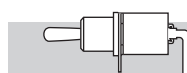
Bushing Mount

Page A52



Bracket PC Mount

Page A64



Angle PC Mount

Page A70

A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH

M20

1

3

S

S1

Poles

1	SPST SPDT
2	DPST DPDT SP3T
3	3PDT
4	4PDT DP3T

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
* C	.571" (14.5mm) Color Tipped Cone (available in colors A, B & C only)
D	.840" (21.3mm) Color Capped Cone

Specify cap color for toggles C & D
at the end of the part number.

* Available on 1- and 2-pole only.

Small Bushings

S1	.350" (8.9mm) Threaded with Keyway
S4	6mm .350" (8.9mm) Threaded with Keyway
S2	.350" (8.9mm) Smooth with Keyway
A1	.280" (7.1mm) Threaded with Keyway
A2	.280" (7.1mm) Smooth with Keyway
D1	.350" (8.9mm) Threaded with D Flat
D4	6mm .350" (8.9mm) Threaded with D Flat
D3	.350" (8.9mm) Threaded Splashproof with D Flat (combines only with S, S2 & S3)
D8	6mm .350" (8.9mm) Threaded Splashproof with D Flat (combines only with S, S2 & S3)

Circuits

* 1	ON	NONE	OFF
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

* ON-NONE-OFF circuit available in 1- and 2-pole only.

** 3-ON circuits

Large Toggles

B	.453" (11.5mm) Large Bat
B2	.689" (17.5mm) Large Bat
R	.610" (15.5mm) Large Flatted

Large Bushings

B1	Large .472" (12mm) Threaded with Keyway
B3	Large .472" (12mm) Threaded Splashproof with D Flat

Locking Lever

L	.201" (5.1mm) Dia. Locking Lever
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Bushings For Locking Levers

L1	.291" (7.4mm) Threaded with Keyway for Lever Lock
L4	6mm .291" (7.4mm) Threaded with Keyway for Lever Lock
L2	Smooth with Keyway for Lever Lock
L3	.295" (7.5mm) Threaded Splashproof with D Flat for Lever Lock
L8	6mm .295" (7.5mm) Threaded Splashproof with D Flat for Lever Lock

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 the General Specifications page.

ORDERING EXAMPLE

W

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

01

Terminals	
01	Solder Lug
02	Quick Connect
03	.250" (6.35mm) Straight PC
05	.425" (10.8mm) Wirewrap
06	.750" (19.05mm) Wirewrap
07	.964" (24.5mm) Wirewrap
08	1.062" (27.0mm) Wirewrap

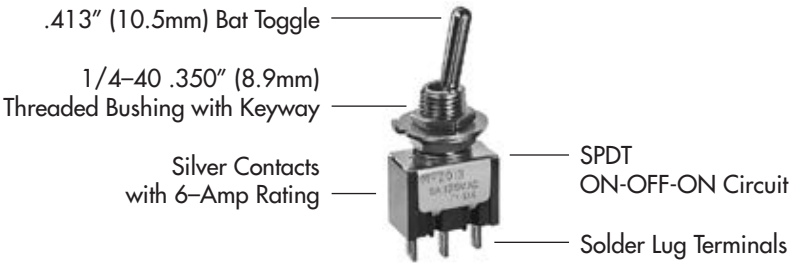
Optional Caps	
For Small Bat Toggles	
B	For S Bat Toggle
C	Conical Cap for S Bat Toggle
For Large Bat Toggles	
R	For B Toggle
V	For B2 Toggle

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

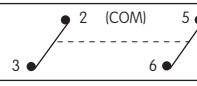
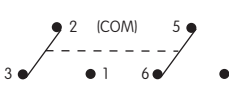
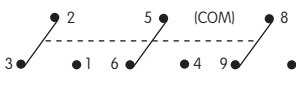
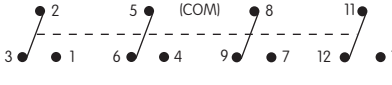
Cap for Locking Lever	
No Code	Nickel Plated Supplied with Switch
A	Black
C	Red
G	Blue

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2013SS1W01

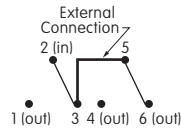
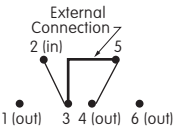
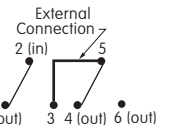
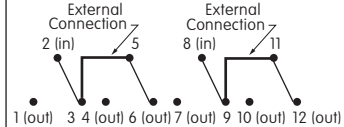
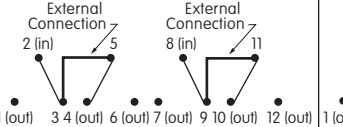
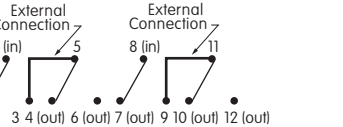


POLES & CIRCUITS

Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Down 	Center 	Up 	Down 	Center 	Up 	
SP	M2011	ON	NONE	OFF	2-3	OPEN	OPEN	SPST 
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	M2021	ON	NONE	OFF	2-3 5-6	OPEN	OPEN	DPST 
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 
3P	M2032 M2033 M2035 M2038 M2039	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	2-3 5-6 8-9	OPEN	2-1 5-4 8-7	3PDT 
4P	M2042 M2043 M2045 M2048 M2049	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	2-3 5-6 8-9 11-12	OPEN	2-1 5-4 8-7 11-10	4PDT 

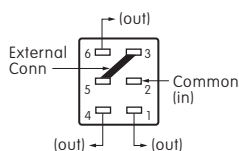
For 3 Throw (3-On)

Connected Terminals & Schematic

Pole	Model	Down	Center	Up	Down	Center	Up
SP	M2024 M2026 M2027	ON (ON) ON	ON ON ON	ON (ON) (ON)	 2-3 5-6	 2-3 5-4	 2-1 5-4
DP	M2044 M2046 M2047	ON (ON) ON	ON ON ON	ON (ON) (ON)	 2-3 5-6 8-9 11-12	 2-3 5-4 8-9 11-10	 2-1 5-4 8-7 11-10

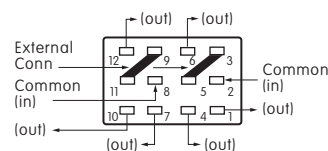
The SP3T model utilizes a double pole base.

External connection must be made during field installation.



The DP3T model utilizes a four pole base.

External connection must be made during field installation.



SMALL TOGGLES

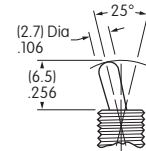
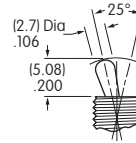
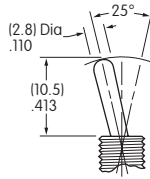
S .413" (10.5mm)
Bat

S2 .200" (5.08mm)
Bat

S3 .256" (6.5mm)
Bat

Important:

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



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

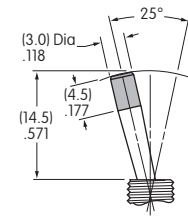
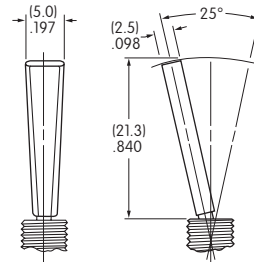
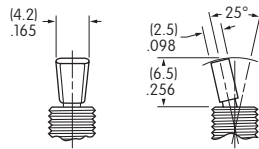
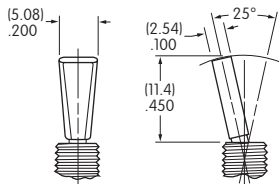
E .450" (11.4mm)
Flatted

E2 .256" (6.5mm)
Flatted

E4 .840" (21.3mm)
Flatted

C .571" (14.5mm)
Color Tipped Cone
Supplied with Cap AT445

Colors: A B C
Material: Polycarbonate



Only Available in 1- & 2-Pole

Only Available in 1- & 2-Pole

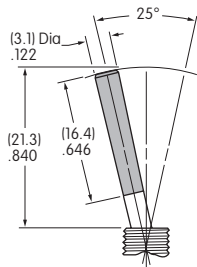
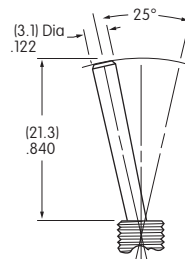
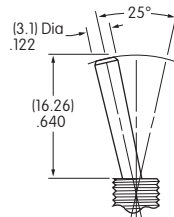
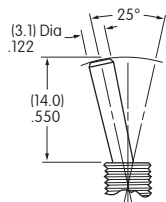
Q .550" (14.0mm)
Cone

Q2 .640" (16.26mm)
Cone

Q4 .840" (21.3mm)
Cone

D .840" (21.3mm)
Color Capped Cone
Supplied with Cap AT460

Colors: A B C E F G
Material: Polyethylene



Only Available in 1- & 2-Pole

Only Available in 1- & 2-Pole

Only Available in 1- & 2-Pole

Cap Colors Available:

A Black

B White

C Red

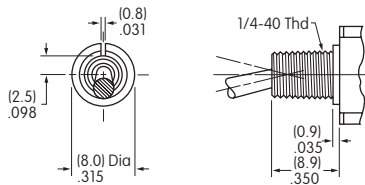
E Yellow

F Green

G Blue

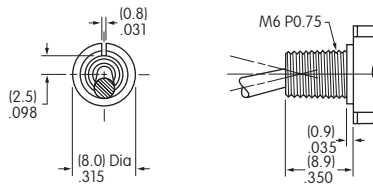
SMALL BUSHINGS

S1 1/4-40 .350" (8.9mm) Threaded with Keyway



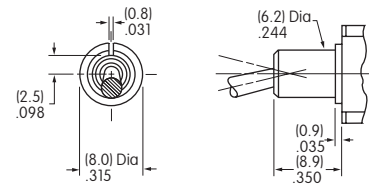
Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

S4 6mm/.350" (8.9mm) Threaded with Keyway

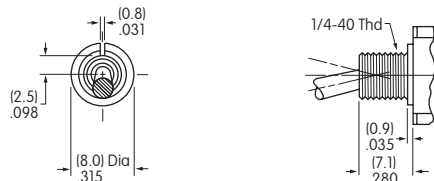


Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

S2 .350" (8.9mm) Smooth with Keyway

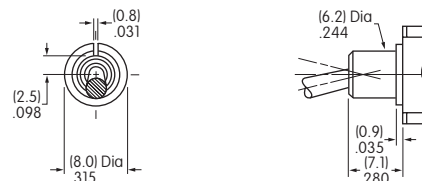


A1 1/4-40 .280" (7.1mm) Threaded with Keyway



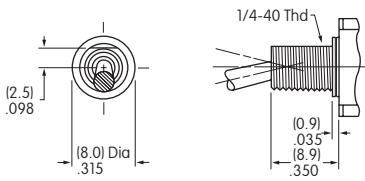
When using this bushing, toggle length is
increased by .070". Maximum Panel Thickness
with Standard Hardware: .031" (0.8mm)

A2 .280" (7.1mm) Smooth with Keyway



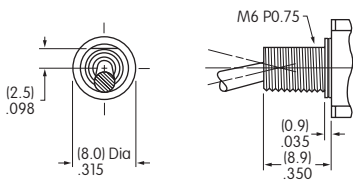
When using this bushing, toggle
length is increased by .070".

D1 1/4-40 .350" (8.9mm) Threaded with D Flat



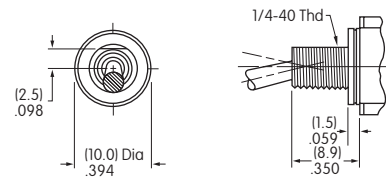
Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

D4 6mm/.350" (8.9mm) Threaded with D Flat



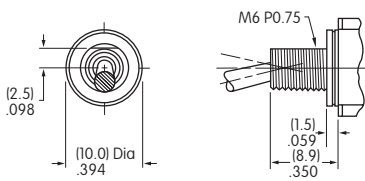
Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

D3 1/4-40 .350" (8.9mm) Threaded Splashproof with D Flat



D3 combines only with S, S2 & S3 toggles.
Maximum Panel Thickness with
Standard Hardware: .193" (4.9mm)

D8 6mm/.350" (8.9mm) Threaded Splashproof with D Flat

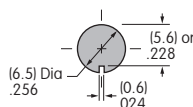


D8 combines only with S, S2 & S3 toggles.
Maximum Panel Thickness with
Standard Hardware: .193" (4.9mm)

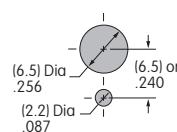
Standard Hardware Supplied for Small Bushings

Bushing Codes	S1/S4	A1	D1/D4	D3/D8	L1/L4	L3/L8
Hex Nut	2	2	2	1	2	1
Locking Ring	1	1	0	0	1	0
Lockwasher	1	1	1	0	1	0
O-ring	0	0	0	1	0	1

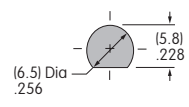
For S1, S2, A1, A2
or S4 Bushing with
Keyway & for L1
or L4 Bushing



For S1, A1 or
S4 Bushing with
Locking Ring & for
L1 or L4 Bushing



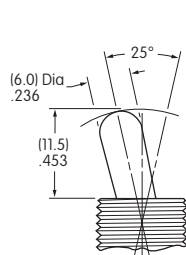
For D1, D4, D3 or
D8 Bushing with
D Flat & for L3
or L8 Bushing



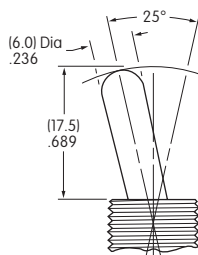
LARGE TOGGLES

Toggle & Bushing Combinations: These toggles combine with the 12mm bushings B1 & B3.

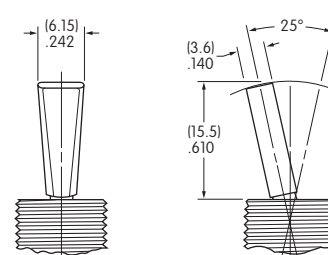
B .453" (11.5mm)
Large Bat



B2 .689" (17.5mm)
Large Bat



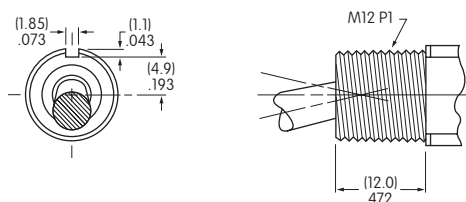
R .610" (15.5mm)
Large Flatted



Standard Material & Finish: Brass with Bright Chrome
Optional Finishes: Contact factory for satin chrome or black.

LARGE BUSHINGS

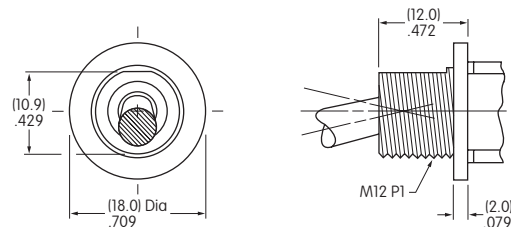
B1 Large .472" (12.0mm)
Threaded with Keyway



Maximum Panel Thickness with
Standard Hardware: .216" (5.5mm)

Standard Hardware for B1:
1 hex face nut AT503M, 1 locking ring AT506M,
1 lockwasher AT508, and 1 hex backup nut AT527M

B3 Large .472" (12.0mm)
Threaded Splashproof with D Flat

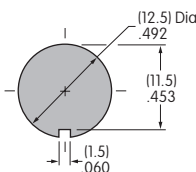


Maximum Panel Thickness with
Standard Hardware: .256" (6.5mm)

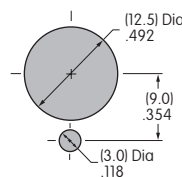
Standard Hardware for B3:
1 hex face nut AT503M
and 1 o-ring AT401P

Panel Cutouts

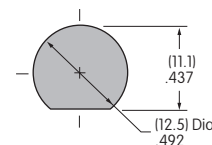
**For B1 Bushing
with Keyway**



**For B1 Bushing
with Locking Ring**

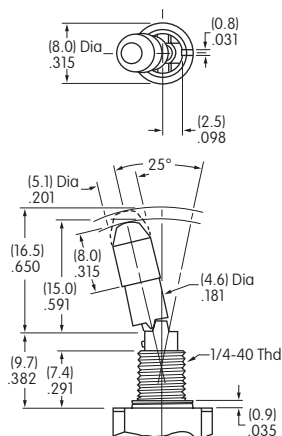


**For B3 Bushing
with D Flat**

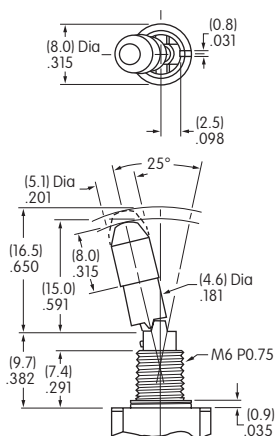


LOCKING LEVER & BUSHINGS

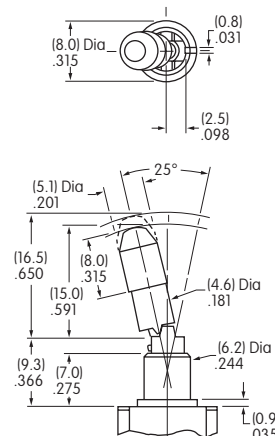
LL1 1/4-40 .291" (7.4mm) Threaded with Keyway



LL4 6mm/.291" (7.4mm) Threaded with Keyway

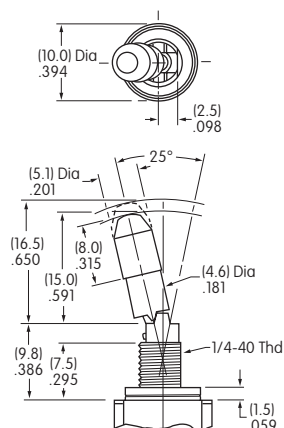


LL2 Smooth with Keyway

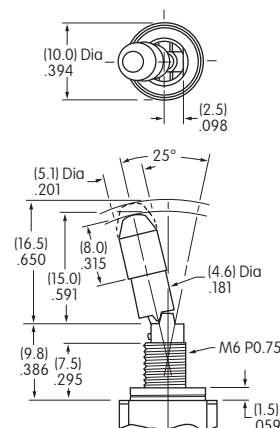


Maximum Panel Thickness with Standard Hardware: .047" (1.2mm)
Standard Hardware for L1 & L4: 2 hex nuts AT513H or AT513M,
1 locking ring AT507H or AT507M, and 1 lockwasher AT509

LL3 1/4-40 .295" (7.5mm) Threaded Splashproof with D Flat



LL8 6mm/.295" (7.5mm) Threaded Splashproof with D Flat



Maximum Panel Thickness with Standard Hardware: .047" (1.2mm)
Standard Hardware for L3 and L8: 1 hex nut AT513H or AT513M and 1 o-ring AT516

Lever Material & Finish: Brass with Chrome Plating

Locking Mechanism

on-none-on



2 positions lock

on-none-(on)



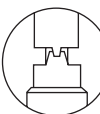
1 position locks

on-off-(on)
on-on-(on)



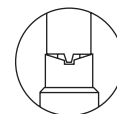
2 positions lock

on-off-on
on-on-on



3 positions lock

(on)-off-(on)
(on)-on-(on)

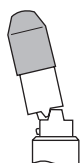


1 position locks

No Code

Supplied with Cap AT427

Cap Material:
Brass with Nickel Plating



Lever

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

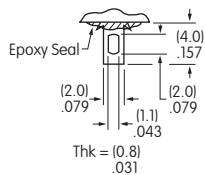
6A @ 125V AC
or 0.4VA maximum @ 28V AC/DC maximum

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

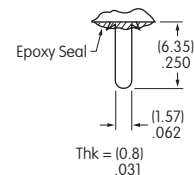
01

Solder Lug



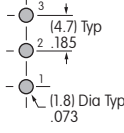
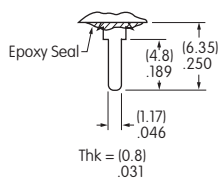
02

.062" (1.57mm) Wide Quick Connect

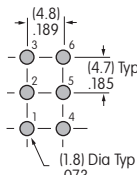


03

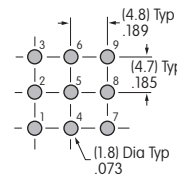
.250" (6.35mm) Straight PC



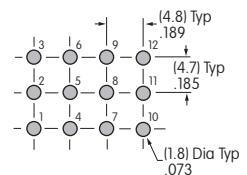
Single Pole



Double Pole



Three Pole



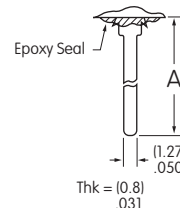
Four Pole

05

.425" (10.8mm) Wirewrap or Extended PC

07

.964" (24.5mm) Wirewrap or Extended PC



06

.750" (19.05mm) Wirewrap or Extended PC

08

1.062" (27.0mm) Wirewrap or Extended PC

If using as extended PC terminal, refer to the above footprints.

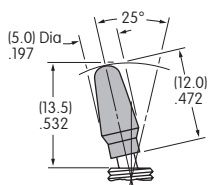
Dimension A = terminal lengths as shown beside the terminal codes at the left.

OPTIONAL CAPS & CAP COLORS

B

* AT415 Lever Cap for S Bat Toggle

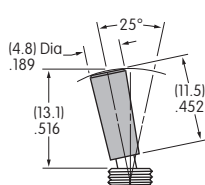
Material: Polyethylene



C

* AT444 Conical Cap for S Bat Toggle

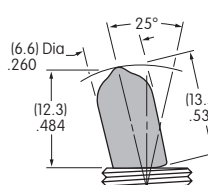
Material: Polyethylene



R

AT434 Lever Cap for B Toggle

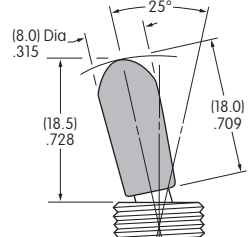
Material: Polyvinyl Chloride



V

AT406 Lever Cap for B2 Toggle

Material: Polyvinyl Chloride



* AT415 and AT444 for use with S toggles only, not S2 or S3 toggles.

Cap Colors Available:

A

Black

B

White

C

Red

E

Yellow

F

Green

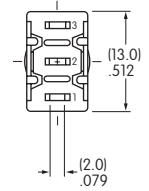
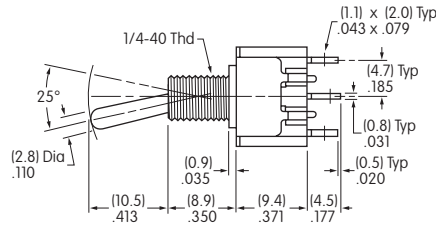
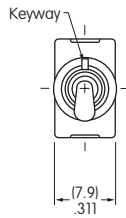
G

Blue

TYPICAL SWITCH DIMENSIONS

Solder Lug

Single Pole

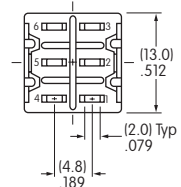
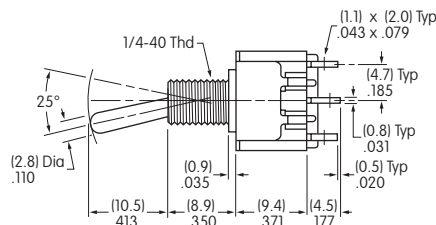
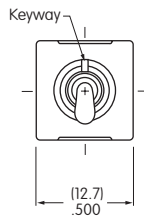


M2012SS1W01

M2011 model does not have terminal 1.

Solder Lug

Double Pole

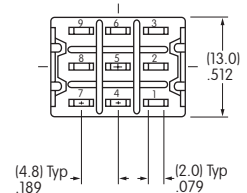
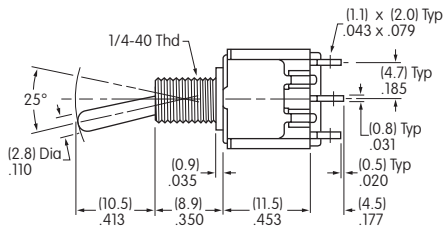
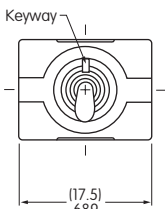


M2022SS1W01

M2021 model does not have terminals 1 & 4.

Solder Lug

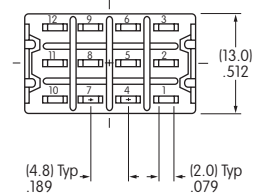
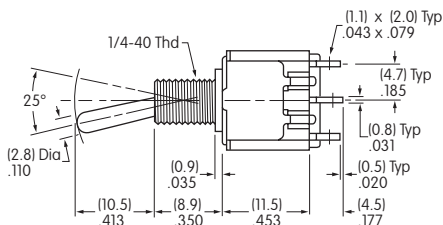
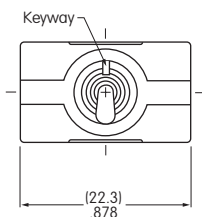
Three Pole



M2032SS1W01

Solder Lug

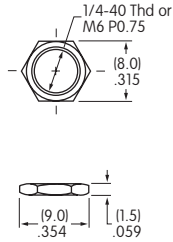
Four Pole



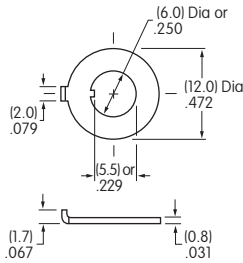
M2042SS1W01

STANDARD HARDWARE FOR SMALL & LARGE BUSHINGS

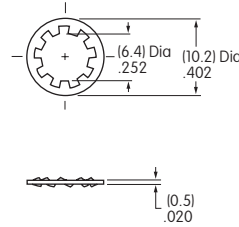
AT513H for Inch
AT513M for Metric
Hex Nut
Brass/Nickel



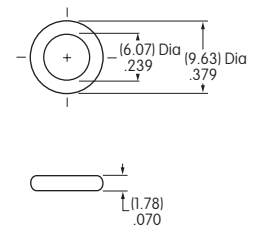
AT507H for Inch
AT507M for Metric
Locking Ring
Steel with Zinc/Chromate



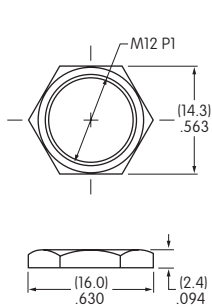
AT509
Lockwasher
Steel with Zinc/Chromate
(not supplied with splashproof models)



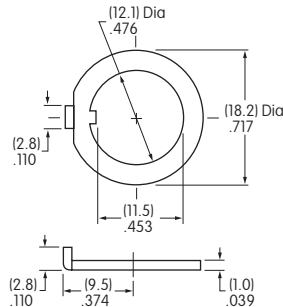
AT516
O-ring for
Splashproof Models
Nitrile Butadiene Rubber



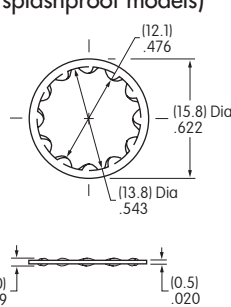
AT503M
Hex Face Nut
Brass/Chrome



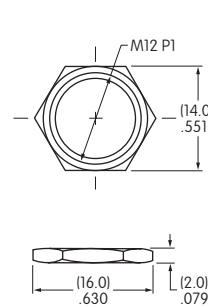
AT506M
Locking Ring
Steel with Zinc/Chromate



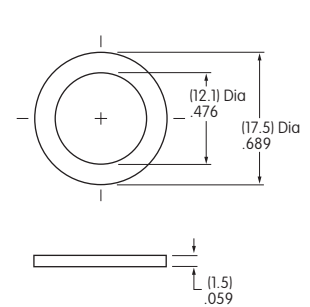
AT508
Lockwasher
Steel with Zinc/Chromate
(not supplied with splashproof models)



AT527M
Hex Nut
Steel with Nickel Plating



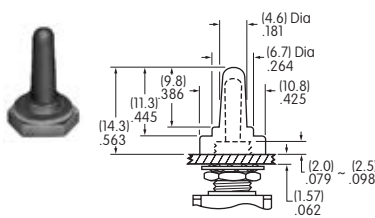
AT401P
O-ring for Splashproof Models
Nitrile butadiene rubber



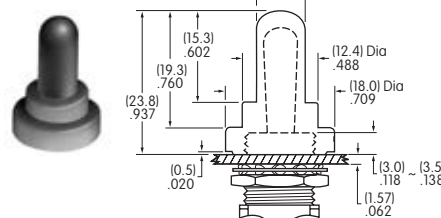
OPTIONAL SPLASHPROOF BOOTS

Various optional nuts and ON-OFF plates are available; dimensions shown in the Accessories & Hardware section.

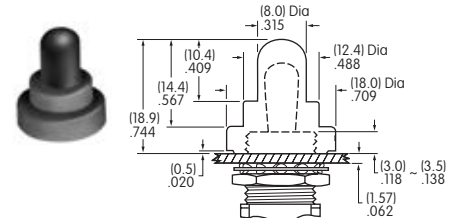
AT428 (M-metric H-Inch)
.445" (11.3mm)
Boot for S Toggle
Silicon Rubber



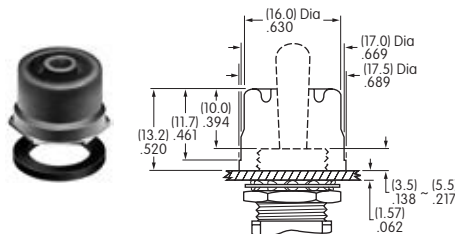
AT402
.760" (19.3mm)
Boot for B2 Toggle
Silicon Rubber



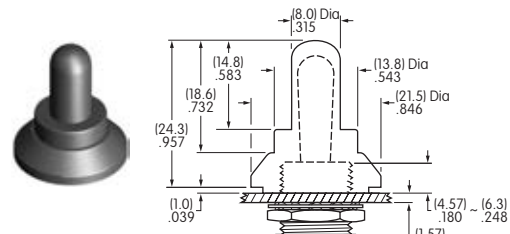
AT402S
.567" (14.4mm)
Boot for B Toggle
Silicon Rubber



AT401A/H/S
.461" (11.7mm)
Boot, Nut and O-ring for B2 Toggle
More details in Accessories section



AT4181
.732" (18.6mm)
Boot, Nut and O-ring for B2 Toggle
More details in Accessories section



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 combin-
ing with a .280" (7.1mm) bushing

Locking Lever

L	.201" (5.1mm) Dia. Locking Lever
---	----------------------------------

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
----	-----------------------------------

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 the General
Specifications page.

ORDERING EXAMPLE

G

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

13

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

B

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

C

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

Cap for Locking Lever	
No Code	Nickel Plated Supplied with Switch
A	Black
C	Red
G	Blue

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2022SS2G13-BC

Gold Contacts with 0.4VA Rating

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

Red Cap on .413" (10.5mm) Bat Toggle

.350" (8.9mm) Smooth Bushing with Keyway

DPDT ON-NONE-ON Circuit

nk switches

www.nkswitches.com

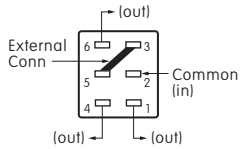
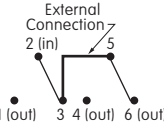
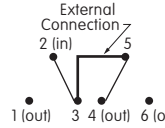
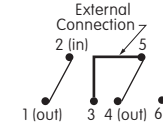
A65

A	Toggles
	Rockers
	Pushbuttons
	Illuminated PB
	Programmable
	Keylocks
	Rotaries
	Slides
	Tactiles
	Tilt
	Touch
	Indicators
	Accessories
	Supplement

POLES & CIRCUITS

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

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. 
		 2-3 5-6	 2-3 5-4	 2-1 5-4	

SMALL TOGGLES

Important:

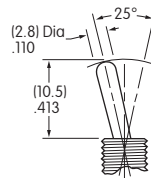
Toggle length changes based on bushing selected. All illustrations are shown with .350" (8.9mm) long bushing. When using a .280" (7.1mm) long bushing, toggle length increases .070" (1.78mm).

Standard Material & Finish:

Brass with Bright Chrome
Contact factory for optional finishes.

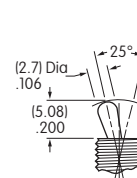
S

.413" (10.5mm)
Bat



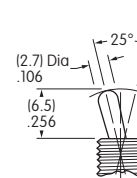
S2

.200" (5.08mm)
Bat



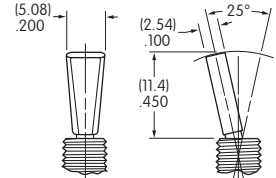
S3

.256" (6.5mm)
Bat



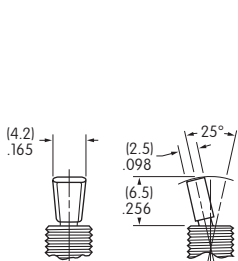
E

.450" (11.4mm)
Flatted



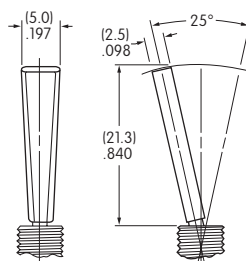
E2

.256" (6.5mm)
Flatted



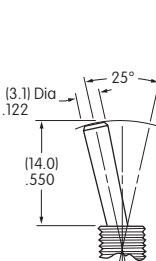
E4

.840" (21.3mm)
Flatted



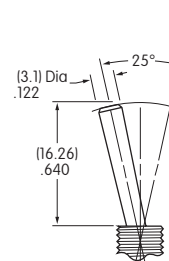
Q

.550" (14.0mm)
Cone



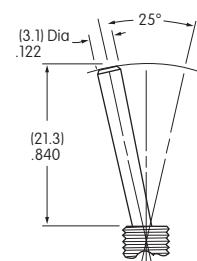
Q2

.640" (16.26mm)
Cone



Q4

.840" (21.3mm)
Cone



SMALL BUSHINGS

A Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

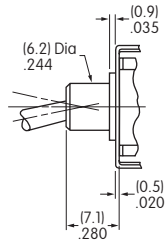
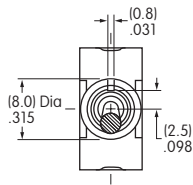
Touch

Indicators

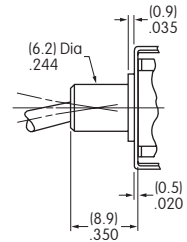
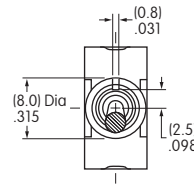
Accessories

Supplement

A2 .280" (7.1mm) Smooth with Keyway

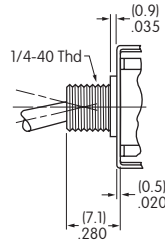
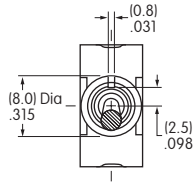


S2 .350" (8.9mm) Smooth with Keyway

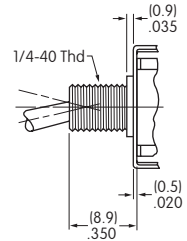
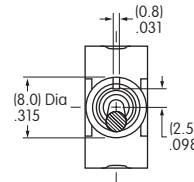


When using this bushing, toggle length is increased by .070" (1.78mm).

A1 .280" (7.1mm) Threaded with Keyway



S1 .350" (8.9mm) Threaded with Keyway

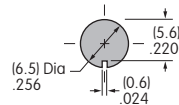


When using this bushing, toggle length is increased by .070" (1.78mm). Maximum Panel Thickness with Standard Hardware: .031" (0.8mm)

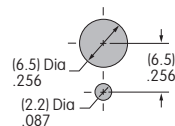
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

Panel Cutouts

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



For A1 or S1 Bushing with Locking Ring



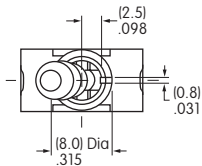
Standard Hardware:

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

For dimensions, see Accessories & Hardware section.

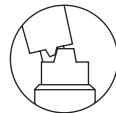
LOCKING LEVER & BUSHING

LL2 Smooth with Keyway



Locking Mechanism

on-none-on



2 positions lock

on-none-(on)



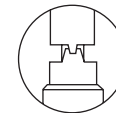
1 position locks

on-off-(on)
on-on-(on)



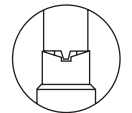
2 positions lock

on-off-on
on-on-on



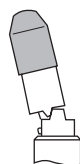
3 positions lock

(on)-off-(on)
(on)-on-(on)



1 position locks

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

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

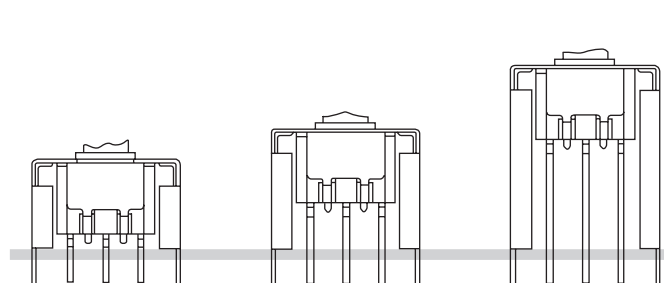
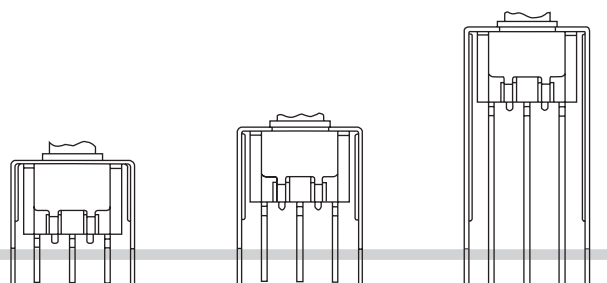
.250" (6.35mm)
Terminal with
.465" (11.8mm)
Bracket

25

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

26

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



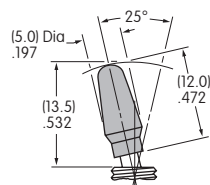
PCB footprints are on the following Typical Switch Dimension page.

OPTIONAL CAPS & CAP COLORS

B

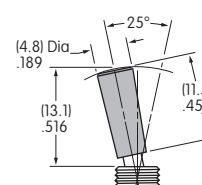
* AT415
for S Bat Toggle

Material:
Polyethylene


C

* AT444
Conical Cap for
S Bat Toggle

Material:
Polyethylene



* AT415 and AT444 for use with S toggles only, not S2 or S3 toggles.

Cap Colors
Available:

A

Black

B

White

C

Red

E

Yellow

F

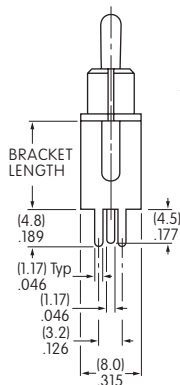
Green

G

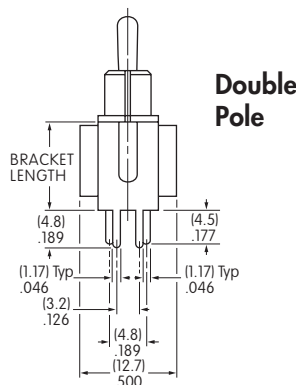
Blue

TYPICAL SWITCH DIMENSIONS

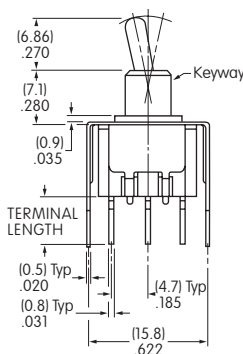
Straight PC • Bracket



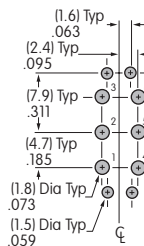
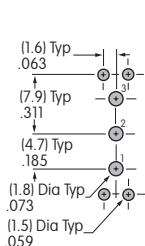
Single Pole



Double Pole

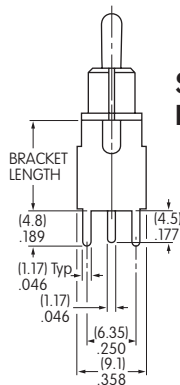


M2012S2A2G13

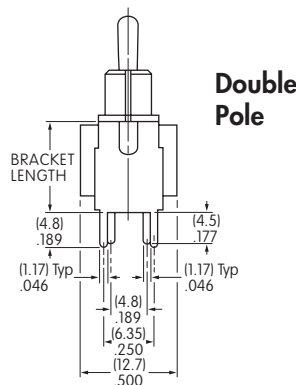


Terminal Code:	Terminal Length:	Bracket Length:
13	.250" (6.35mm)	.465" (11.8mm)
15	.425" (10.8mm)	.630" (16.0mm)
17	.964" (24.5mm)	1.150" (29.2mm)

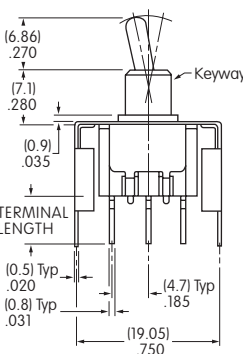
Straight PC • Reinforced Bracket



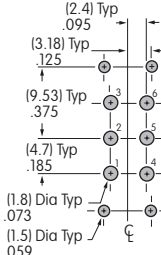
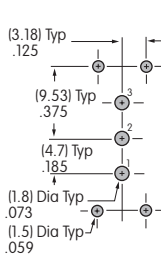
Single Pole



Double Pole



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)

TYPICAL SWITCH

M20

1

2

S2

A2

Poles

1	SPDT
2	DPDT SP3T
3	3PDT
*4	4PDT DP3T

*4-pole available
on vertical
models only.

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

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

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 available
with double and
four pole bases only

Locking Lever

L	.201" (5.1mm) Dia. Locking Lever
---	----------------------------------

Bushing For Locking Levers

L2	Smooth with Keyway for Lever Lock
----	-----------------------------------

Standard Toggle, Bushing, & Terminal Combinations:

S2A2G30, S2A2G40, SS2G30, SS2G40,
LL2G30, & LL2G40

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 the General
Specifications page.

ORDERING EXAMPLE

G

40

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	
30	.150" (3.81mm) Right Angle PC (1-3 Pole)
32	Right Angle PCB (1 Pole & 0.4VA Rating Only)
40	.150" (3.81mm) Vertical PC (1-4 Pole)
45	.100" (2.54mm) Vertical PC (1-4 Pole)

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
M2012S2A2G40

.280" (7.1mm)
Smooth Bushing with Keyway

.200" (5.08mm) Bat Toggle

Gold Contacts with 0.4VA Rating

Vertical PC Terminals with .150" (3.81mm) Terminal Spacing

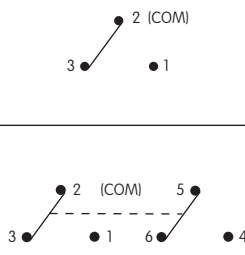
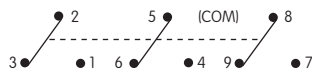
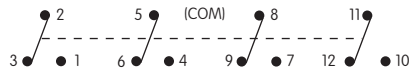
SPDT ON-NONE-ON Circuit

www.nkkswitches.com

A71

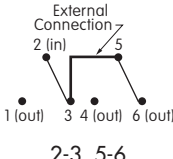
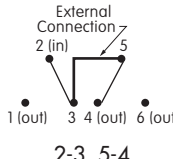
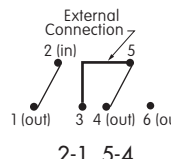
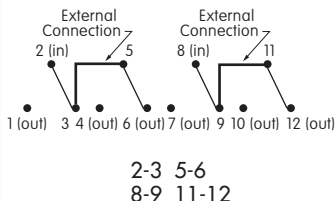
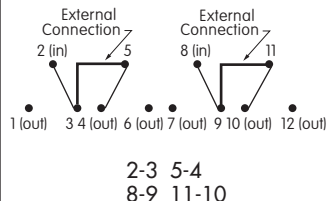
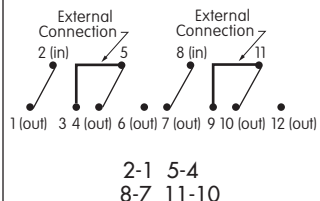
A	Toggles
	Rockers
	Pushbuttons
	Illuminated PB
	Programmable
	Keylocks
	Rotaries
	Slides
	Tactiles
	Tilt
	Touch
	Indicators
	Accessories
	Supplement

POLES & CIRCUITS

Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Down 	Center 	Up 	Down 	Center 	Up 	
SP	* M2012	ON	NONE	ON				Note: Terminal numbers are not actually on the switch. * Reverse circuits available for vertical mount SP & DP upon request.
	M2013	ON	OFF	ON				
	M2015	ON	NONE	(ON)	2-3	OPEN	2-1	
	* M2018	(ON)	OFF	(ON)				
	M2019	ON	OFF	(ON)				
DP	* M2022	ON	NONE	ON				
	M2023	ON	OFF	ON				
	M2025	ON	NONE	(ON)	2-3 5-6	OPEN	2-1 5-4	
	* M2028	(ON)	OFF	(ON)				
	M2029	ON	OFF	(ON)				
3P	M2032	ON	NONE	ON				
	M2033	ON	OFF	ON				
	M2035	ON	NONE	(ON)	2-3 5-6 8-9	OPEN	2-1 5-4 8-7	
	M2038	(ON)	OFF	(ON)				
	M2039	ON	OFF	(ON)				
4P	M2042	ON	NONE	ON				
	M2043	ON	OFF	ON				
	M2045	ON	NONE	(ON)	2-3 5-6 8-9 11-12	OPEN	2-1 5-4 8-7 11-10	
	M2048	(ON)	OFF	(ON)				
	M2049	ON	OFF	(ON)				

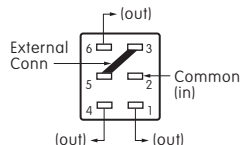
For 3 Throw (3-On)

Connected Terminals & Schematics

Pole	Model	Down	Center	Up	Down	Center	Up
SP	M2024	ON	ON	ON			
	M2026	(ON)	ON	(ON)			
	M2027	ON	ON	(ON)			
DP	M2044	ON	ON	ON			
	M2046	(ON)	ON	(ON)			
	M2047	ON	ON	(ON)			

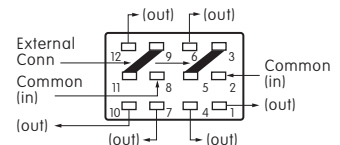
The SP3T model utilizes a double pole base.

External connection must be made during field installation.



The DP3T model utilizes a four pole base.

External connection must be made during field installation.

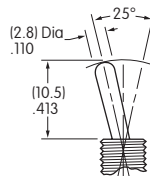


SMALL TOGGLES

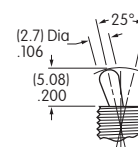
Important:

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).

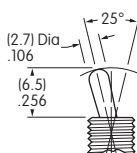
S .413" (10.5mm) Bat



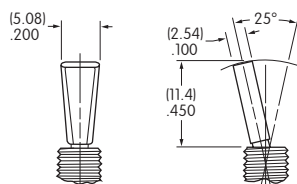
S2 .200" (5.08mm) Bat



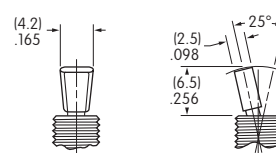
S3 .256" (6.5mm) Bat



E .450" (11.4mm) Flatted



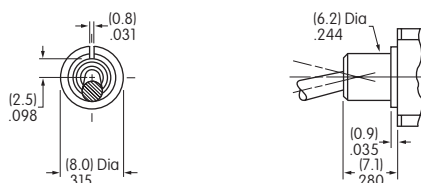
E2 .256" (6.5mm) Flatted



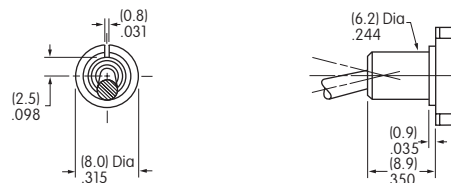
Standard Material & Finish: Brass with Bright Chrome
Contact factory for optional finishes.

SMALL BUSHINGS

A2 .280" (7.1mm) Smooth with Keyway

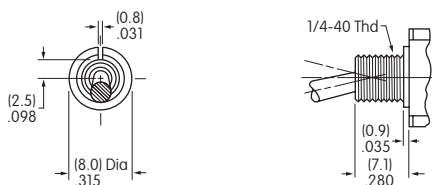


S2 .350" (8.9mm) Smooth with Keyway

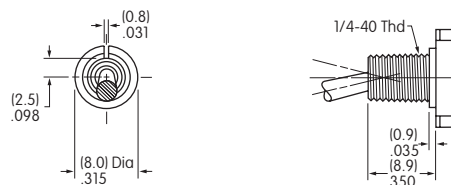


When using this bushing, toggle length is increased by .070" (1.78mm).

A1 .280" (7.1mm) Threaded with Keyway



S1 .350" (8.9mm) Threaded with Keyway

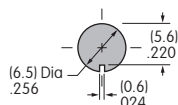


When using this bushing, toggle length is increased by .070" (1.78mm). Maximum Panel Thickness with Standard Hardware: .031" (0.8mm)

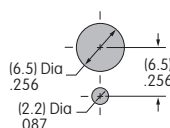
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

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)

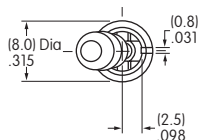
For dimensions, see Accessories & Hardware section.

LOCKING LEVER & BUSHING

LL2

Smooth with Keyway

Locking Mechanism



on-none-on



2 positions lock

on-none-(on)



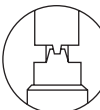
1 position locks

on-off-(on)
on-on-(on)



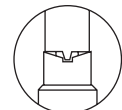
2 positions lock

on-off-on
on-on-on

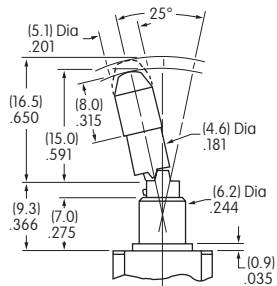


3 positions lock

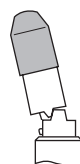
(on)-off-(on)
(on)-on-(on)



1 position locks



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

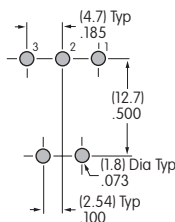
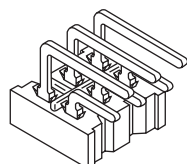
6A @ 125V AC
or 0.4VA maximum @ 28V AC/DC maximum

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.

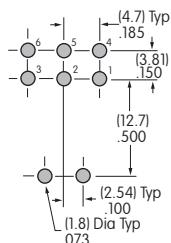
TERMINALS

30

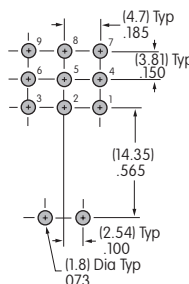
.150" (3.81mm)
Right Angle PC (1-3 Pole)



Single Pole



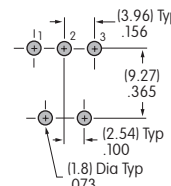
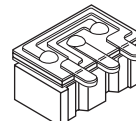
Double Pole



Three Pole

32

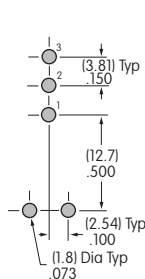
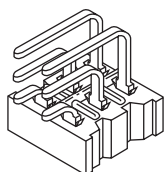
Right Angle PCB
with Reverse Circuit
(1 Pole & 0.4VA Rating Only)



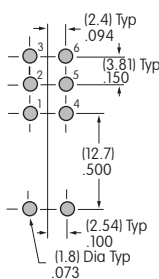
Terminal dimensions are shown on the Typical Switch Dimensions pages which follow.

TERMINALS (Continued)

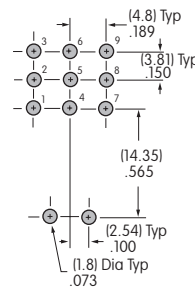
40 .150" (3.81mm) Vertical PC (1-4 Pole)



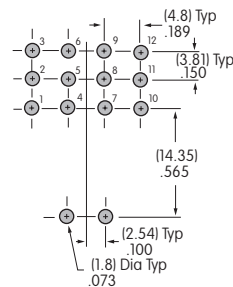
Single Pole



Double Pole

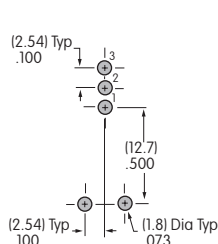
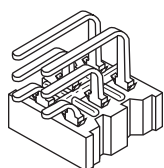


Three Pole

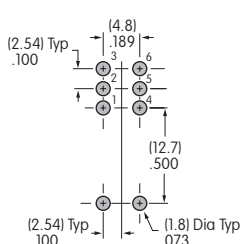


Four Pole

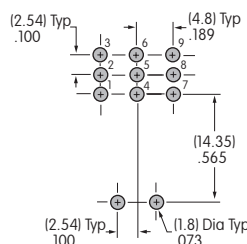
45 .100" (2.54mm) Vertical PC (1-4 Pole)



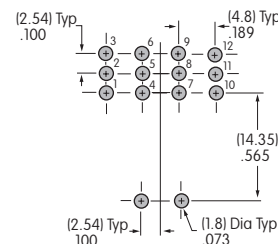
Single Pole



Double Pole



Three Pole



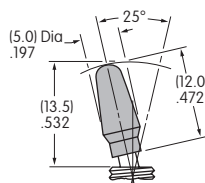
Four Pole

Terminal dimensions are shown on the Typical Switch Dimensions pages which follow.

OPTIONAL CAPS & CAP COLORS

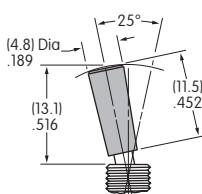
B * AT415 for S Bat Toggle

Material:
Polyethylene



C * AT444 Conical Cap for S Bat Toggle

Material:
Polyethylene



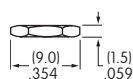
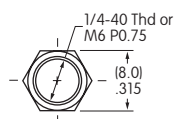
Colors Available

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

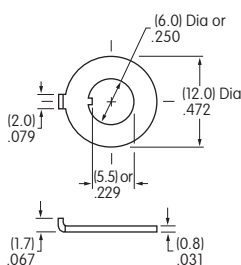
* AT415 and AT444 for use with S toggles only, not S2 or S3 toggles.

STANDARD HARDWARE

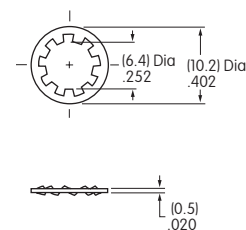
AT513H for Inch
AT513M for Metric
Hex Nut (2 per switch)
Brass/Nickel



AT507H for Inch
AT507M for Metric
Locking Ring (1 per switch)
Steel with Zinc/Chromate



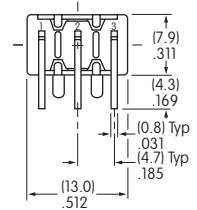
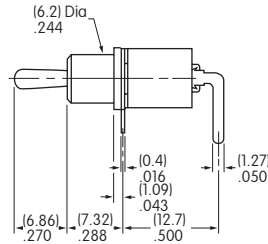
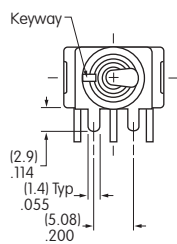
AT509
Lockwasher (1 per switch, none
with splashproof)
Steel with Zinc/Chromate



TYPICAL SWITCH DIMENSIONS

.150" (3.81mm) Right Angle PC

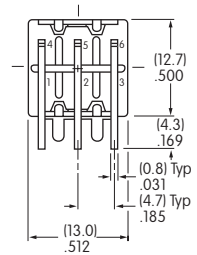
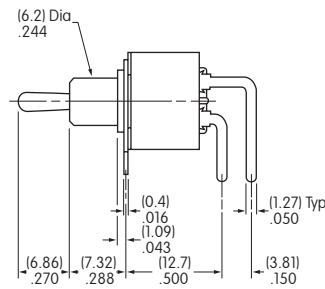
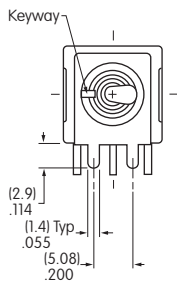
Single Pole



M2012S2A2G30

.150" (3.81mm) Right Angle PC

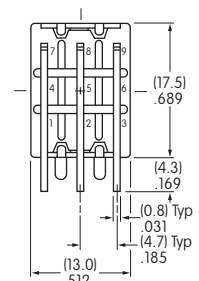
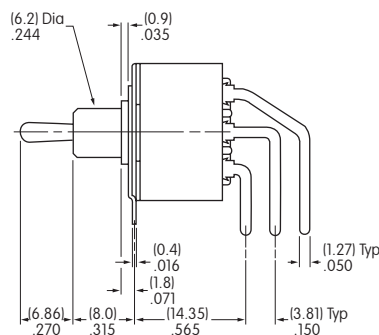
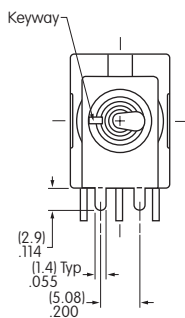
Double Pole



M2022S2A2G30

.150" (3.81mm) Right Angle PC

Three Pole

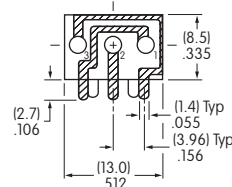
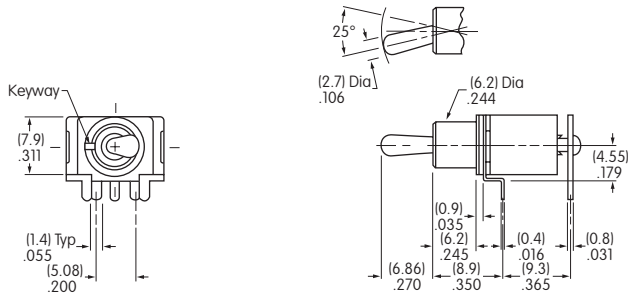


M2032S2A2G30

TYPICAL SWITCH DIMENSIONS

Single Pole • Reverse Circuit

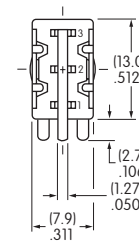
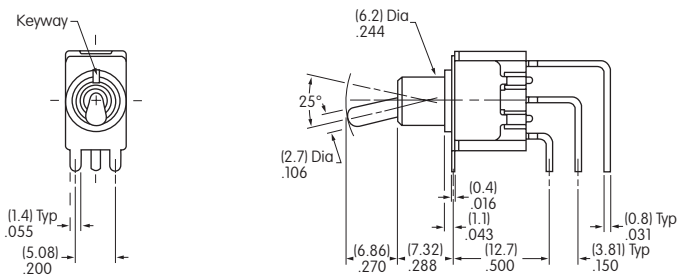
Right Angle PCB



M2012S2A2G32

Single Pole

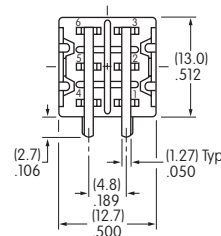
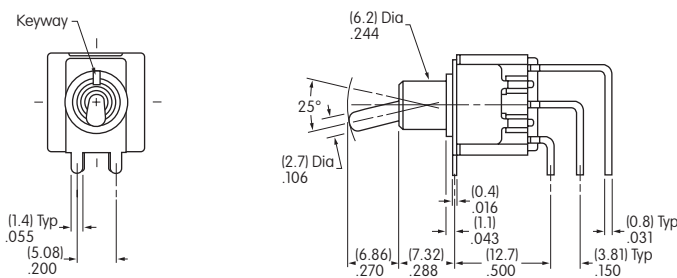
.150" (3.81mm) Vertical PC



M2012S2A2G40

Double Pole

.150" (3.81mm) Vertical PC

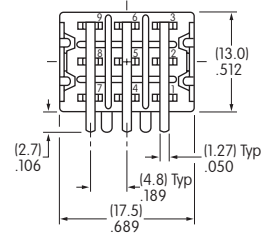
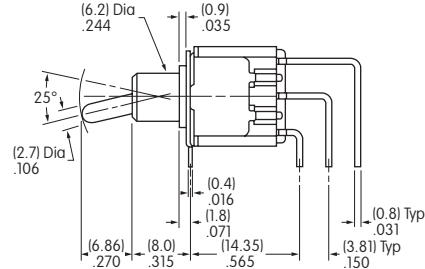
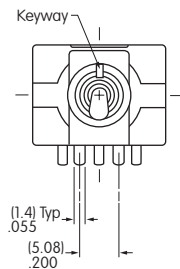


M2022S2A2G40

TYPICAL SWITCH DIMENSIONS

.150" (3.81mm) Vertical PC

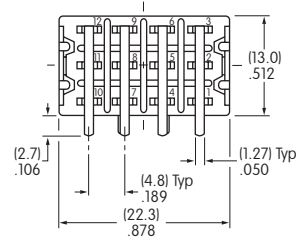
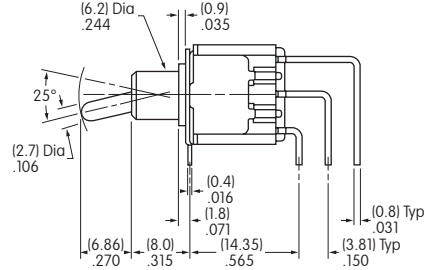
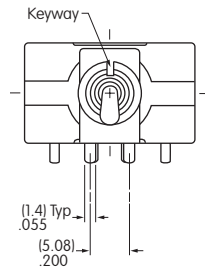
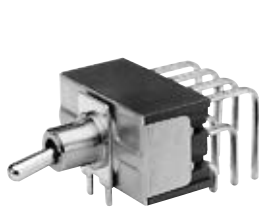
Three Pole



M2032S2A2G40

.150" (3.81mm) Vertical PC

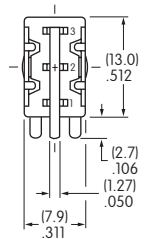
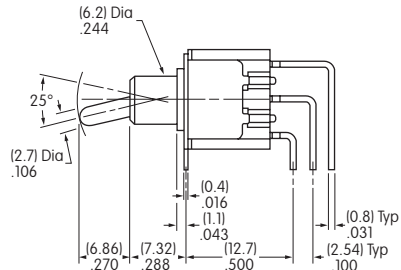
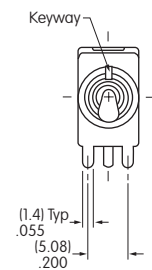
Four Pole



M2042S2A2G40

.100" (2.54mm) Vertical PC

Single Pole

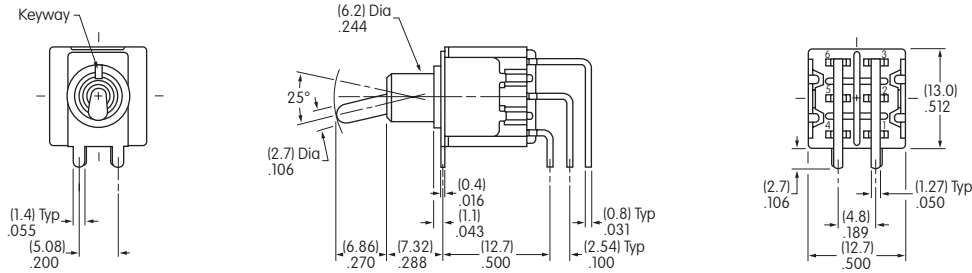


M2012S2A2G45

TYPICAL SWITCH DIMENSIONS

Double Pole

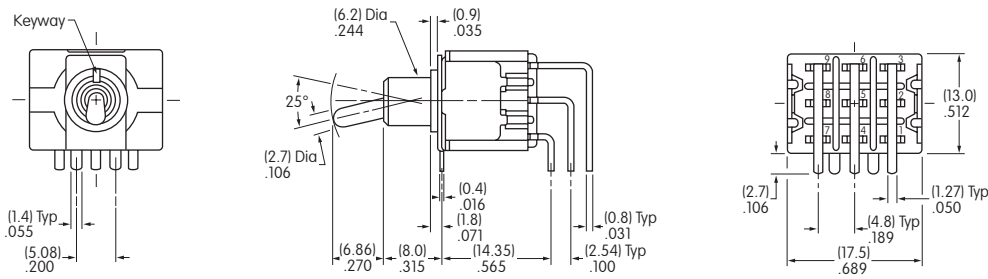
.100" (2.54mm) Vertical PC



M2022S2A2G45

Three Pole

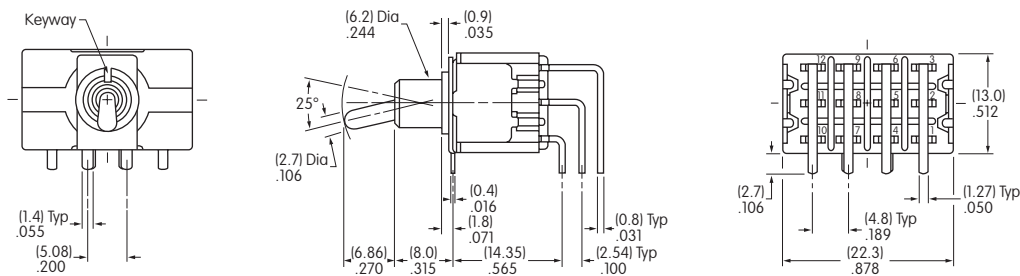
.100" (2.54mm) Vertical PC



M2032S2A2G45

Four Pole

.100" (2.54mm) Vertical PC



M2042S2A2G45

Mouser Electronics

Authorized Distributor

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NKK Switches:

[M2012EA2W13](#) [M2018SS2G13](#) [M2022SS2W23/UC](#) [M2012S2A2G13](#) [M2012S2A2W13](#) [M2013S2A2W13](#)
[M2013SS2G23](#) [M2022LL2W13](#) [M2028SS2G13](#) [M2012SS2G13-BC](#) [M2012SS1W13/UC](#) [M2022S2A2G26](#)
[M2012SS1W13/CUL](#) [M2013S2A2G15](#) [M2022SS1W13/CUL](#) [M2023SA1W13](#) [M2024S2A2W13](#) [M2028SA1W13](#)
[M2012S2A2W25/UC](#) [M2012SS1W25](#) [M2015SS2G23](#) [M2022SA2A13](#) [M2013SA1W13](#) [M2032SS1W13/UC](#)
[M2013S3S1W13](#) [M2012S3S1W13](#) [M2012SS2G13-BG](#) [M2012S2S1W13](#) [M2013S2S1W13](#) [M2022S2S1W13](#)
[M2012SS2G13-BF](#) [M2012SA1G15](#) [M2012ES1A25](#) [M2012S3S1W13/CUL](#) [M2013S3S1W13/CUL](#) [M2018ES2A23](#)
[M2018B2B1W13](#) [M2022SS1W13](#) [M2012SS1W17](#) [M2012SS2W13](#) [M2015EA2G13](#) [M2022EA1G13](#) [M2012SS1G13](#)
[M2012SS2G13-BE](#) [M2022SS2G13](#) [M2022S2A2W23/U](#) [M2012SA2W13-BA](#) [M2012EA1W15](#) [M2012SS2W13-BC](#)
[M2018SS1W13](#) [M2019EA2A13](#) [M2024E2S2G13](#) [M2012SS1W15](#) [M2012LL2G13](#) [M2015SS2G13](#) [M2013SS2G13](#)
[M2015SA2W13](#) [M2012SS2G13](#) [M2012EA2G13](#) [M2012S3A2G13](#) [M2023SS2G13](#) [M2022SS2W26](#) [M2042SA2W23](#)
[M2012SS1W15-BA](#) [M2022SS2W13/C](#) [M2018SA1G13](#) [M2022SS2W13](#) [M2012S3A1G13](#) [M2012SA2W13](#)
[M2012ES2G13/U](#) [M2012SS2W13/C](#) [M2018EA2A13](#) [M2013SS2W13](#) [M2013SS1W13](#) [M2022SS2G13-BC](#)
[M2022ES2G13/U](#) [M2012SS1W13](#) [M2012S2A2G15](#) [M2012SA1W13](#) [M2018ES2A25](#) [M2022S2A2W13](#)
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[M2015SA2A13](#) [M2015SS2W13](#) [M2012SA2A13](#)