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.

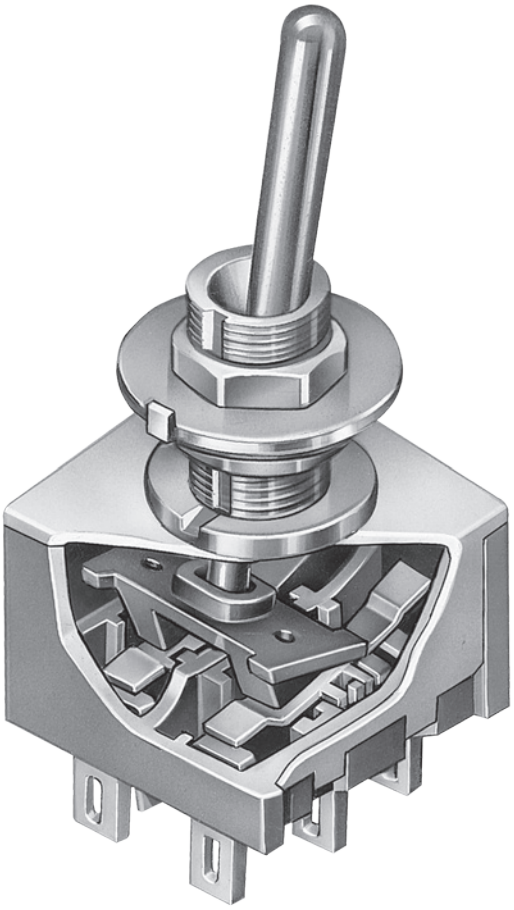
Molded diallyl phthalate case has a UL flammability rating of 94V-0.

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

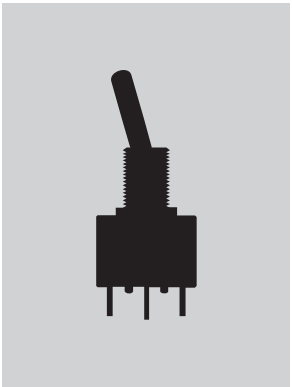
Prominent external insulating barriers increase insulation resistance and dielectric strength.

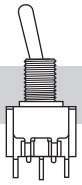
Interlocked actuator block, lever, and interior guide prevent switch failure due to biased lever movement.

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

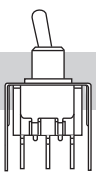


Actual Size

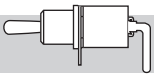




Bushing Mount Page A48



Bracket PC Mount Page A60



Angle PC Mount Page A66

TYPICAL SWITCH

M20 | 1 | 3 | S | S1

Poles

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

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

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
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 Splash-proof with D Flat (combines only with S, S2 & S3)

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

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 Splash-proof 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 General Specifications page.

ORDERING EXAMPLE

W 01 — □ □

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

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

* Wire harness & cable assemblies offered only in Americas

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 for Locking Lever

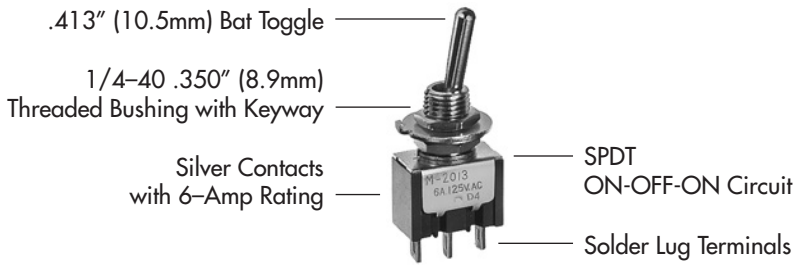
No Code	Nickel Plated Supplied with Switch
A	Black
C	Red
G	Blue

Cap Colors

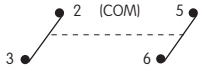
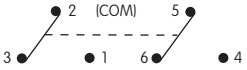
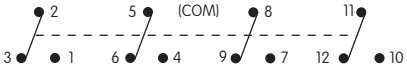
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray (for K1 & K2 paddles)

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2013SS1W01

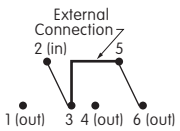
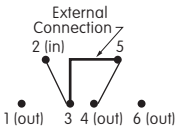
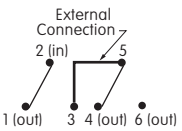
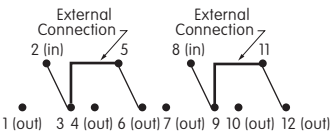
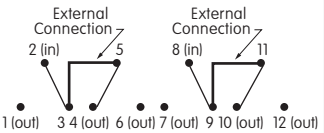
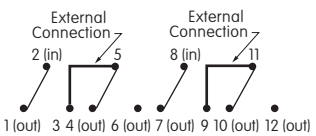


POLES & CIRCUITS

Pole	Model	Toggle Position ( ) = Momentary: Down (Keyway)	Center	Up	Connected Terminals: Down (Keyway)	Center	Up	Throw & Schematics
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 

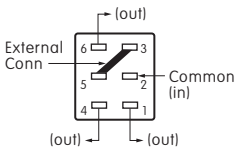
For 3 Throw (3-On)

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

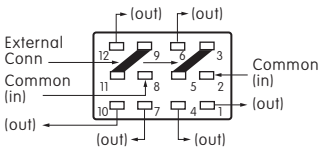
The SP3T model utilizes a double pole base.

External connection must be made during field installation.



The DP3T model utilizes a four pole base.

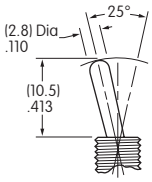
External connection must be made during field installation.



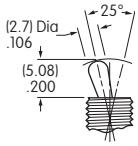
SMALL TOGGLES

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".

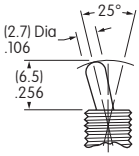
S .413" (10.5mm) Bat



S2 .200" (5.08mm) Bat

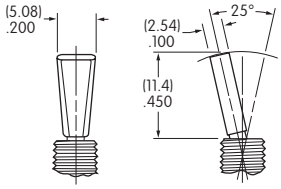


S3 .256" (6.5mm) Bat

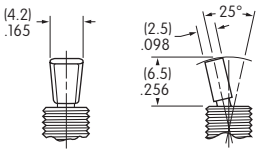


Standard Material & Finish: Brass with Bright Chrome
Contact factory for optional finishes.

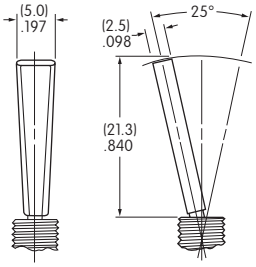
E .450" (11.4mm) Flatted



E2 .256" (6.5mm) Flatted



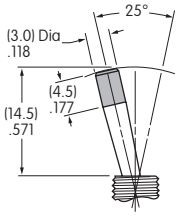
E4 .840" (21.3mm) Flatted



Only Available in 1- & 2-Pole

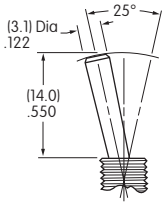
C .571" (14.5mm) Color Tipped Cone Supplied with Cap AT445

Material: Polycarbonate

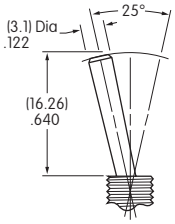


Only Available in 1- & 2-Pole

Q .550" (14.0mm) Cone

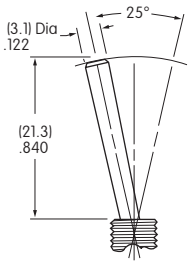


Q2 .640" (16.26mm) Cone



Only Available in 1- & 2-Pole

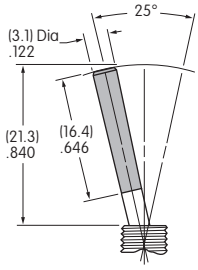
Q4 .840" (21.3mm) Cone



Only Available in 1- & 2-Pole

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

Material: Polyethylene

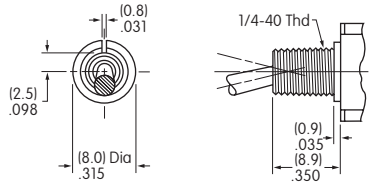


Only Available in 1- & 2-Pole

Cap Colors Available: A Black, B White, C Red, E Yellow, F Green, G Blue, H Gray (For K1 & K2 only)

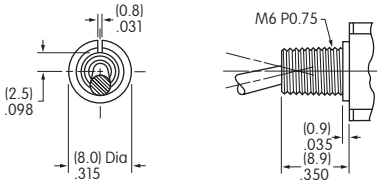
SMALL BUSHINGS

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



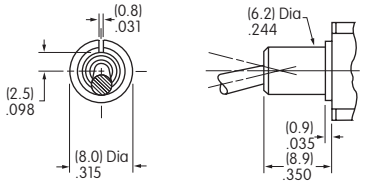
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

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

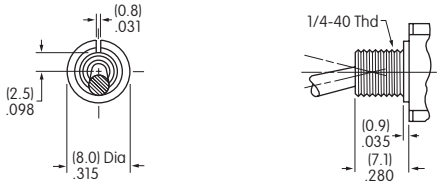


Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

S2 .350" (8.9mm) Smooth with Keyway

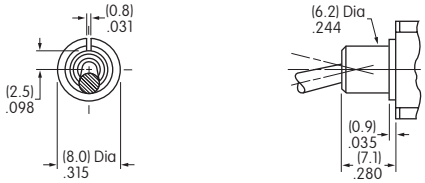


A1 1/4-40 .280" (7.1mm) Threaded with Keyway



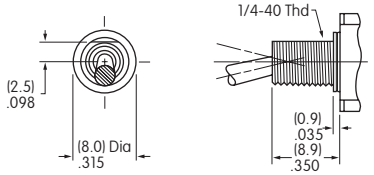
When using this bushing, toggle length is increased by .070". Maximum Panel Thickness with Standard Hardware: .031" (0.8mm)

A2 .280" (7.1mm) Smooth with Keyway



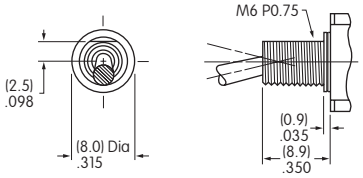
When using this bushing, toggle length is increased by .070".

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



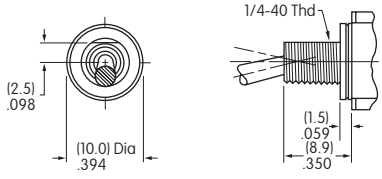
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

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



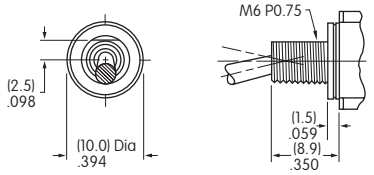
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

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

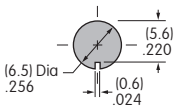


D8 combines only with S, S2 & S3 toggles. Maximum Panel Thickness with Standard Hardware: .193" (4.9mm)

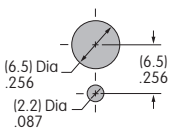
Standard Hardware Supplied for Small Bushings

	Bushing Codes	S1/S4	A1	D1/D4	D3/D8	L1/L4	L3/L8
Hardware and Quantity	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

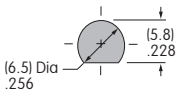
For S1, S2, A1, A2 or S4 Bushing with Keyway & for L1 or L4 Bushing



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



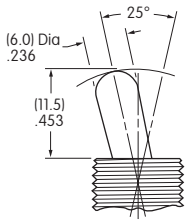
For D1, D4, D3 or D8 Bushing with D Flat & for L3 or L8 Bushing



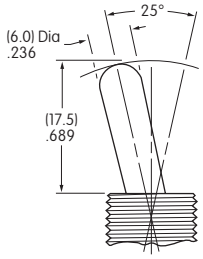
LARGE TOGGLES

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

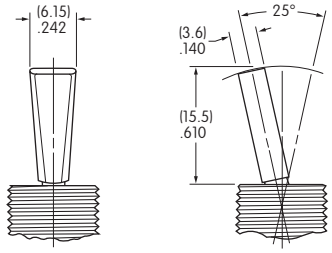
B **.453" (11.5mm) Large Bat**



B2 **.689" (17.5mm) Large Bat**



R **.610" (15.5mm) Large Flatted**

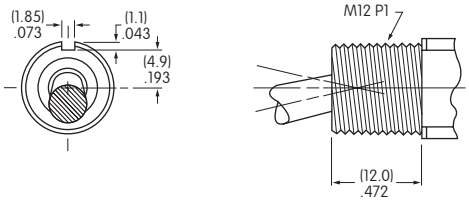


Standard Material & Finish: Brass with Bright Chrome

Optional Finishes: Contact factory for satin chrome or black.

LARGE BUSHINGS

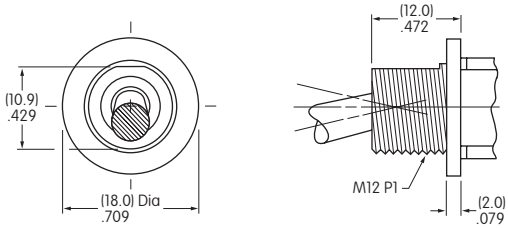
B1 **Large .472" (12.0mm) Threaded with Keyway**



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**

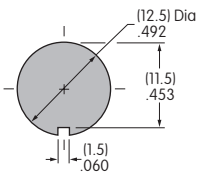


Maximum Panel Thickness with Standard Hardware: .256" (6.5mm)

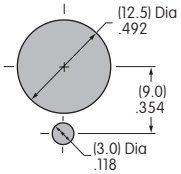
Standard Hardware for B3:
1 hex face nut AT503M and 1 o-ring AT401P

Panel Cutouts

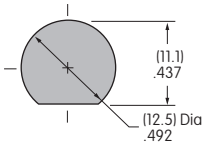
For B1 Bushing with Keyway



For B1 Bushing with Locking Ring

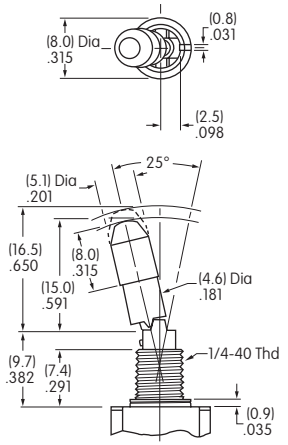


For B3 Bushing with D Flat

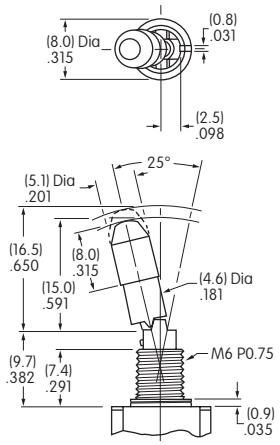


LOCKING LEVER & BUSHINGS

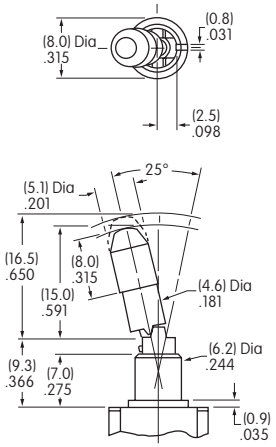
LL1 **1/4-40 .291" (7.4mm) Threaded with Keyway**



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

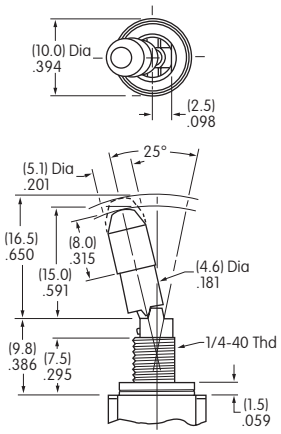


LL2 **Smooth with Keyway**

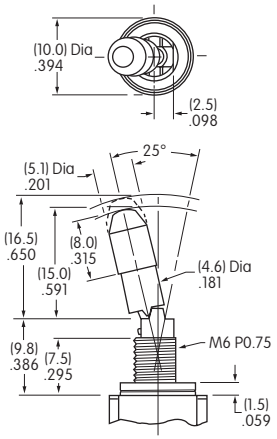


Maximum Panel Thickness with Standard Hardware: .047" (1.2mm)
Standard Hardware for L1 & L4: 2 hex nuts AT513H or AT513M,
1 locking ring AT507H or AT507M, and 1 lockwasher AT509

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



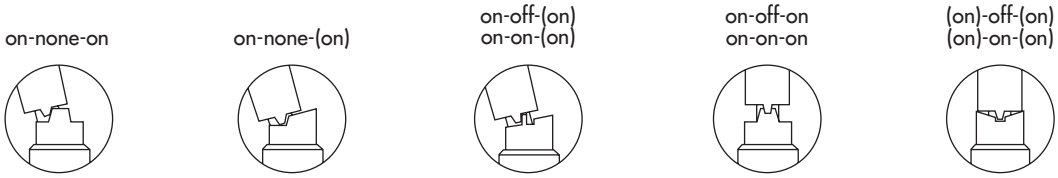
LL8 **6mm/.295" (7.5mm) Threaded Splashproof with D Flat**



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

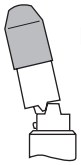
Locking Mechanism



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

No Code **Supplied with Cap AT427**

Cap Material:
Brass with Nickel 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**	**6A @ 125V AC & 3A @ 250V AC**

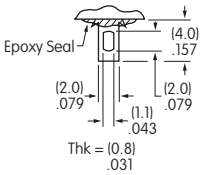
Note: See Supplement section to find complete explanation of operating range.

A	**Gold over Silver**	**Power Level or Logic Level**	**6A @ 125V AC or 0.4VA maximum @ 28V AC/DC maximum**

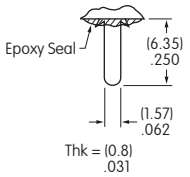
Note: This dual rated option is suitable when two or more identical switches are used in logic and in power circuits within the same application. See Supplement section to find complete explanation of dual rating and operating range.

TERMINALS

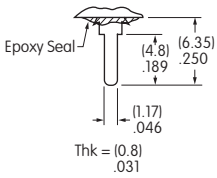
01 **Solder Lug**

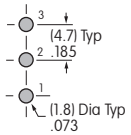


02 **.062" (1.57mm) Wide Quick Connect**

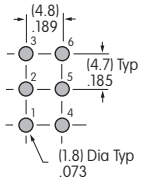


03 **.250" (6.35mm) Straight PC**

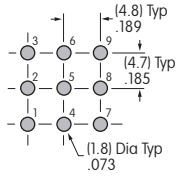




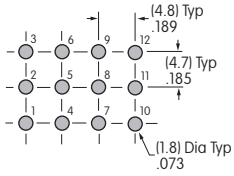
Single Pole



Double Pole



Three Pole



Four Pole

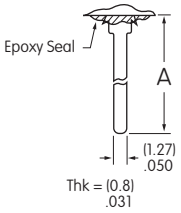
05 **.425" (10.8mm) Wirewrap or Extended PC**

06 **.750" (19.05mm) Wirewrap or Extended PC**

07 **.964" (24.5mm) Wirewrap or Extended PC**

08 **1.062" (27.0mm) Wirewrap or Extended PC**

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

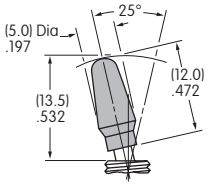


Dimension A = terminal lengths as shown beside the terminal codes at the left.

OPTIONAL CAPS & CAP COLORS

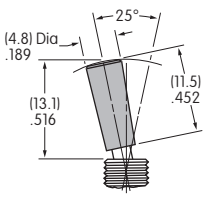
B **AT415 Lever Cap for S Bat Toggle**

Material: Polyethylene



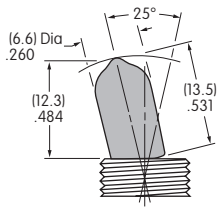
C **AT444 Conical Cap for S Bat Toggle**

Material: Polyethylene



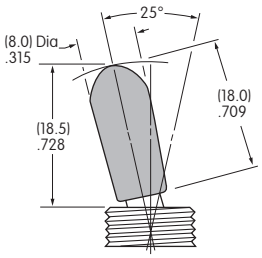
R **AT434 Lever Cap for B Toggle**

Material: Polyvinyl Chloride



V **AT406 Lever Cap for B2 Toggle**

Material: Polyvinyl Chloride

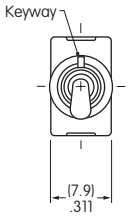


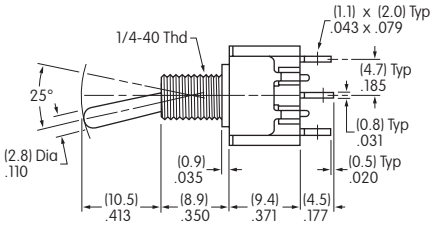
Cap Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue

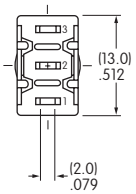
TYPICAL SWITCH DIMENSIONS

Solder Lug

Single Pole





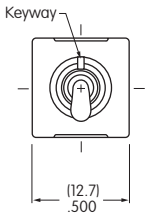


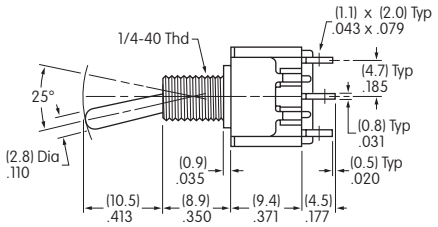
M2012SS1W01

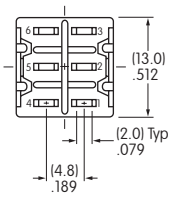
M2011 model does not have terminal 1.

Solder Lug

Double Pole





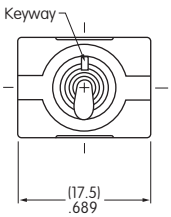


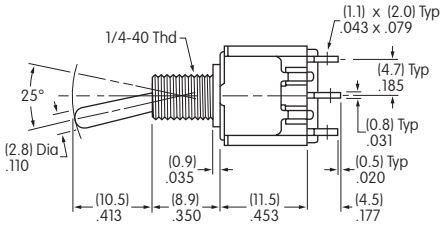
M2022SS1W01

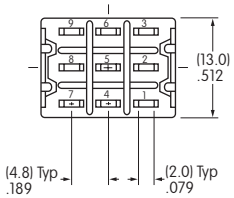
M2021 model does not have terminals 1 & 4.

Solder Lug

Three Pole



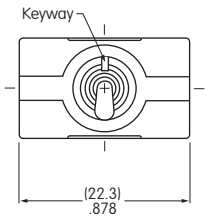


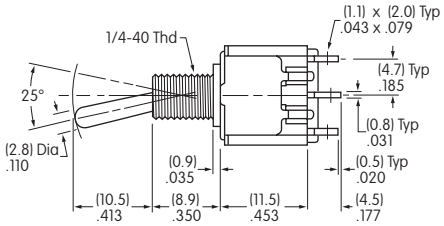


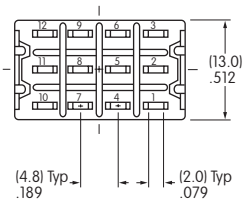
M2032SS1W01

Solder Lug

Four Pole



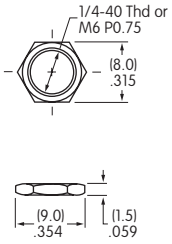




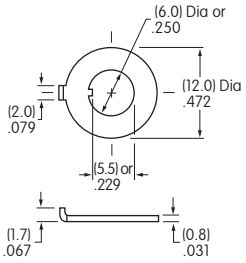
M2042SS1W01

STANDARD HARDWARE FOR SMALL & LARGE BUSHINGS

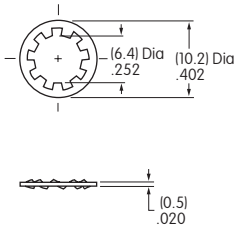
AT513H for Inch
AT513M for Metric
Hex Nut
Brass/Nickel



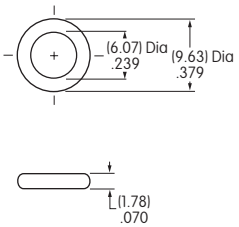
AT507H for Inch
AT507M for Metric
Locking Ring
Steel with Zinc/Chromate



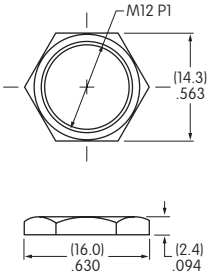
AT509
Lockwasher
Steel with Zinc/Chromate
(not supplied with splashproof models)



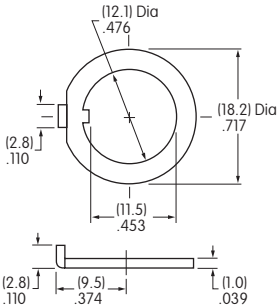
AT516
O-ring for
Splashproof Models
Nitrile Butadiene Rubber



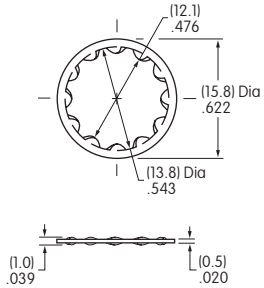
AT503M
Hex Face Nut
Brass/Chrome



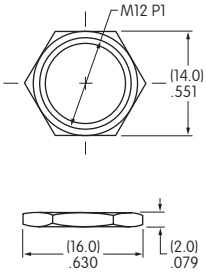
AT506M
Locking Ring
Steel with Zinc/Chromate



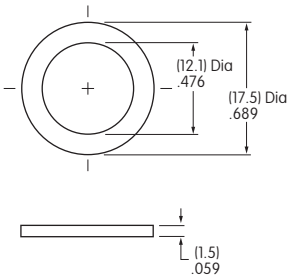
AT508
Lockwasher
Steel with Zinc/Chromate
(not supplied with splashproof models)



AT527M
Hex Nut
Steel with
Nickel Plating



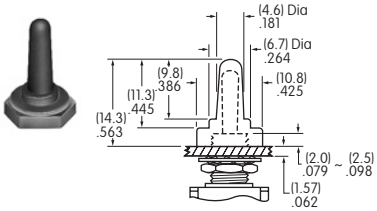
AT401P
O-ring for Splashproof Models
Nitrile butadiene rubber



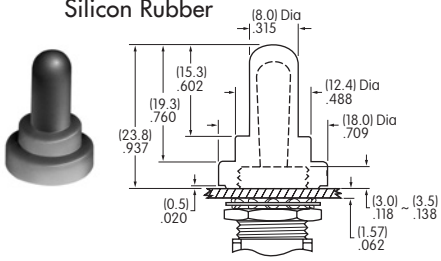
OPTIONAL SPLASHPROOF BOOTS

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

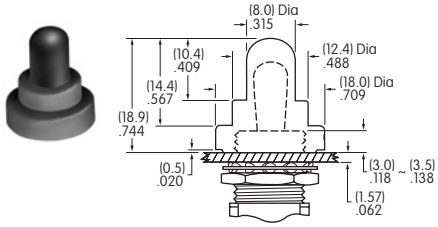
AT428 (M-metric H-Inch)
.445" (11.3mm)
Boot for S Toggle
Silicon Rubber



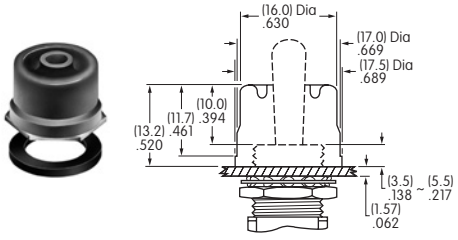
AT402
.760" (19.3mm)
Boot for B2 Toggle
Silicon Rubber



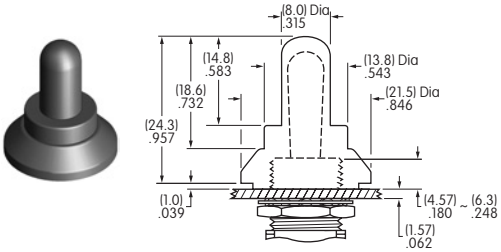
AT402S
.567" (14.4mm)
Boot for B Toggle
Silicon Rubber



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



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



OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

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