



A Series.....A4

0.4VA Logic Level; Process Sealed
Straight, Right Angle, & Vertical PC
PCB Mount



B Series.....A12

Antistatic; Process Sealed
0.4VA Logic Level
Straight, Right Angle, & Vertical PC
PCB Mount



B Series Illuminated.....A20

Subminiature Fully Illuminated; Process Sealed
0.4VA Logic Level
Straight, Right Angle, & Vertical PC
PCB Mount



D2 Series.....A24

0.4VA Logic Level
Straight, Right Angle, & Vertical PC
PCB Mount



G Series.....A34

Ultra-Miniature; Process Sealed
0.4VA Logic Level
Straight, Right Angle, & Vertical PC
PCB Mount



G Series Illuminated.....A38

Ultra-Miniature Fully Illuminated
0.4VA Logic Level
Straight, Right Angle, & Vertical PC
PCB Mount



G3T Series.....A42

Ultra-Miniature; Process Sealed SMT
0.4VA Logic Level
Gull-wing Terminals
Upright & Right Angle Mount



M Series.....A48

Dual Seal Waterproof, IP67 Rated
6A Power Level & 0.4VA Logic Level
12mm Bushing, Solder Lug Terminals



M Series.....A52

Bushing Mount
6A Power Level & 0.4VA Logic Level
Solder Lug, Quick Connect, Straight PC, & Wirewrap



M SeriesA64

Straight PC with Bracket
6A Power Level & 0.4VA Logic Level
PCB Mount

M SeriesA70

Right Angle & Vertical PC
6A Power Level & 0.4VA Logic Level
PCB Mount

M2100 Series IlluminatedA80

6A Power Level & 0.4VA Logic Level
LED Tipped Toggle
Solder Lug, Quick Connect, & PC
Bushing, Flat Frame & Snap-in Mount

M2T SeriesA88

Process Sealed
6A Power Level & 0.4VA Logic Level
Straight, Right Angle, Vertical, & Extended PC
PCB Mount

P SeriesA96

Internationally Approved
10A Power Level
Solder Lug, Straight PC, & Quick Connect
Bushing Mount

S SeriesA100

5A to 50A Low, Medium, & High Capacity
Solder Lug, Quick Connect, & Screw Lug
Bushing Mount

TL Series IlluminatedA126

6A Power Level or 0.4VA Logic Level
Translucent Toggle with Bright or Super Bright LED
Solder Lug; Bushing Mount

WT SeriesA132

Environmentally Sealed
10A Power Level
Solder Lug, Screw Lug, & Wire Lead
Bushing Mount

A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 50 milliohms maximum
Insulation Resistance: 500 megohms minimum @ 500V DC
Dielectric Strength: 500V AC minimum between contacts for 1 minute minimum;
500V AC minimum between contacts & case for 1 minute minimum
Mechanical Life: 100,000 operations minimum for On-None-On & On-Off-On
50,000 operations minimum for other circuits
Electrical Life: 50,000 operations minimum
Nominal Operating Force: 1.47N (momentary); 1.18N (maintained) for .394" (10.0mm) toggles
2.73N (momentary); 1.84N (maintained) for all other toggles
Contact Timing: Nonshorting (break-before-make)
Angle of Throw: 26°

Materials & Finishes

Toggle: Glass fiber reinforced polyamide for antistatic; nickel plated brass for all others
Case Housing: Glass fiber reinforced polyamide
Support Bracket: Tin plated phosphor bronze
Movable Contact: Phosphor bronze with gold plating
Stationary Contacts: Brass with gold plating
Terminals: Brass with gold plating

Environmental Data

Operating Temperature Range: -30°C through +85°C (-22°F through +185°F)
Humidity: 90 ~ 95% humidity for 240 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)

PCB Processing

Soldering: Wave Soldering Recommended. See Profile A in Supplement section.
Manual Soldering: See Profile B in Supplement section.
Cleaning: Automated cleaning. See Cleaning Specifications in Supplement section.

Standards & Certifications

The A Series toggles have not been tested for UL recognition or CSA certification.
These switches are designed for use in a low-voltage, low-current, logic-level circuit.
When used as intended in a logic-level circuit, the results do not produce hazardous energy.

Distinctive Characteristics

Subminiature size saves space on PC boards.

Specifically developed for logic-level applications.

Totally sealed body construction prevents contact contamination and allows time- and money-saving automated soldering and cleaning.

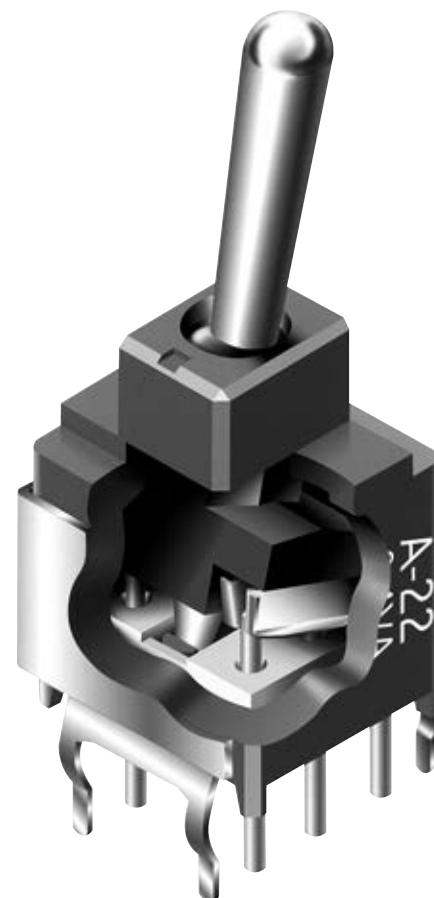
Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother, positive detent actuation, increased contact stability and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement contents.)

Molded-in, epoxy sealed or ultrasonically welded terminals lock out flux, solvents, and other contaminants.

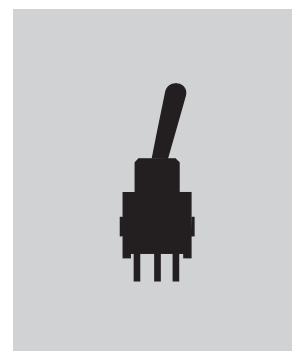
.100" x .100" (2.54mm x 2.54mm) terminal spacing conforms to standard PC board grid spacing.

Toggle option in antistatic material available for dissipating electrostatic discharges.

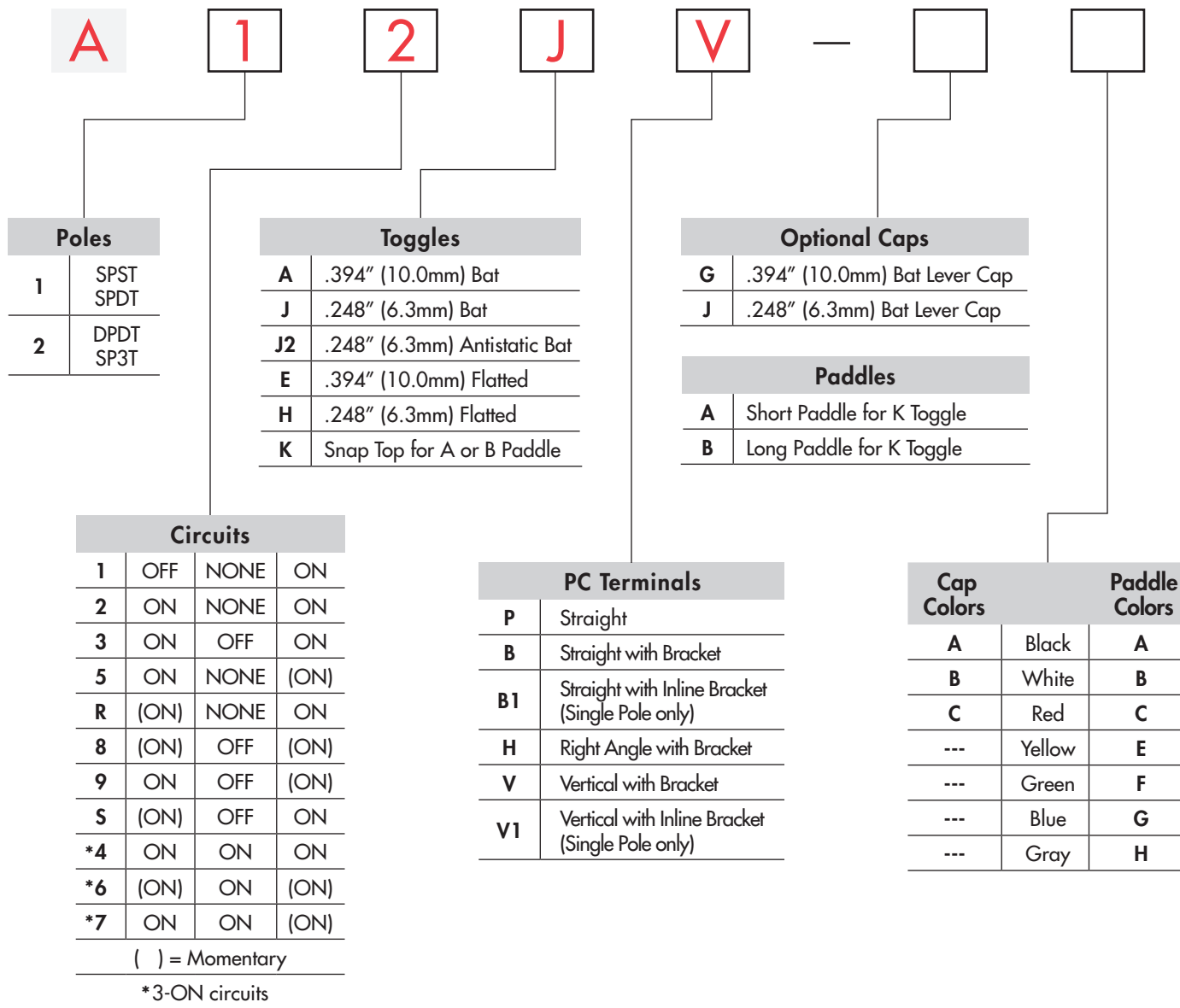
Matching indicators available.



Actual Size



TYPICAL SWITCH ORDERING EXAMPLE



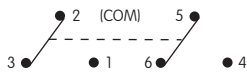
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

A12JV

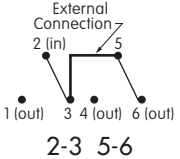
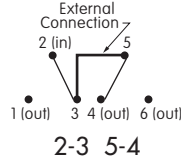
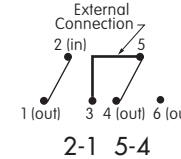


Process Sealed Subminiature Toggles

POLES & CIRCUITS

		Toggle Position () = Momentary			Connected Terminals			Throw & Schematics	
Pole	Model	Up 	Center 	Down 	Up 	Center 	Down 	Note: Terminal numbers are not actually on the switch.	
SP	A11	OFF	NONE	ON	OPEN	OPEN	3-1	SPST	
SP	A12	ON	NONE	ON	2-3	OPEN	2-1	SPDT	
	A13	ON	OFF	ON					
	A15	ON	NONE	(ON)					
	A1R	(ON)	NONE	ON					
	A18	(ON)	OFF	(ON)					
	A19	ON	OFF	(ON)					
DP	A1S	(ON)	OFF	ON					
	A22	ON	NONE	ON	2-3 5-6	OPEN	2-1 5-4	DPDT	
	A23	ON	OFF	ON					
	A25	ON	NONE	(ON)					
	A2R	(ON)	NONE	ON					
	A28	(ON)	OFF	(ON)					
	A29	ON	OFF	(ON)					
DP	A2S	(ON)	OFF	ON					

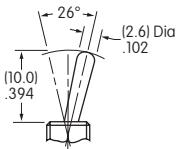
For 3 Throw (3-on)

Connected Terminals & Schematics					External Connection
Pole	Model	Up	Center	Down	The SP3T model utilizes a double pole base. External connections must be made during field installation.
SP	A24 A26 A27	ON (ON) ON 	ON ON ON 	ON (ON) (ON) 	

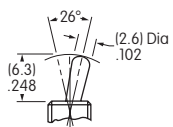
TOGGLES

Standard Material & Finish: Brass with Bright Nickel Material & Finish for J2: Matte finish black glass fiber reinforced polyamide

A .394" (10.0mm) Bat



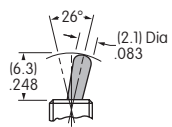
J .248" (6.3mm) Bat



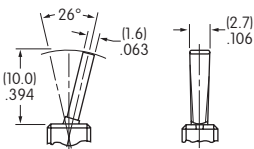
J2 .248" (6.3mm) Antistatic Bat

Dissipating 20Kv ESD: Straight PC

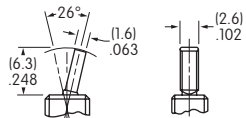
Dissipating 10Kv ESD: Straight PC with Bracket, Right Angle, & Vertical



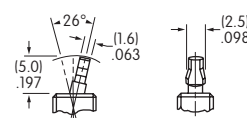
E .394" (10.0mm) Flatted



H .248" (6.3mm) Flatted



K Snap Top for Paddles

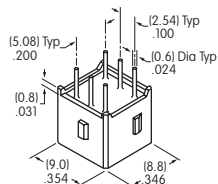


PC TERMINALS

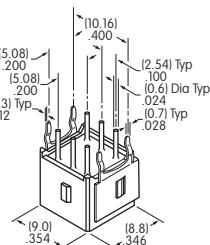
Use of a support bracket is recommended to increase PCB mounting strength and stability.

A11 models do not have Terminal 2.

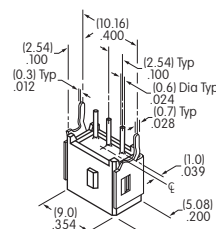
P Straight



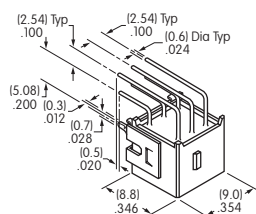
B Straight with Bracket



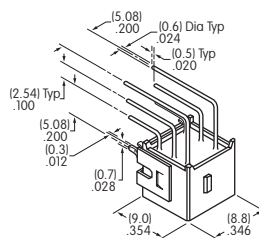
B1 Straight with Inline Bracket Single Pole only



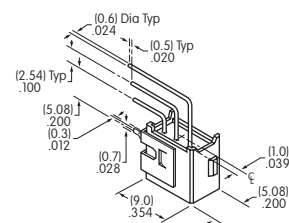
H Right Angle with Bracket



V Vertical with Bracket



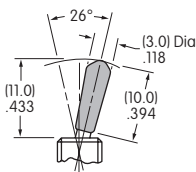
V1 Vertical with Inline Bracket Single Pole only



CAPS & PADDLES

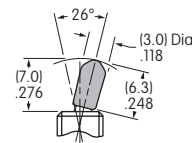
G AT4003 .394" (10.0mm) Bat Lever Cap

Material: PVC
Colors Available:
A, B, C



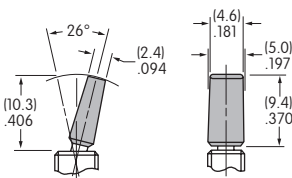
J AT4064 .248" (6.3mm) Bat Lever Cap

Material: PVC
Colors Available:
A, B, C



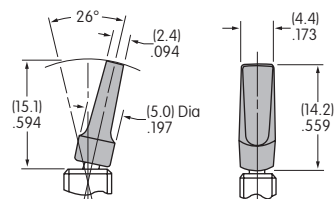
A AT467 Short Paddle

Material: Polyamide
Colors Available:
A, B, C, E, F, G, H



B AT468 Long Paddle

Material: Polyamide
Colors Available:
A, B, C, E, F, G, H



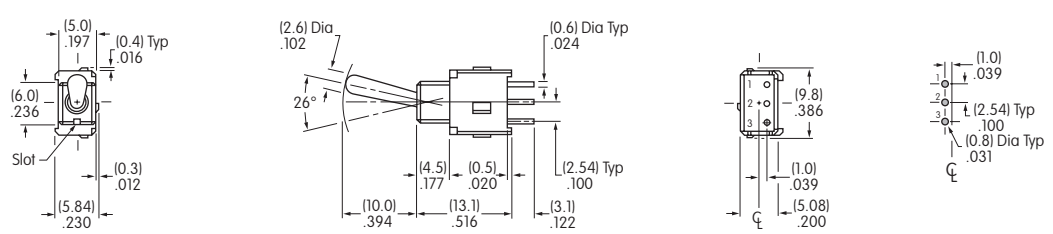
Color Codes:

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

TYPICAL SWITCH DIMENSIONS

Single Pole

Straight PC

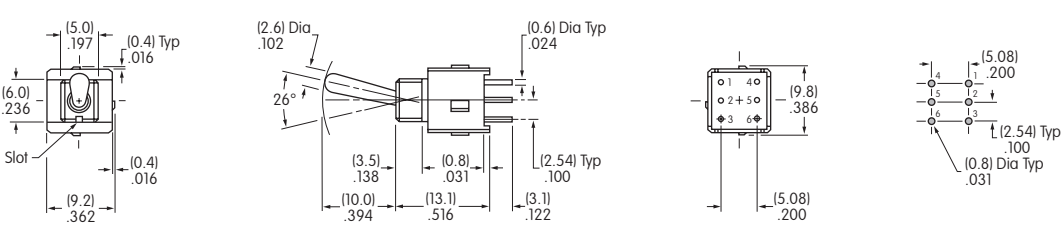


A11 models do not have Terminal 2

A12AP

Double Pole

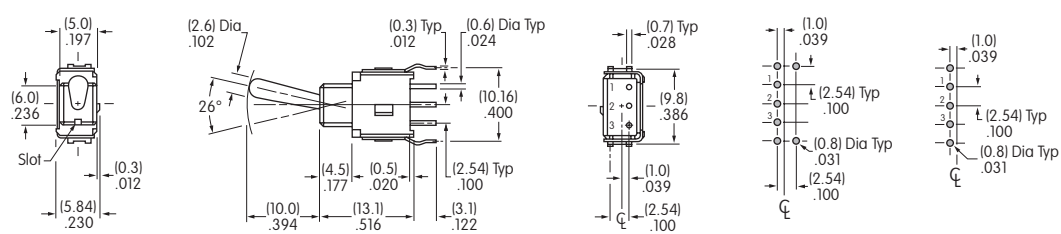
Straight PC



A22AP

Single Pole

Straight PC • Bracket



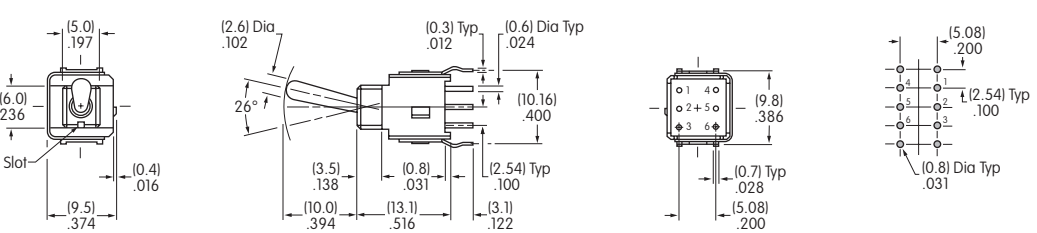
B Terminals

B1 Terminals

A12AB

Double Pole

Straight PC • Bracket



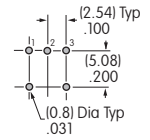
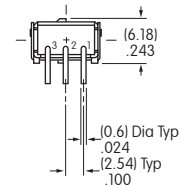
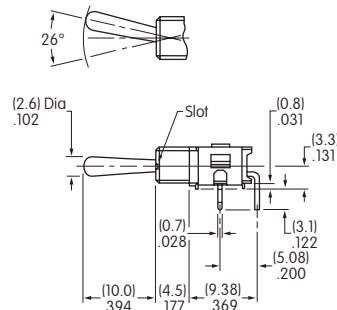
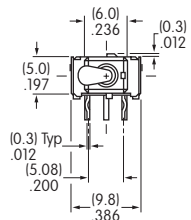
A22AB

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

TYPICAL SWITCH DIMENSIONS

Right Angle PC

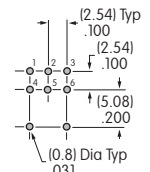
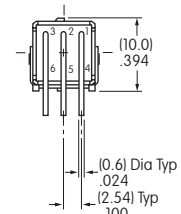
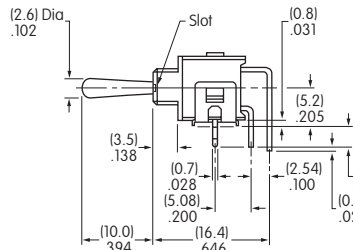
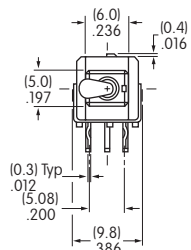
Single Pole



A12AH

Right Angle PC

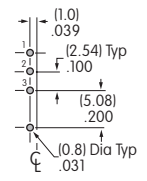
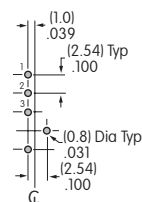
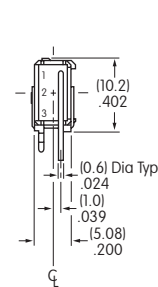
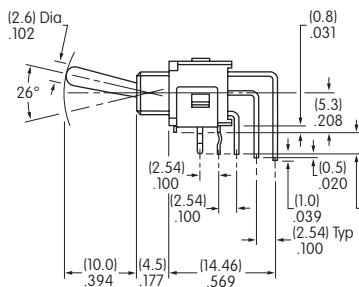
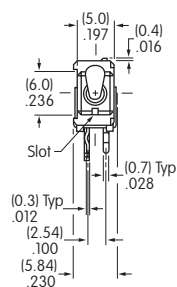
Double Pole



A22AH

Vertical PC

Single Pole



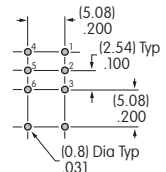
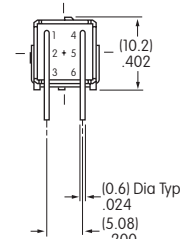
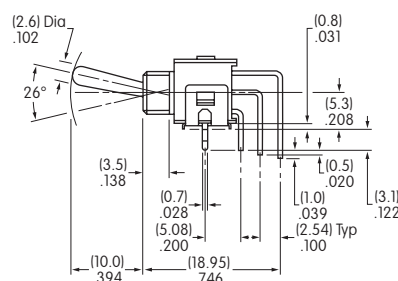
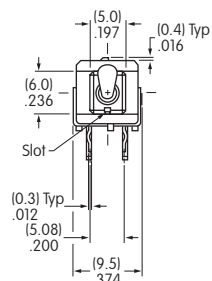
A12AV

V Terminals

V1 Terminals

Vertical PC

Double Pole



A22AV

A General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 50 milliohms maximum
Insulation Resistance: 500 megohms minimum @ 500V DC
Dielectric Strength: 500V AC minimum for 1 minute minimum
Mechanical Life: 100,000 operations minimum for On-None-On & On-Off-On
50,000 operations minimum for other circuits
50,000 operations minimum for locking lever models
Electrical Life: 50,000 operations minimum
Nominal Operating Force: Toggles A, A1, E & K with Long Paddle: 1.47N (momentary); 1.18N (maintained)
Toggles J & H & K with Short Paddle: 2.72N (momentary); 1.84N (maintained)
Toggle L: 0.59N
Contact Timing: Nonshorting (break-before-make)
Angle of Throw: 26°

Materials & Finishes

Toggle: Nickel plated brass
Bushing: Carbon blended polyamide; nickel plated zinc alloy for locking levers & threaded bushing
Gasket: Nitrile butadiene rubber
Case Housing: Glass fiber reinforced polyamide
Support Bracket: Tin plated phosphor bronze
Movable Contact: Phosphor bronze with gold plating
Stationary Contacts: Copper alloy with gold plating
Terminals: Copper alloy with gold plating

Environmental Data

Operating Temperature 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)

Installation

Mounting Torque: .30 ~ .45Nm (2.65 ~ 3.98 lb•in) for A1 actuator with threaded bushing only

PCB Processing

Soldering: Wave Soldering Recommended: See Profile A in Supplement section.
Manual Soldering: See Profile A in Supplement section.
Cleaning: Automated cleaning. See Cleaning specifications in Supplement section.

Standards & Certifications

Flammability Standards: UL94V-0 available
The B Series toggles have not been tested for UL recognition or CSA certification.
These switches are designed for use in a low-voltage, low-current, logic-level circuit.
When used as intended in a logic-level circuit, the results do not produce hazardous energy.

Distinctive Characteristics

Subminiature size saves space on PC boards.

Specifically developed for logic-level applications.

Antistatic superstructure, consisting of the carbon impregnated bushing and the support bracket, prevents static discharge to the contacts. Static electricity from an operator's touch travels from actuator through the bushing and bracket to the PC board.

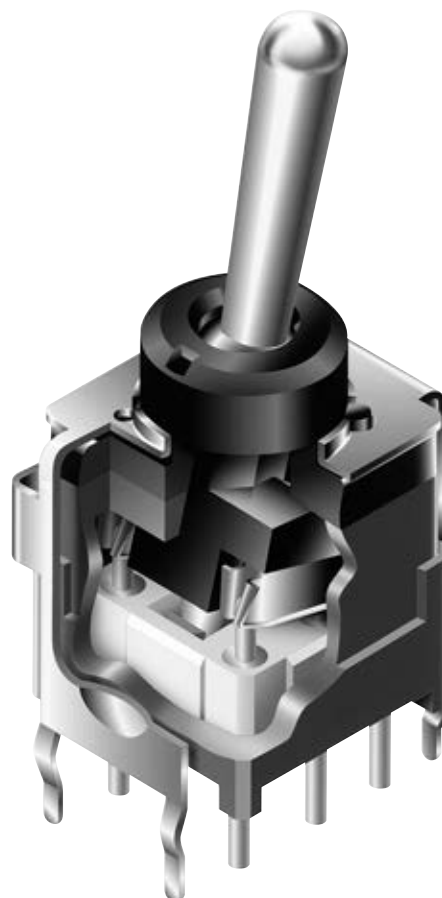
Locking lever mechanism offered as a toggle option.

Optional threaded, 6mm diameter bushing for panel seal mounting meets IP65 of IEC60529 specifications (similar to NEMA 4 and 13).

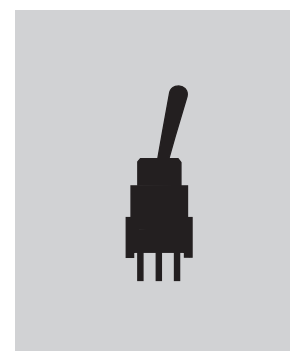
Totally sealed body construction prevents contact contamination and allows time- and money-saving soldering and cleaning. Epoxy sealed terminals lock out flux and other contaminants.

Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother, positive detent actuation, increased contact stability and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement section.)

.100" x .100" (2.54mm x 2.54mm) terminal spacing conforms to standard PC board grid spacing.

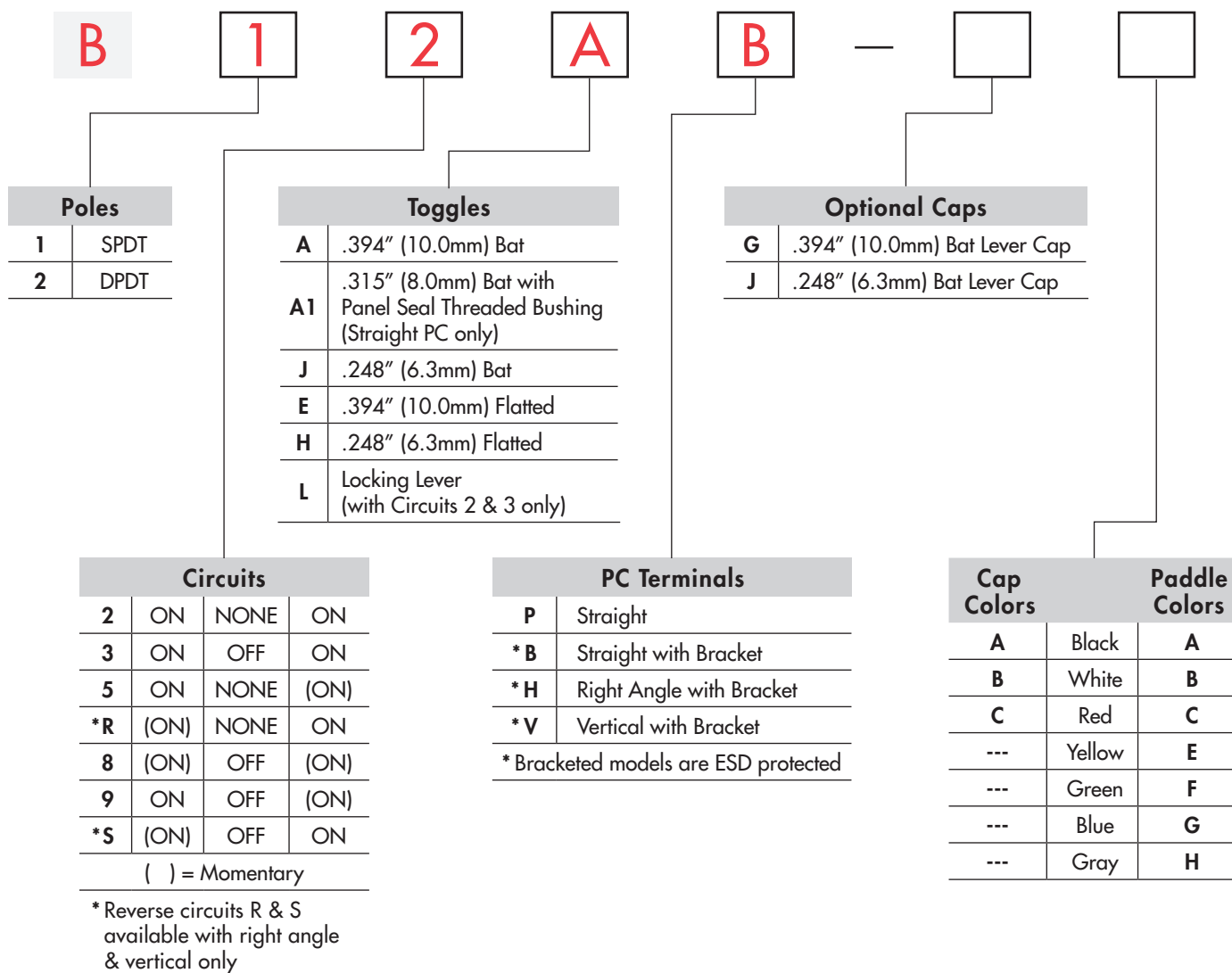


Actual Size



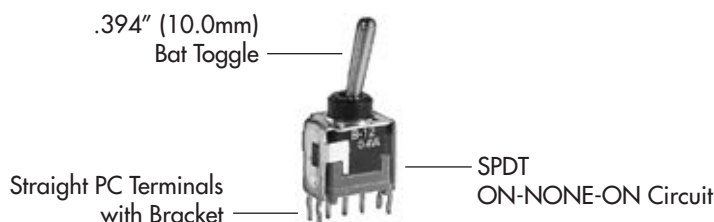
A	Toggles
	Rockers
	Pushbuttons
	Illuminated PB
	Programmable
	Keylocks
	Rotaries
	Slides
	Tactiles
	Tilt
	Touch
	Indicators
	Accessories
	Supplement

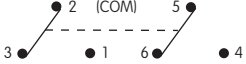
TYPICAL SWITCH ORDERING EXAMPLE



DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

B12AB



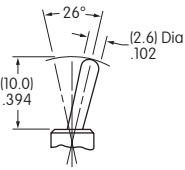
POLES & CIRCUITS								
Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Up 	Center 	Down 	Up 	Center 	Down 	
SP	B12	ON	NONE	ON				Note: Terminal numbers are not actually on the switch. SPDT 
	B13	ON	OFF	ON				
	B15	ON	NONE	(ON)				
	B1R	(ON)	NONE	ON	2-3	OPEN	2-1	
	B18	(ON)	OFF	(ON)				
	B19	ON	OFF	(ON)				
	B1S	(ON)	OFF	ON				
DP	B22	ON	NONE	ON				DPDT 
	B23	ON	OFF	ON				
	B25	ON	NONE	(ON)				
	B2R	(ON)	NONE	ON	2-3 5-6	OPEN	2-1 5-4	
	B28	(ON)	OFF	(ON)				
	B29	ON	OFF	(ON)				
	B2S	(ON)	OFF	ON				

TOGGLES

Standard Material & Finish: Brass with Bright Nickel

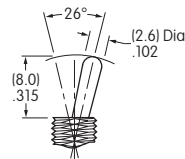
A

.394" (10.0mm)
Bat



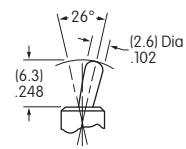
A1

.315" (8.0mm) Bat with
Panel Seal Threaded Bushing



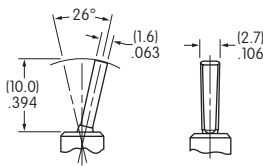
J

.248" (6.3mm)
Bat



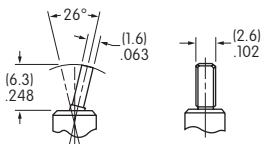
E

.394" (10.0mm)
Flatted



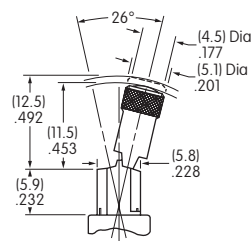
H

.248" (6.3mm) Flatted



L

Locking Lever

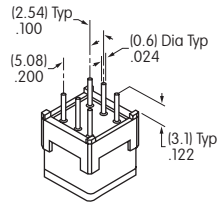


A
Toggles
Rocker
Pushbuttons
Illuminated PB
Programmable
Keylocks
Rotaries
Slides
Tactiles
Tilt
Touch
Indicators
Accessories
Supplement

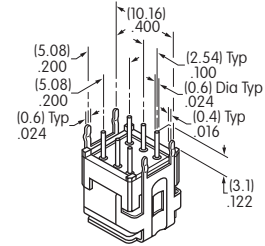
PC TERMINALS

Use of a support bracket is recommended to increase PCB mounting strength and stability.

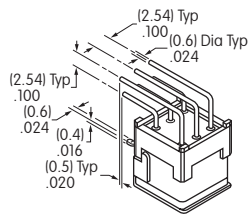
P Straight



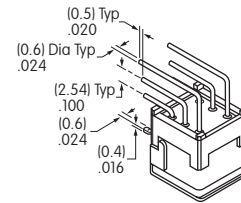
B Straight with Bracket



H Right Angle with Bracket



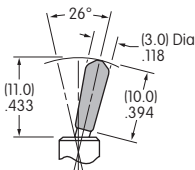
V Vertical with Bracket



OPTIONAL CAPS

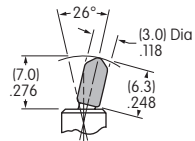
G AT4003 .394" (10.0mm) Bat Lever Cap

Material: PVC
Colors Available:
A, B, C



J AT4064 .248" (6.3mm) Bat Lever Cap

Material: PVC
Colors Available:
A, B, C

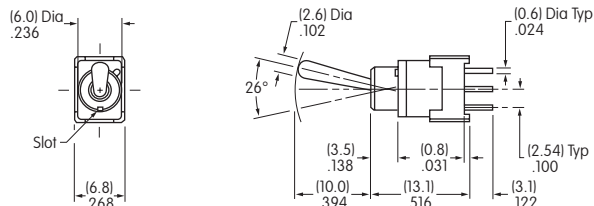


Color Codes:

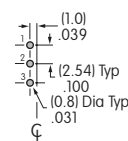
A Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

TYPICAL SWITCH DIMENSIONS

Single Pole

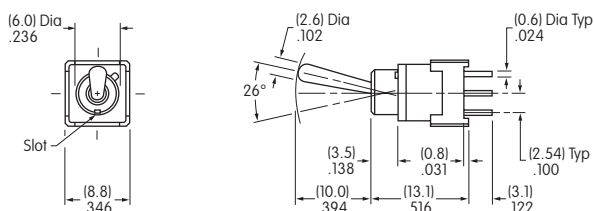


Straight PC

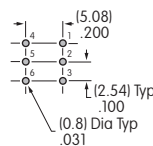


B12AP

Double Pole

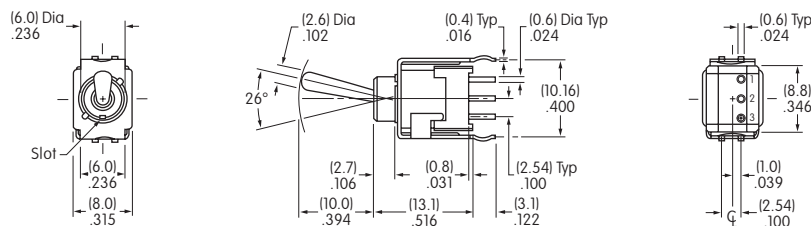


Straight PC

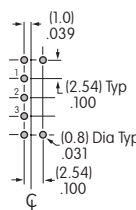


B22AP

Single Pole

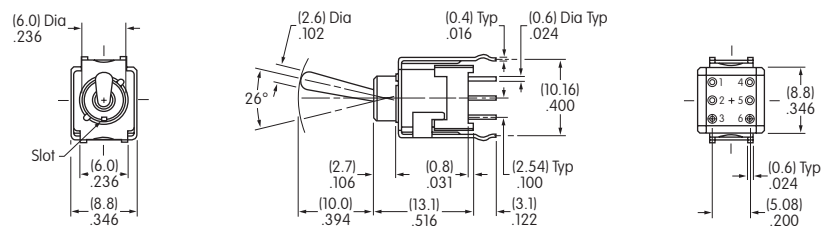


Straight PC • Bracket

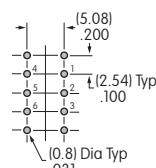


B12AB

Double Pole

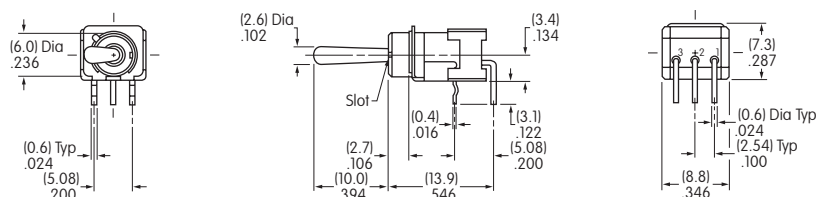


Straight PC • Bracket

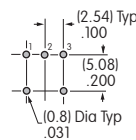


B22AB

Single Pole



Right Angle PC



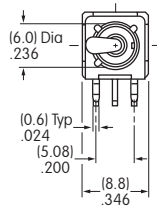
B12AH

TYPICAL SWITCH DIMENSIONS

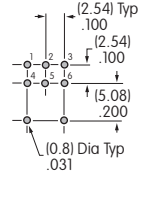
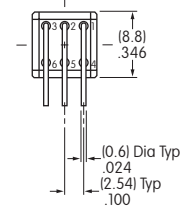
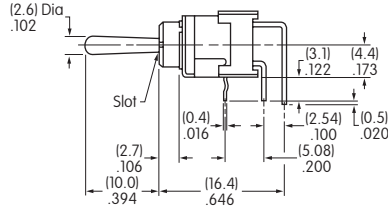
Right Angle PC



B22AH



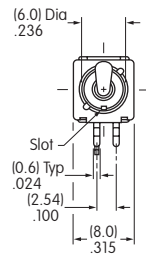
Double Pole



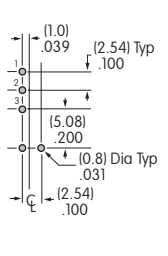
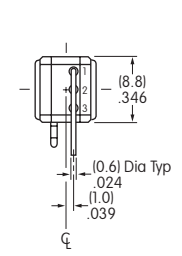
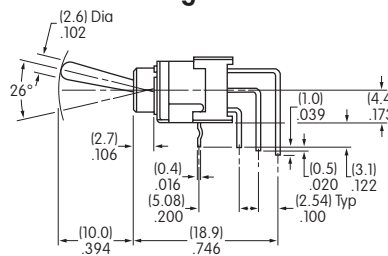
Vertical PC



B12AV



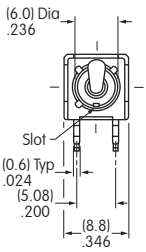
Single Pole



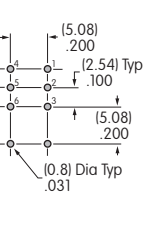
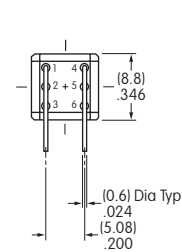
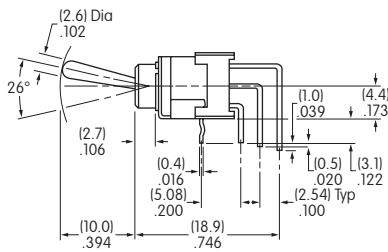
Vertical PC



B22AV



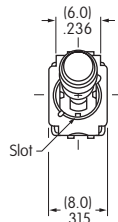
Double Pole



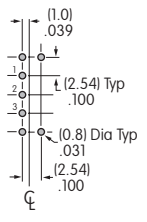
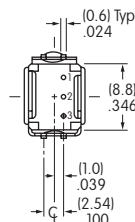
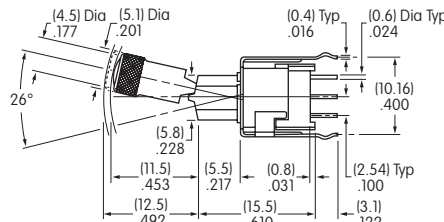
Locking Lever • Straight PC • Bracket



B12LB



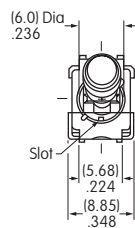
Single Pole



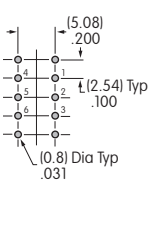
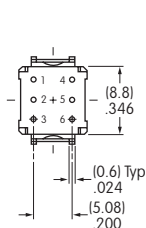
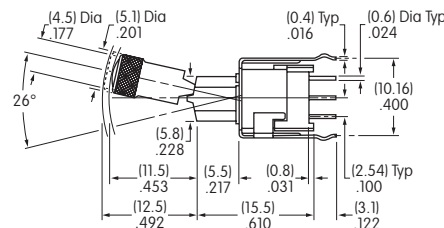
Locking Lever • Straight PC • Bracket



B22LB



Double Pole

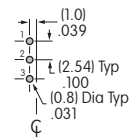
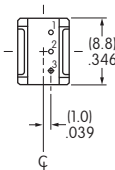
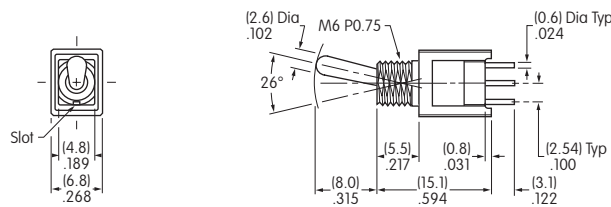


Process Sealed Subminiature Antistatic Toggles

TYPICAL SWITCH DIMENSIONS

Panel Seal • Single Pole

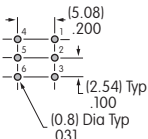
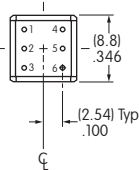
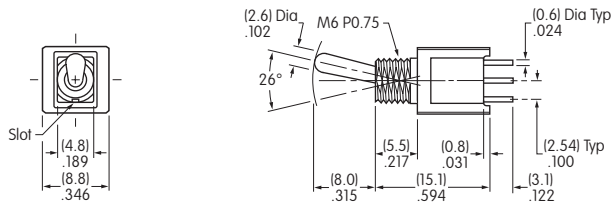
Threaded Bushing • Straight PC



B12A1P

Panel Seal • Double Pole

Threaded Bushing • Straight PC

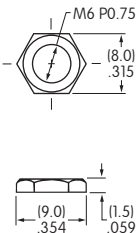


B22A1P

STANDARD HARDWARE & PANEL CUTOUT

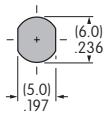
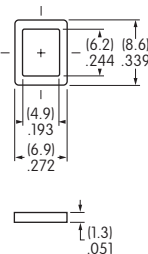
AT513M
Metric Hex Nut

Material:
Brass,
Nickel plated



AT063
Gasket

Material:
Nitrile butadiene
rubber



Maximum Panel Thickness
with Standard Hardware:
.087" (2.2mm)

General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 50 milliohms maximum
Insulation Resistance: 500 megohms minimum @ 500V DC
Dielectric Strength: 500V AC minimum for 1 minute minimum
Mechanical Life: 100,000 operations minimum
Electrical Life: 50,000 operations minimum
Nominal Operating Force: 1.18N
Contact Timing: Nonshorting (break-before-make)
Angle of Throw: 26°

Materials & Finishes

Actuator: Polyamide
Bushing Housing: Polyamide
Case Housing: Glass fiber reinforced polyamide
Support Bracket: Phosphor bronze with tin plating
Movable Contact: Phosphor bronze with gold plating
Stationary Contacts: Brass with tin plating
Terminals: Brass with gold plating

Environmental Data

Operating Temperature Range: -25°C through +55°C (-13°F through +131°F)
Humidity: 90 ~ 95% humidity for 240 hours @ 40°C (104°F)
Vibration: 10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning in 5 minutes; 3 right angled directions for 2 hours
Shock: 50G (490m/s²) acceleration (tested in 3 right angled directions, with 5 shocks in each direction)

PCB Processing

Soldering: Wave Soldering recommended. See Profile A in Supplement section.
Manual Soldering: See Profile A in Supplement section.
Cleaning: Automated alcohol based cleaning recommended, 5 minutes maximum. Do not use high-purity alcohol (50% alcohol or more) or organic solvent. High alcohol solution can damage clear plastic. See Cleaning specifications in Supplement section.

Standards & Certifications

The B Series illuminated toggles have not been tested for UL recognition or CSA certification. These switches are designed for use in a low-voltage, low-current, logic-level circuit. When used as intended in a logic-level circuit, the results do not produce hazardous energy.

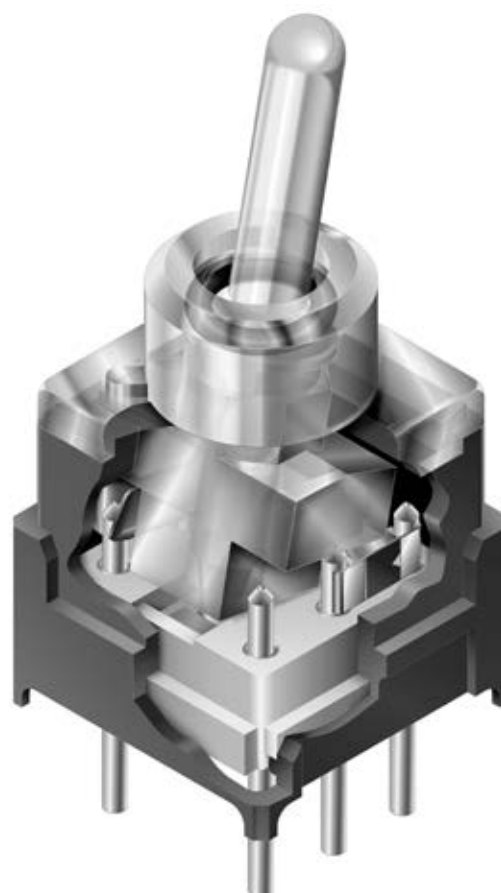
Distinctive Characteristics

LED provides maximum illumination to bushing and actuator, indicating actuator status in highly visible green, red, or amber for single color or red/green for bicolor.

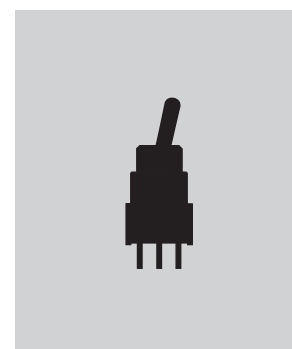
Totally sealed body construction prevents contact contamination and allows time- and money-saving automated soldering and cleaning. Molded-in, epoxy sealed terminals lock out flux and other contaminants.

Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother, positive detent actuation, increased contact stability, and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement section.)

.100" x .100" (2.54mm x 2.54mm) terminal spacing conforms to standard PC board grid spacing.



Actual Size



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

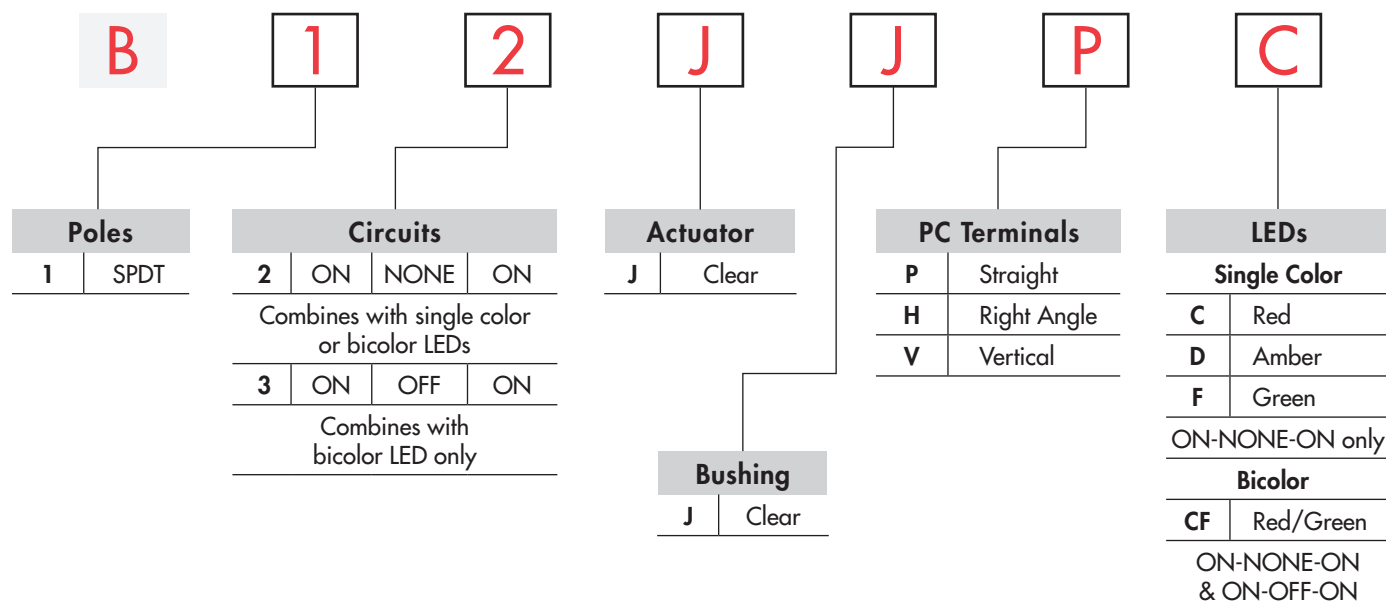
Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE



DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

B12JJPC

Clear Toggle & Bushing
with Red LED

Straight
PC Terminals



SPDT
ON-NONE-ON Circuit

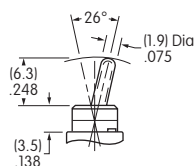
POLE & CIRCUITS

Pole Throw	Model	Toggle Position			Connected Terminals			Throw & Schematics
		Up	Center	Down	Up	Center	Down	
								Note: Terminal numbers are not actually on the switch. LED circuit is isolated and requires an external power source. Single Color Bicolor
SPDT	B12 B13	ON ON	NONE OFF	ON ON	2-3 2-3	NONE OPEN	2-1 2-1	

ACTUATOR & BUSHING



Clear Toggle



Clear Bushing

LED COLORS & SPECIFICATIONS

LEDs are an integral part of the switch and not available separately. The electrical specifications shown are determined at a basic temperature of 25°C. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula in the Supplement section.

	Colors	Single Color			Bicolor
		C Red	D Amber	F Green	CF Red/Green
Maximum Forward Current	I_{FM}	30mA	30mA	25mA	30mA/25mA
Typical Forward Current	I_F	20mA	20mA	20mA	20mA/20mA
Forward Voltage	V_F	1.95V	2.0V	3.3V	1.95V/3.3V
Maximum Reverse Voltage	V_{RM}	5V	5V	5V	5V/5V
Current Reduction Rate Above 25°C	ΔI_F	0.40mA/°C		0.33mA/°C	0.40mA/°C/0.33mA/°C
Ambient Temperature Range		-25°C ~ +55°C			

PC TERMINALS



Straight

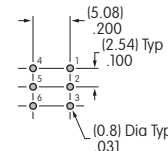
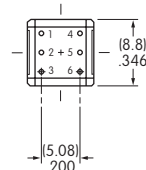
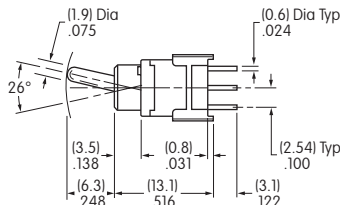
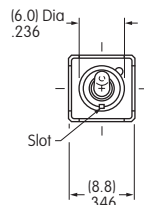


Right Angle with Bracket



Vertical with Bracket

TYPICAL SWITCH DIMENSIONS

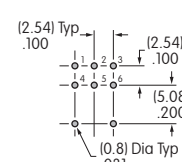
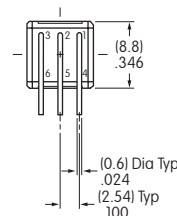
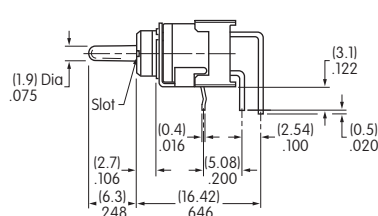
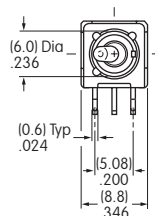
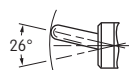


Straight PC



B12JJPC

Terminal 4 is a support pin on single color models.

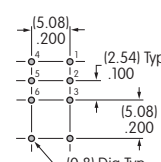
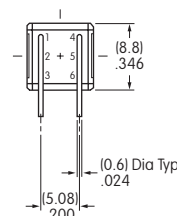
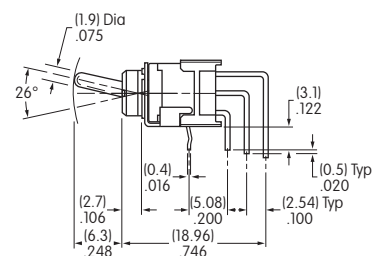
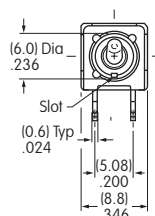


Right Angle PC



B13JJHCF

Terminal 4 is a support pin on single color models.



Vertical PC



B13JJVCF

Terminal 4 is a support pin on single color models.

A General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 48V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 48V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 50 milliohms maximum
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 & case for 1 minute minimum
Mechanical Life: 100,000 operations minimum for bat lever models
50,000 operations minimum for locking lever models
Electrical Life: 50,000 operations minimum
Contact Timing: Nonshorting (break-before-make)
Angle of Throw: 24°

Materials & Finishes

Toggle/Lever: Brass with chrome plating
Bushing: Brass with nickel plating
Support Bracket: Straight PC: phosphor bronze with tin plating; right angle & vertical: brass with tin plating
Housing: Polybutylene terephthalate (PBT) (UL94V-0)
Base: 1- and 2-pole GFR polyamide (UL94V-0); 4-pole liquid crystal polymer (LCP) (UL94V-0)
Movable Contacts: Phosphor bronze with gold plating
Stationary Contacts: Brass with gold plating
Terminals: Brass with gold plating

Environmental Data

Operating Temp Range: -10°C through +70°C (+14°F through +158°F)
Humidity: 90 ~ 95% humidity for 240 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)

PCB Processing

Soldering: Wave Soldering recommended. See Profile A in Supplement section.
Manual Soldering: 1- & 2-pole: 3 seconds maximum @ 350°C maximum;
4-pole: 4 seconds maximum @ 410°C maximum
Cleaning: Hand clean locally using alcohol based solution.
See Cleaning specifications in Supplement section.

Standards & Certifications

Flammability Standards: UL94V-0 rated housing & base
The D2 Series toggles have not been tested for UL recognition or CSA certification.
These switches are designed for use in a low-current, logic level circuit.
When used as intended in a logic level circuit, the results do not produce hazardous energy.

Distinctive Characteristics

Base of heat resistant resin meets UL94V-0 flammability rating.

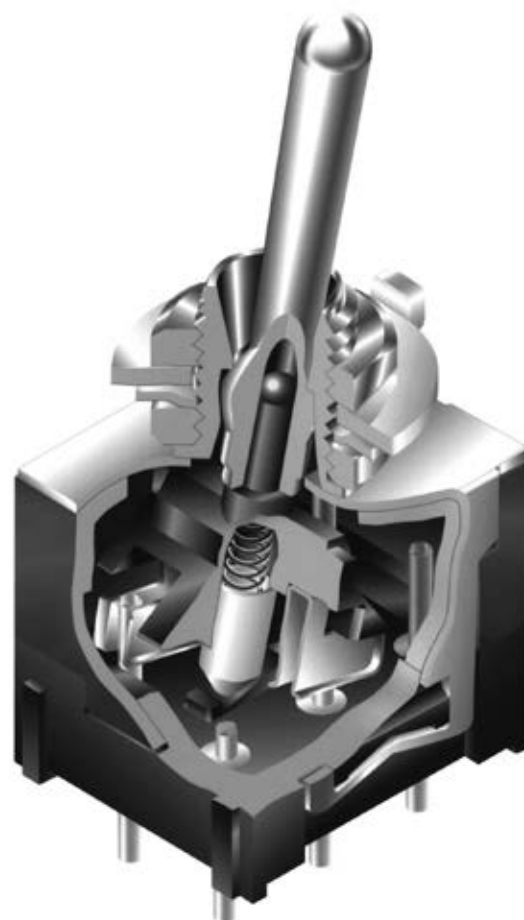
Maximized voltage capability of 48V allows use in medium source applications and increases operating life.

Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother positive detent actuation, increased contact stability, and unparalleled reliability. (Additional STC details under Terms and Acronyms in the Supplement section.)

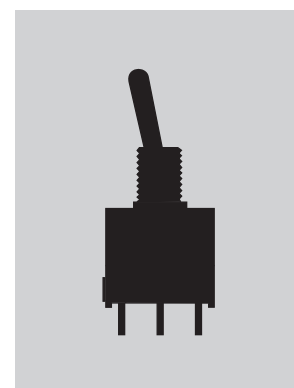
Round .031" (0.8mm) diameter PC terminals for easy PCB assembly.

Terminal spacing conforms to standard .100" (2.54mm) PC board grid spacing.

Molded-in terminals prevent entry of flux, solvents, and other contaminants.



Actual Size



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

TYPICAL SWITCH ORDERING EXAMPLE

D220

1

2

P

Poles

1	SPDT
2	DPDT
*4	4PDT

* Combines with ON-NONE-ON circuit only & not available with Right Angle

Actuators

No Code	.413" (10.5mm) Bat Lever
L	.200" (5.1mm) Diameter Locking Lever

Circuits

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

() = Momentary

PC Terminals

P	Straight
*B	Straight with Bracket
*H	Right Angle with Bracket
*V	Vertical with Bracket

*Bracketed models combine with smooth bushings

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

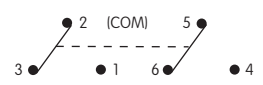
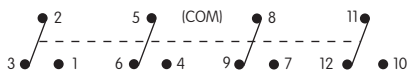
D22012P

.413" (10.5mm)
Bat Lever



SPDT
ON-NONE-ON Circuit

Straight PC Terminals

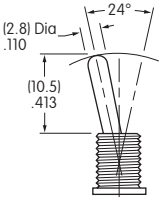
POLES & CIRCUITS								
		Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
Pole	Model	Down 	Center 	Up 	Down 	Center 	Up 	Note: Terminal numbers are not actually on the switch.
SP	D22012	ON	NONE	ON	2-3	OPEN	2-1	SPDT 
	D22013	ON	OFF	ON				
	D22015	ON	NONE	(ON)				
	D22018	(ON)	OFF	(ON)				
	D22019	ON	OFF	(ON)				
DP	D22022	ON	NONE	ON	2-3 5-6	OPEN	2-1 5-4	DPDT 
	D22023	ON	OFF	ON				
	D22025	ON	NONE	(ON)				
	D22028	(ON)	OFF	(ON)				
	D22029	ON	OFF	(ON)				
4P	D22042	ON	NONE	ON	2-3 5-6 8-9 11-12	OPEN	2-1 5-4 8-7 11-10	4PDT 

ACTUATORS

No Code

.413" (10.5mm)
Bat Lever

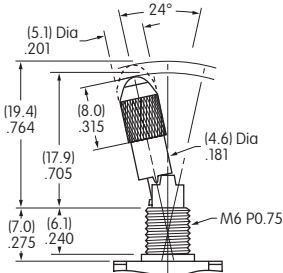
Material:
Chrome over brass



L

.413" (5.1mm) Diameter
Locking Lever

Material:
Chrome over brass



PC TERMINALS

P

Straight



B

Straight with Bracket



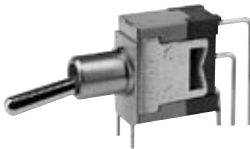
H

Right Angle with Bracket



V

Vertical with Bracket

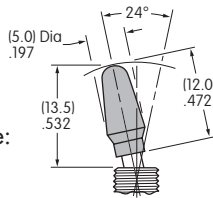


OPTIONAL CAPS & CAP COLORS

AT415
Bat Lever Cap

Material:
Polyethylene

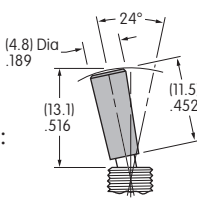
Colors Available:
A B C E F G



AT444 Bat Lever
Conical Cap

Material:
Polyethylene

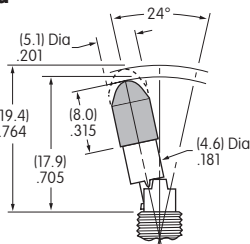
Colors Available:
A B C E F G



AT427 Cap Supplied
with Locking Lever

Material:
Anodized Aluminum

Colors Available:
A C G



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

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

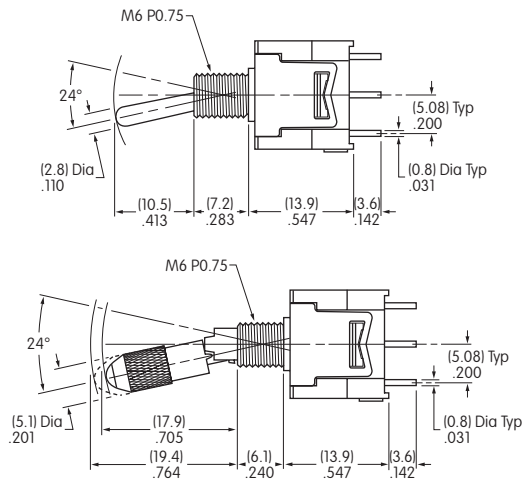
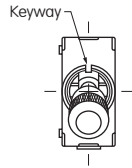
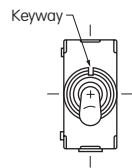
TYPICAL SWITCH DIMENSIONS

Straight PC • Single Pole

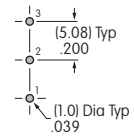
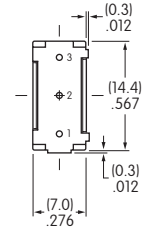


D22012P

D22012LP



Actuator in Down Position

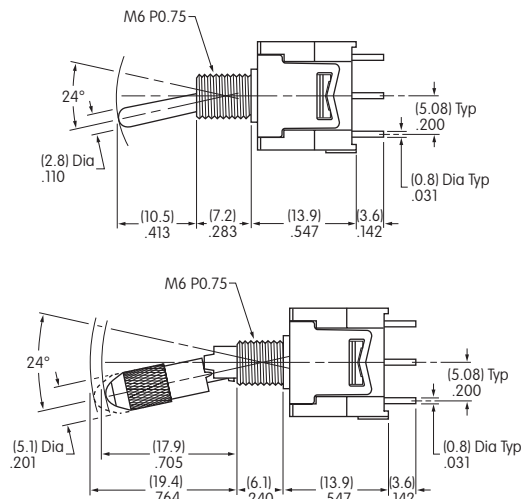
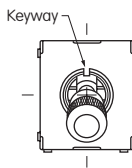
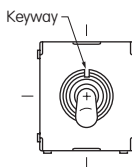


Straight PC • Double Pole

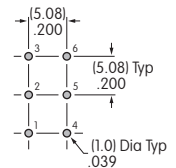
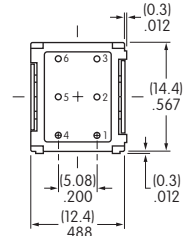


D22022P

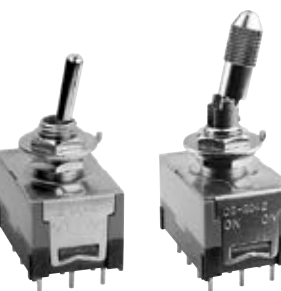
D22022LP



Actuator in Down Position

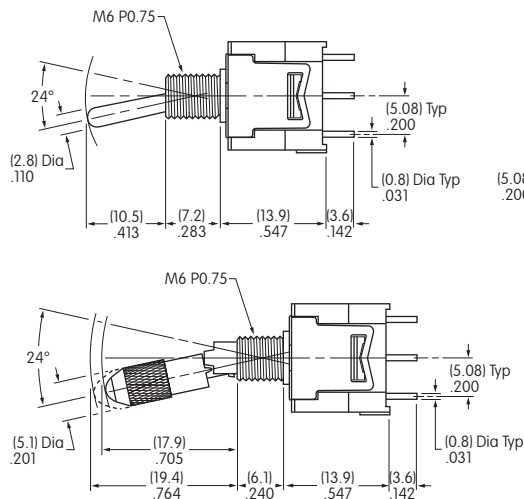
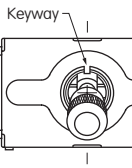
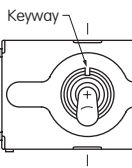


Straight PC • Four Pole

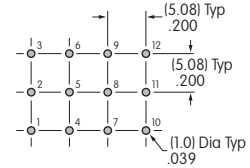
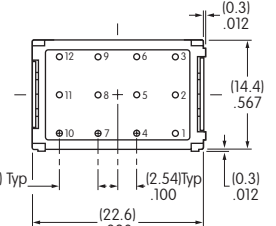


D22042P

D22042LP



Actuator in Down Position



TYPICAL SWITCH DIMENSIONS

A Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

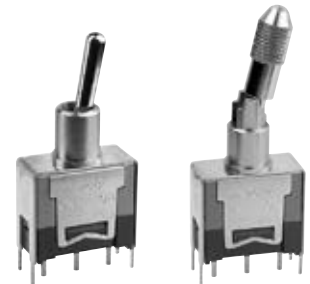
Touch

Indicators

Accessories

Supplement

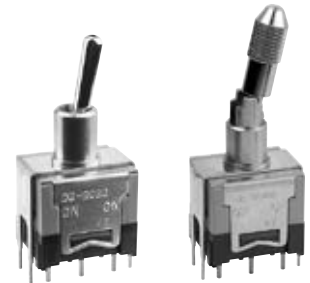
Straight PC • Bracket Single Pole



D22012B

D22012LB

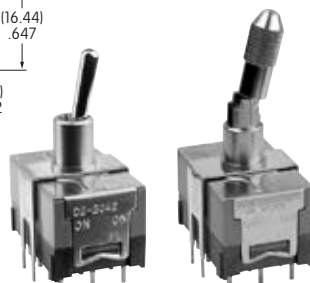
Straight PC • Bracket Double Pole



D22022B

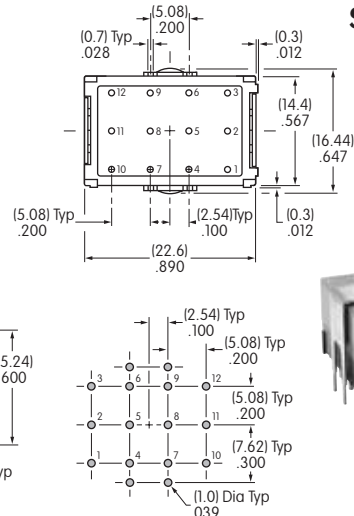
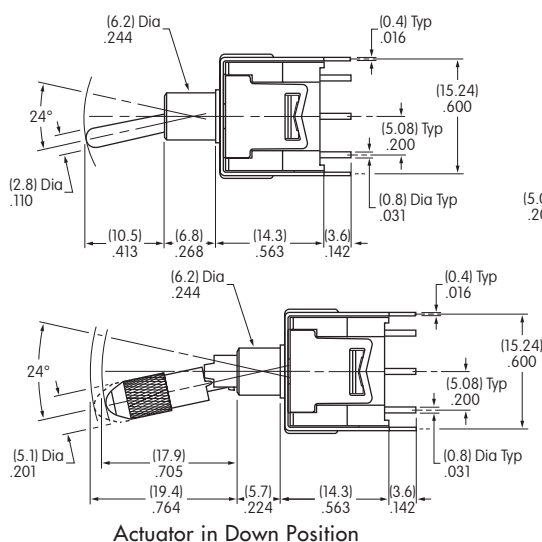
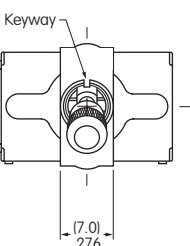
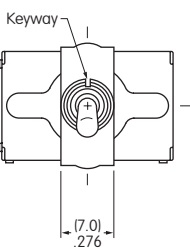
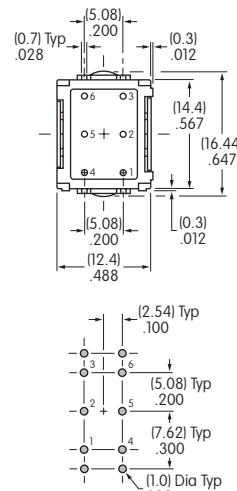
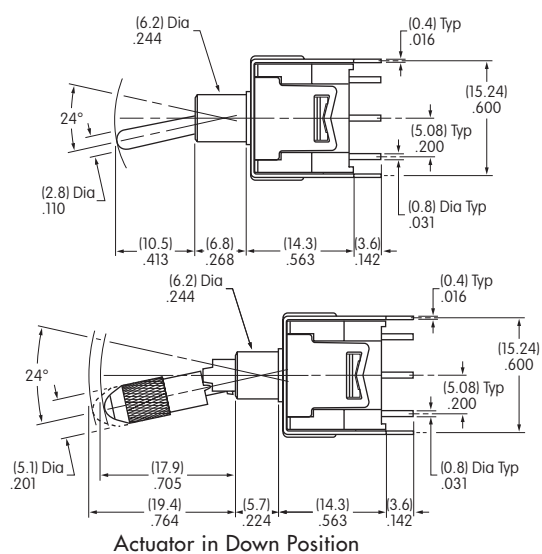
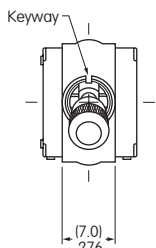
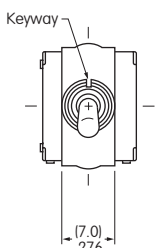
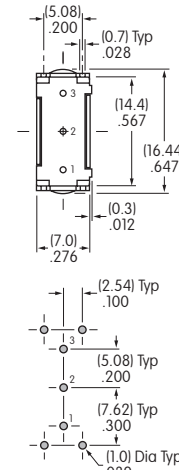
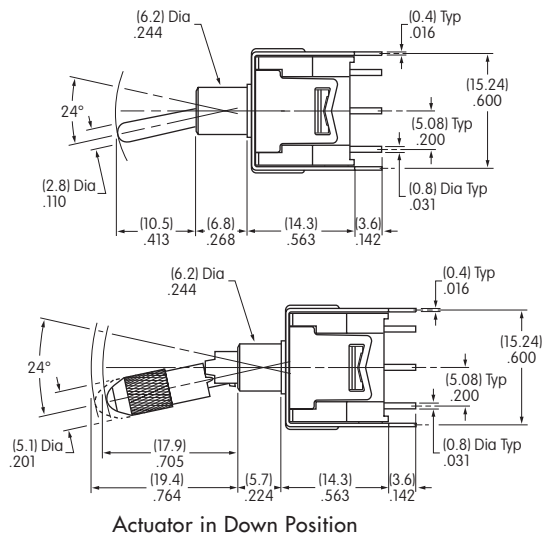
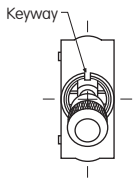
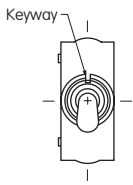
D22022LB

Straight PC • Bracket Four Pole



D22042B

D22042LB

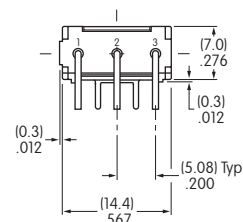
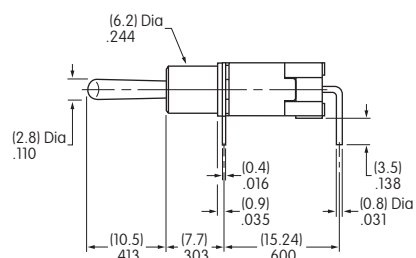
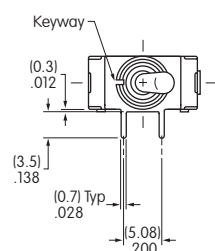


TYPICAL SWITCH DIMENSIONS

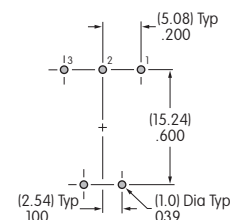
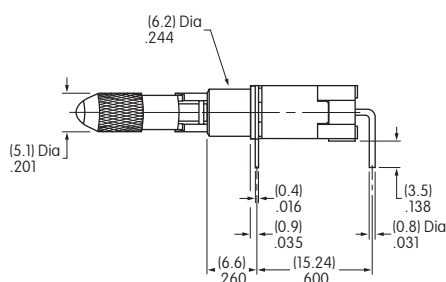
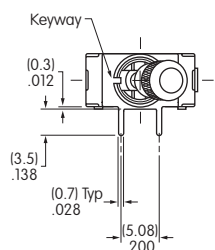
Right Angle PC • Single Pole



D22012H



D22012LH

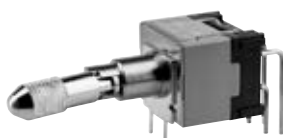
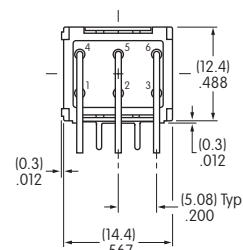
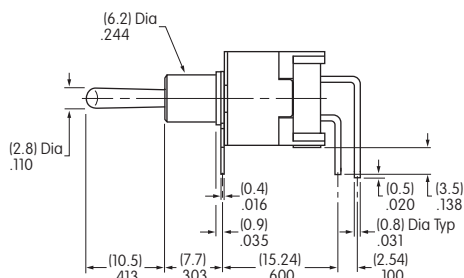
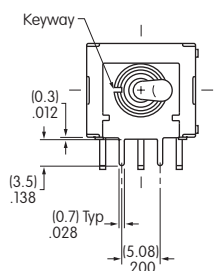


Actuator in Down Position

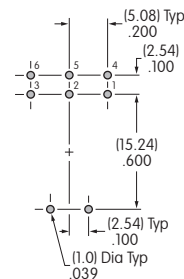
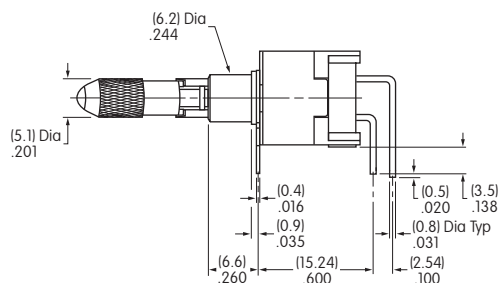
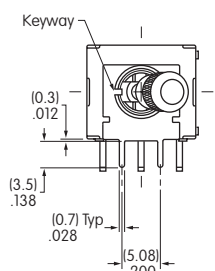
Right Angle PC • Double Pole



D22022H



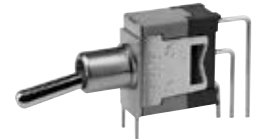
D22022LH



Actuator in Down Position

A Toggles

Rocker's



Pushbuttons



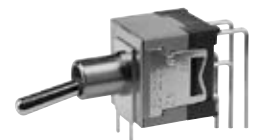
Illuminated PB

programmable

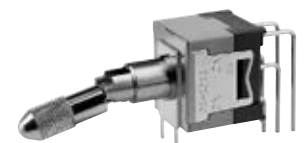
Keylocks

Rotaries

Slides



lactiles



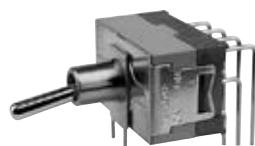
louch

Indicators

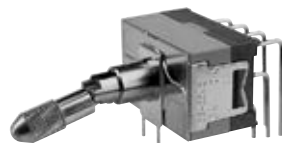
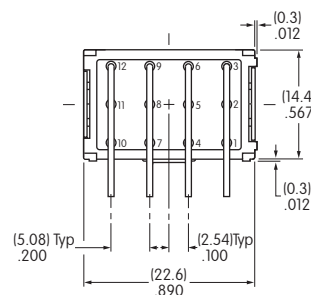
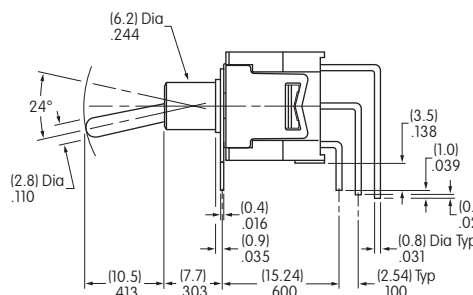
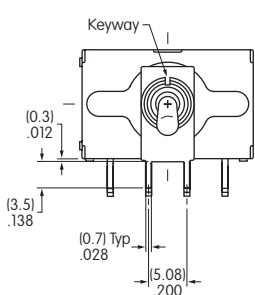
Accessories

Supplement

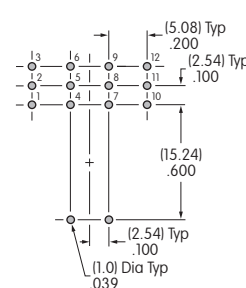
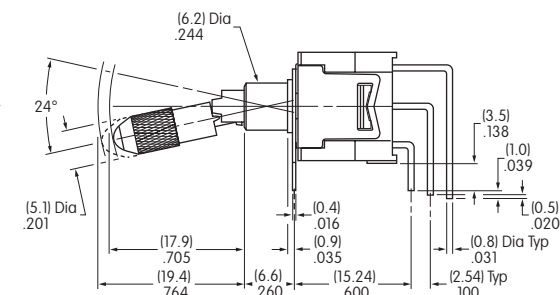
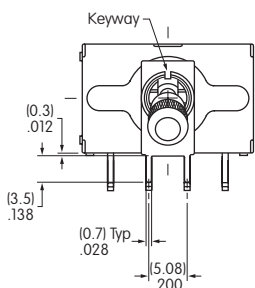
Vertical PC • Four Pole



D22042V



D22042LV



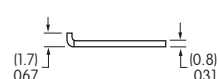
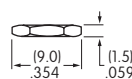
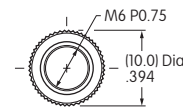
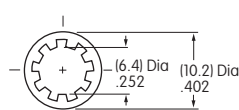
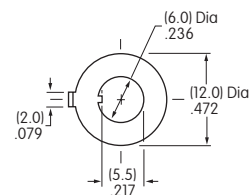
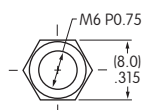
Actuator in Down Position

OPTIONAL

AT501M

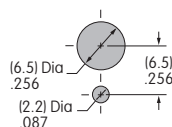
Knurled Face Nut

Brass with chrome plating

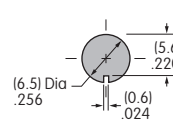


Without Locking Ring & Bottom Hex Nut

.185" (4.7mm) for
Standard Lever



.142" (3.6mm) for
Locking Lever



A General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 80 milliohms maximum
Insulation Resistance: 500 megohms minimum @ 500V DC
Dielectric Strength: 500V AC minimum for 1 minute minimum
Mechanical Life: 100,000 operations minimum for On-None-On & On-Off-On
50,000 operations minimum for other circuits
Electrical Life: 100,000 operations minimum for On-None-On & On-Off-On
50,000 operations minimum for other circuits
Nominal Operating Force: 0.93N for momentary & 1.20N for maintained
Angle of Throw: 28°

Materials & Finishes

Actuator: Glass fiber reinforced polyamide
Case: Glass fiber reinforced polyamide
Sealing Rings: Nitrile butadiene rubber
Movable Contacts: Phosphor bronze with gold plating
Stationary Contacts: Phosphor bronze with gold plating
Base: Glass fiber reinforced polyamide
Terminals: Phosphor bronze with gold plating
Support Bracket: Phosphor bronze with tin plating

Environmental Data

Operating Temperature Range: -25°C through +85°C (-13°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)

PCB Processing

Soldering: Wave Soldering recommended: See Profile A in Supplement section.
Manual Soldering: See Profile A in Supplement section.
Cleaning: Automated cleaning. See Cleaning specifications in Supplement section.

Standards & Certifications

The G Series toggles have not been tested for UL recognition or CSA certification.
These switches are designed for use in a low-voltage, low-current, logic-level circuit.
When used as intended in a logic-level circuit, the results do not produce hazardous energy.

Distinctive Characteristics

Ultra-miniature size allows high density mounting, and extremely light weight of 0.25 gram makes these switches ideal for handheld equipment.

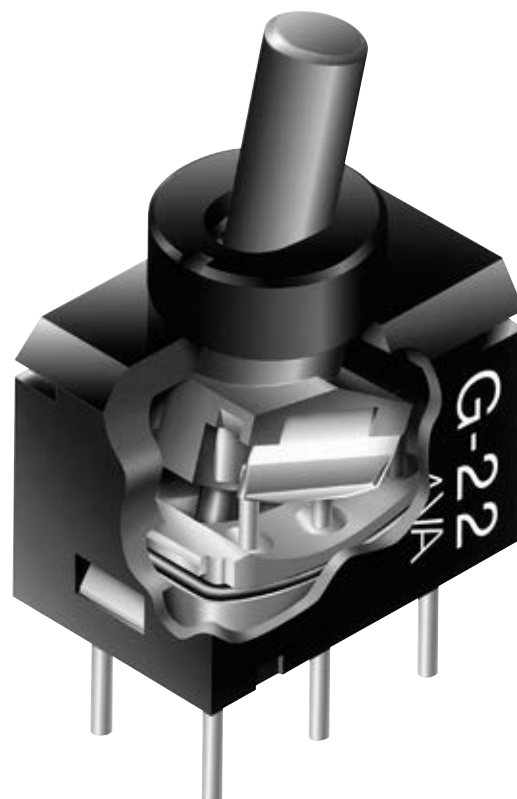
Totally sealed body construction prevents contact contamination and allows time- and money-saving automated soldering and cleaning.

Molded-in, epoxy sealed terminals lock out flux, solvents, and other contaminants.

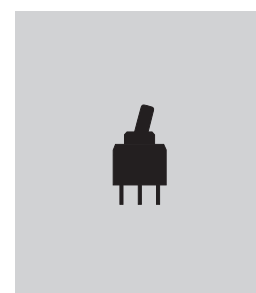
Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smooth, positive detent actuation, increased contact stability, and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement section.)

.100" x .100" (2.54mm x 2.54mm) terminal spacing conforms to standard PC board grid spacing. Round terminals facilitate easier through-hole mounting on PC boards.

Matching indicators available.



Actual Size



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

TYPICAL SWITCH ORDERING EXAMPLE

G

1

3

A

H

Poles

1	SPDT
2	DPDT

Circuits

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

() = Momentary

Actuator

A	.150" (3.8mm) Column Toggle
---	--------------------------------

PC Terminals

P	Straight
H	Right Angle
V	Vertical

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

G13AH

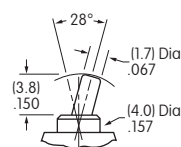


POLES & CIRCUITS

Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Up 	Center 	Down 	Up 	Center 	Down 	
SP	G12 G13 G15 G18 G19	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	5-6	OPEN	5-4	SPDT
DP	G22 G23 G25 G28 G29	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	5-6 2-3	OPEN	5-4 2-1	DPDT

ACTUATOR

A .150" (3.8mm) Column Toggle

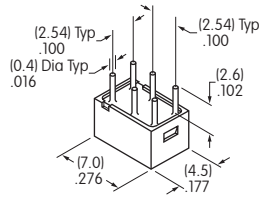


PC TERMINALS

A
Toggles

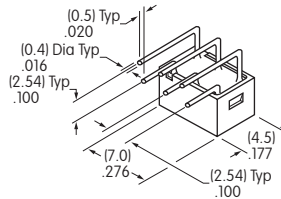
P

Straight



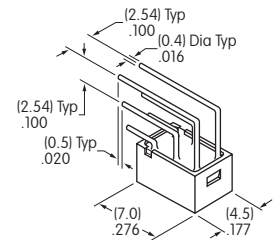
H

Right Angle



V

Vertical



Rockers

Pushbuttons

Illuminated PB

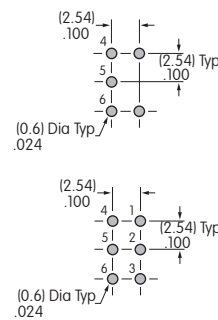
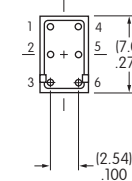
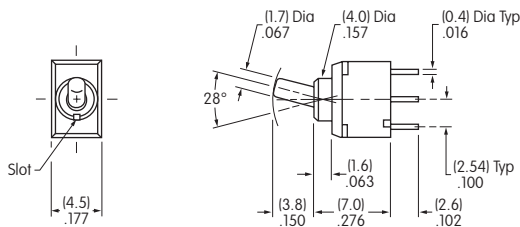
Programmable

Keylocks

Rotaries

TYPICAL SWITCH DIMENSIONS

Single & Double Pole



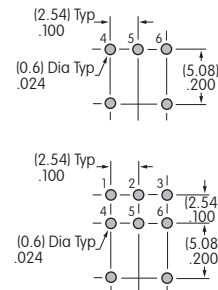
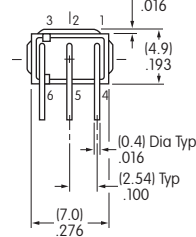
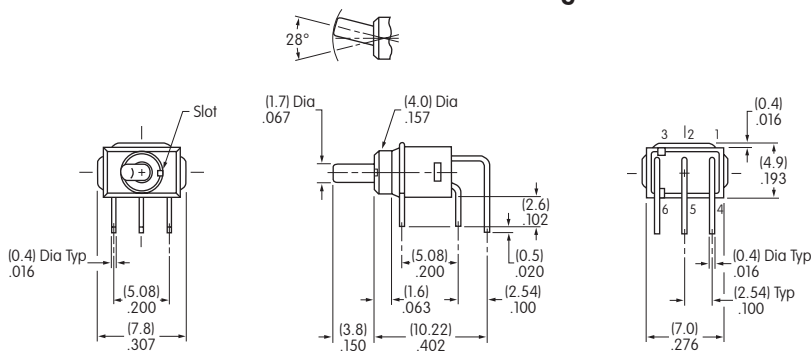
Straight PC



G19AP

On single pole models, locations 1 & 3 are for support pins.

Single & Double Pole

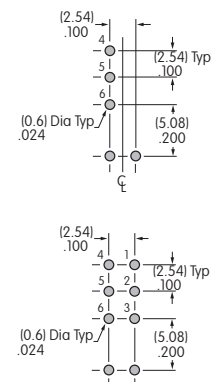
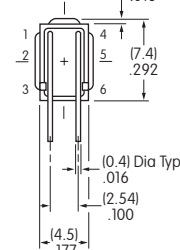
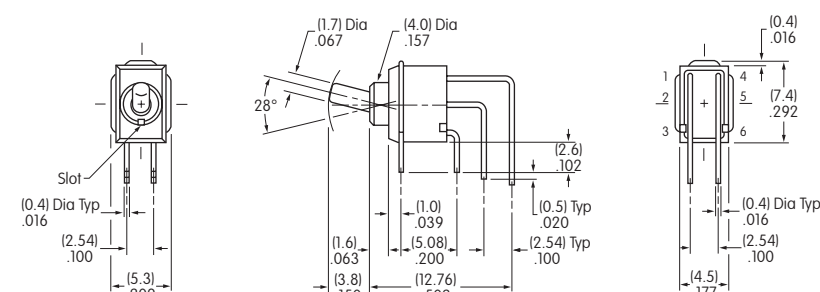


Right Angle PC



G19AH

Single & Double Pole



Vertical PC



G22AV

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 80 milliohms maximum
Insulation Resistance: 500 megohms minimum @ 500V DC
Dielectric Strength: 500V AC minimum for 1 minute minimum
Mechanical Life: 100,000 operations minimum
Electrical Life: 100,000 operations minimum
10,000 operations minimum @ 0.1A @ 28V AC/DC
Nominal Operating Force: 1.30N
Angle of Throw: 28°

Materials & Finishes

Actuator: Polyamide
Case: Glass fiber reinforced polyamide
Sealing Rings: Nitrile butadiene rubber
Movable Contacts: Phosphor bronze with gold plating
Stationary Contacts: Phosphor bronze with gold plating
Base: Glass fiber reinforced polyamide
Power Terminals: Phosphor bronze with gold plating
Lamp Terminals: Phosphor bronze with gold plating

Environmental Data

Operating Temperature Range: -25°C through +55°C (-13°F through +131°F)
Humidity: 90 ~ 95% humidity for 240 hours @ 40°C (104°F)
Vibration: 10 ~ 500Hz 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)

PCB Processing

Soldering: Wave Soldering recommended. See Profile A in Supplement section.
Manual Soldering: See Profile A in Supplement section.
Cleaning: Automated cleaning. See Cleaning specifications in Supplement section.

Standards & Certifications

The G Series toggles have not been tested for UL recognition or CSA certification. These switches are designed for use in a low-voltage, low-current, logic-level circuit. When used as intended in a logic-level circuit, the results do not produce hazardous energy.

Distinctive Characteristics

Fully illuminated toggle for highly visible status indication with LED in red, green, or amber for single color and red/green for bicolor.

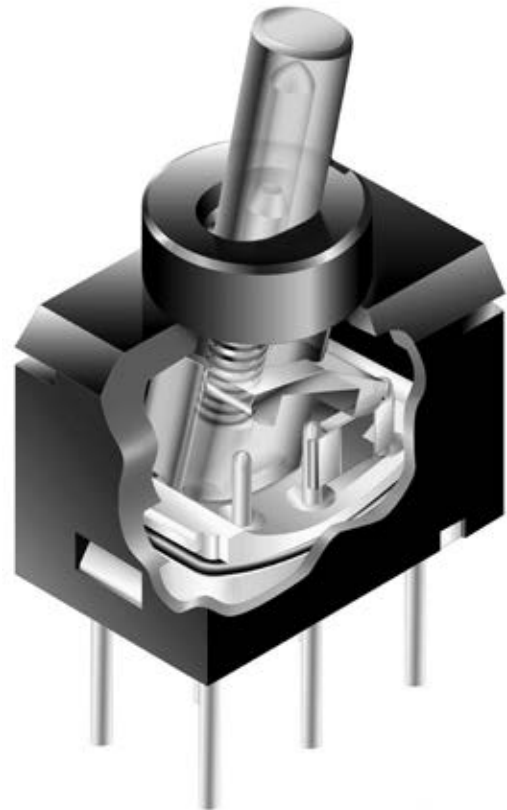
Ultra-miniature size allows high density mounting, and extremely light weight makes these switches ideal for handheld equipment.

Totally sealed body construction prevents contact contamination and allows time- and money-saving automated soldering and cleaning.

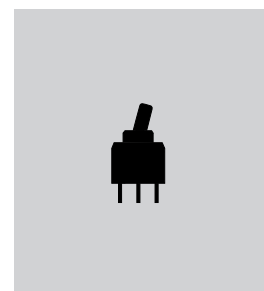
Molded-in, epoxy sealed terminals lock out flux, solvents, and other contaminants.

Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smooth, positive detent actuation, increased contact stability, and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement section.)

.100" x .100" (2.54mm x 2.54mm) terminal spacing conforms to standard PC board grid spacing. Round terminals facilitate easier through-hole mounting on PC boards.



Actual Size



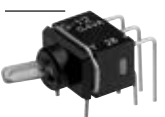
TYPICAL SWITCH ORDERING EXAMPLE

G **1** **2** **J** **H** **C**

Pole		Circuits			Actuator		PC Terminals		LEDs		
1	SPDT	2	ON	NONE	ON	J	Clear	P	Straight	Single Color	
Combines with single color or bicolor LEDs							H	Right Angle	C	Red	
Combines with bicolor LED only							V	Vertical	D	Amber	
									F	Green	
									ON-NONE-ON only		
									Bicolor		
									CF	Red/Green	
									ON-NONE-ON & ON-OFF-ON		

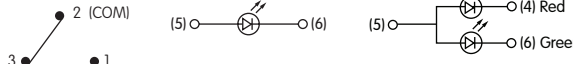
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE
G12JHC

ON-NONE-ON Circuit
Clear Toggle, Red LED



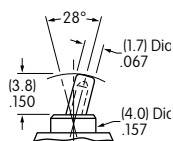
SPDT
Right Angle PC Terminals

POLES & CIRCUITS

		Toggle Position			Connected Terminals			Schematics	
Pole Throw	Model	Up	Center	Down	Up	Center	Down	Note: Terminal numbers are not actually on the switch. LED circuit is isolated and requires an external power source.	
									
SPDT	G12	ON	NONE	ON	2-3	NONE	2-1		
	G13	ON	OFF	ON	2-3	OPEN	2-1		

ACTUATOR

J Clear Toggle



LED COLORS & SPECIFICATIONS

		Single Color			Bicolor
		C	D	F	CF
Colors		Red	Amber	Green	Red/Green
Maximum Forward Current	I_{FM}	30mA	30mA	25mA	30mA/25mA
Typical Forward Current	I_F	20mA	20mA	20mA	20mA/20mA
Forward Voltage	V_F	2.0V	2.0V	2.1V	2.0V/2.1V
Maximum Reverse Voltage	V_{RM}	5V	5V	5V	5V/5V
Current Reduction Rate Above 25°C	ΔI_F	0 - No current Reduction Rate within Ambient Temperature Range			
Ambient Temperature Range		-25° ~ +55°C			

LEDs are an integral part of the switch and not available separately. The electrical specifications shown are determined at a basic temperature of 25°C.

If the source voltage exceeds the rated voltage, a ballast resistor is required.

The resistor value can be calculated by using the formula in the Supplement; see Supplement Index.

A toggles

Rocks

Pushbuttons

Illuminated PB

programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

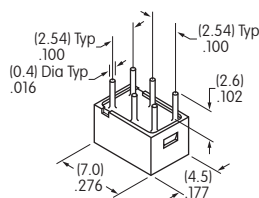
Touch

ndicators

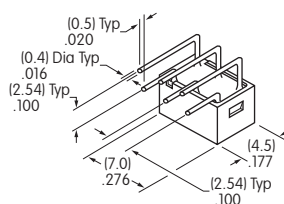
Accessories

Supplement

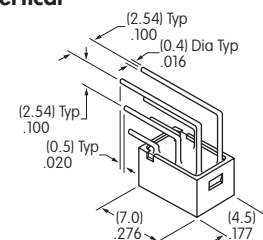
Straight



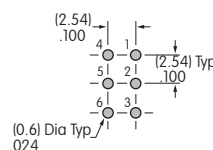
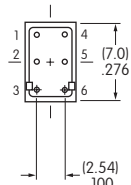
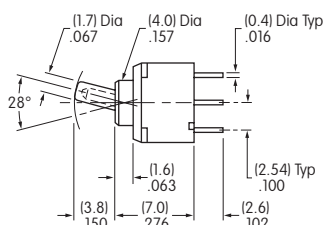
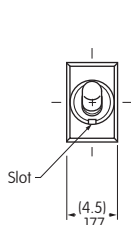
Right Angle



Vertical

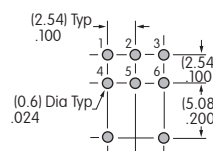
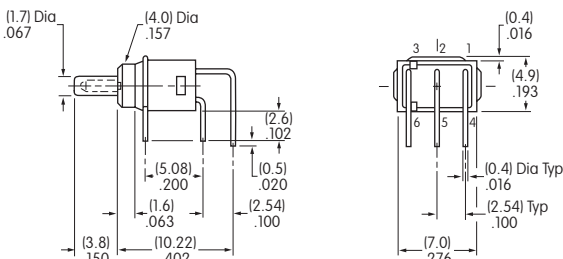
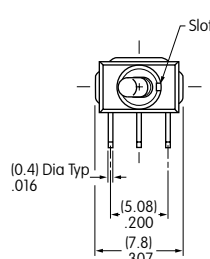


Straight PC



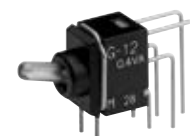
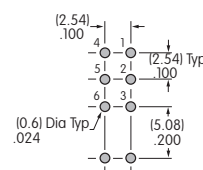
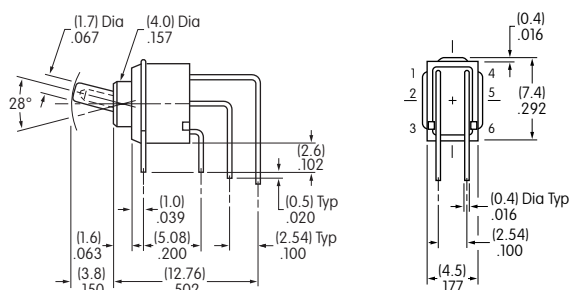
G12JPC

A diagram showing a laser beam with a divergence angle of 28° . The beam is represented by two lines diverging from a point, with the angle between them labeled as 28° . The beam is shown passing through a lens or aperture.



G12JHD

Technical drawing of a 1/2 inch square connector. The drawing shows a top view of the connector with a central circular feature. Dimensions are provided for the connector's width, the diameter of the central feature, and the width of the slot. The width of the connector is 1/2 inch (12.7 mm). The diameter of the central feature is 0.4 inches (10.16 mm). The width of the slot is 0.16 inches (4.06 mm). The drawing also shows a slot with a width of 0.100 inches (2.54 mm) and a depth of 0.009 inches (0.228 mm).



G12JVCF

General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Note: See Supplement section for explanation of operating range.

Other Ratings

Contact Resistance: 80 milliohms maximum
Insulation Resistance: 500 megohms minimum @ 500V DC
Dielectric Strength: 500V AC minimum for 1 minute minimum
Mechanical Life: 50,000 operations minimum
Electrical Life: 50,000 operations minimum
Nominal Operating Force: 1.6N for momentary & 1.7N for maintained
Angle of Throw: 28°

Materials & Finishes

Actuator: Polyphenylene sulfide (UL94V-0)
Case: Polyphenylene sulfide (UL94V-0)
Sealing Rings: Nitrile butadiene rubber
Movable Contacts: Phosphor bronze with gold plating
Stationary Contacts: Phosphor bronze with gold plating
Base: Polyphenylene sulfide (UL94V-0)
Terminals: Phosphor bronze with gold plating

Environmental Data

Operating Temperature Range: -30°C through +85°C (-22°F through +185°F)
Humidity: 90 ~ 95% humidity for 96 hours @ 40°C (104°F)
Vibration: 10 ~ 500Hz 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)

Installation

Mounting: It is recommended that the body of models for upright mounting without bracket be fastened to a panel or similar support for protection of solder joints from mechanical stress.
Coplanarity: See specifications in Terms & Acronyms in Supplement section

Processing

Soldering: Reflow Soldering recommended. See Profile B in Supplement section.
Manual Soldering: See Profile B in Supplement section.
Cleaning: Automated cleaning. See Cleaning specifications in Supplement section.

Standards & Certifications

Flammability Standard: UL94V-0 actuator, case & base
The G3T Series toggles have not been tested for UL recognition or CSA certification.
These switches are designed for use in a low-voltage, low-current, logic-level circuit.
When used as intended in a logic-level circuit, the results do not produce hazardous energy.

Distinctive Characteristics

Ultra-miniature size allows high density mounting, and extremely light weight of 0.6 gram makes these switches ideal for handheld equipment.

Tape-reel and stick-tube packaging allow rapid automated placement of surface mount devices. Tape-reel packaging meets EIA-481-D Standard.

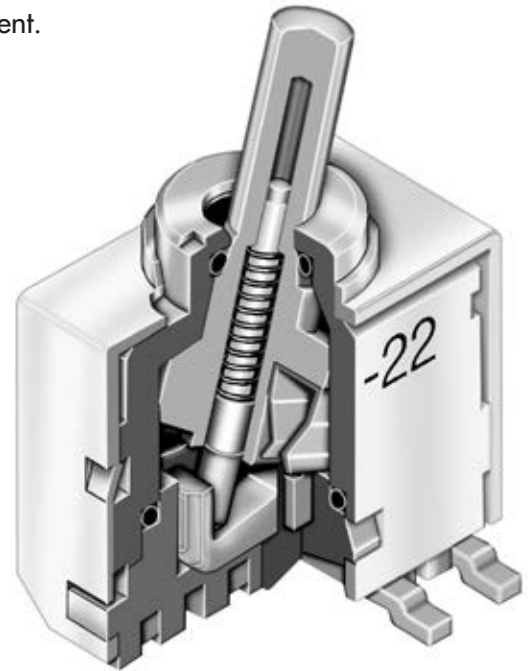
Heat resistant resin used for housing, base, and lever allows vapor phase and infrared convection reflow soldering.

Combination of design features achieves total seal and allows automated processing techniques, including flux cleaning procedures: one-piece bushing and housing, rubber seals surrounding actuator and base, epoxy at joint of case and base, and molded-in, epoxy-sealed terminals.

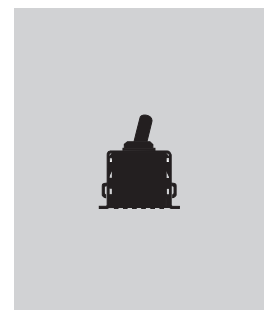
Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother, positive detent actuation, increased contact stability and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement section.)

Gull-wing terminals provide mechanical stability during soldering and simplified solder joint inspection.

Coplanarity: all considered surfaces must lie between two parallel planes that are a maximum distance apart of .0059" (0.15mm). (Additional coplanarity details in Terms and Acronyms in the Supplement section.)



Actual Size


A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE

G3T

1

2

A

H

—

Poles

1	SPDT
2	DPDT

Actuator

A	.150" (3.8mm) Column Toggle
----------	--------------------------------

Packaging

R	Tape-Reel for Right Angle Only 500 Pieces/Reel
S	Stick-Tube for Upright Mount 50 Pieces/Stick
No Code	Partitioned Tray for Upright & Right Angle Any Quantity
Packaging details at end of G3T Series	

Circuits

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

() = Momentary

Terminals

P	Gull Wing for Upright Mount
B	Gull Wing for Upright with Bracket Mount
H	Gull Wing for Right Angle Mount

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

G3T12AH

SPDT
ON-NONE-ON Circuit
.150" (3.8mm)
Column Toggle
Gull Wing Terminals for
Right Angle Mount

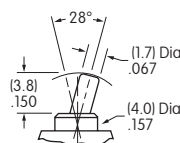
POLES & CIRCUITS

		Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
Pole	Model	Up 	Center 	Down 	Up 	Center 	Down 	Note: Terminal numbers are not actually on switch.
SP	G3T12	ON	NONE	ON	5-6	OPEN	5-4	SPDT 
	G3T13	ON	OFF	ON				
	G3T15	ON	NONE	(ON)				
	G3T18	(ON)	OFF	(ON)				
	G3T19	ON	OFF	(ON)				
DP	G3T22	ON	NONE	ON	5-6 2-3	OPEN	5-4 2-1	DPDT 
	G3T23	ON	OFF	ON				
	G3T25	ON	NONE	(ON)				
	G3T28	(ON)	OFF	(ON)				
	G3T29	ON	OFF	(ON)				

ACTUATOR

A

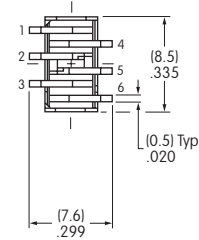
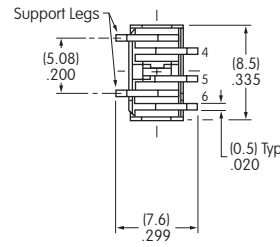
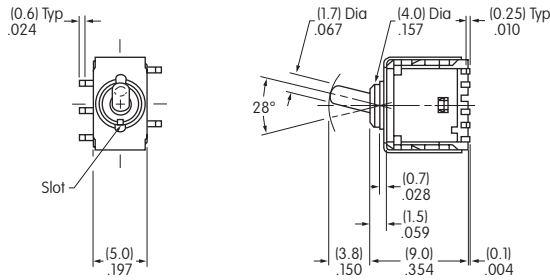
.150" (3.8mm) Column Toggle



TYPICAL SWITCH DIMENSIONS

Single & Double Pole

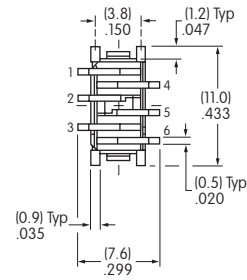
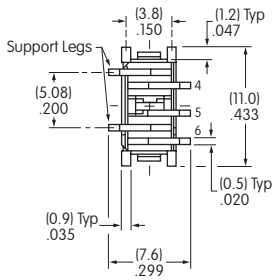
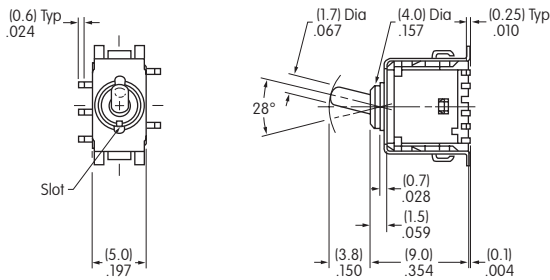
Upright Mounting



G3T12AP

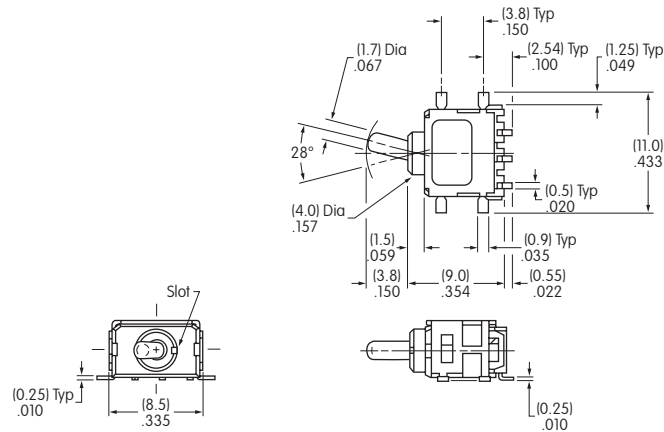
Single & Double Pole

Upright Mounting with Bracket



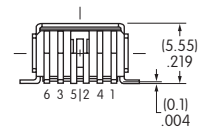
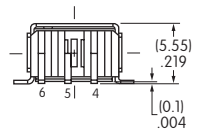
G3T22AB

Right Angle Mounting



Single Pole

Double Pole



G3T12AH

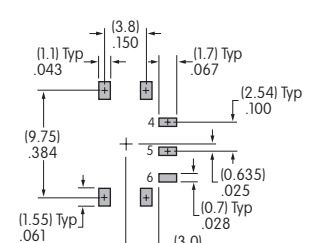
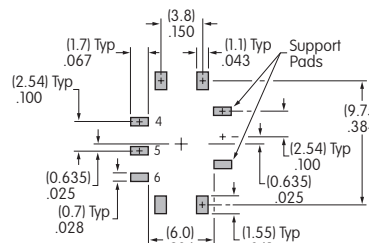
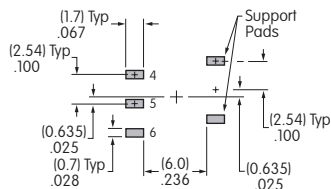
Pad Layouts for Surface Mount Terminals

Upright Mounting

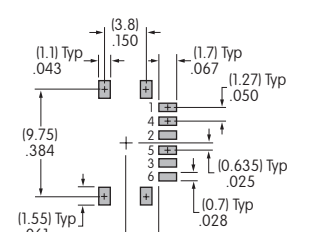
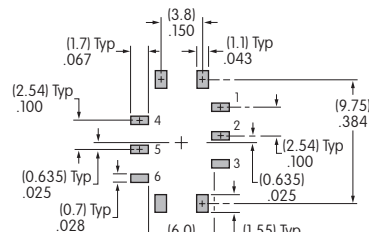
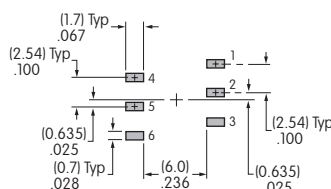
Upright Mounting with Bracket

Right Angle Mounting

Single Pole Double Throw



Double Pole Double Throw



PACKAGING

R Tape-Reel for Right Angle

500 pieces per reel

Switches must be ordered in 500-piece increments when tape-reel packaging is selected.

This packaging meets EIA-481-D Standard for "16mm and 24mm Embossed Carrier Taping of Surface Mount Components for Automatic Handling."



S Stick-Tube for Upright Mount

50 pieces per stick

Switches must be ordered in 50-piece increments when stick-tube packaging is selected.



No Code Partitioned Tray for Upright & Right Angle

Any quantity

If the G3 upright models are ordered in less than 50-piece increments or the right angle models in less than 500-piece increments, the switches are packaged in a partitioned tray. No code is required.

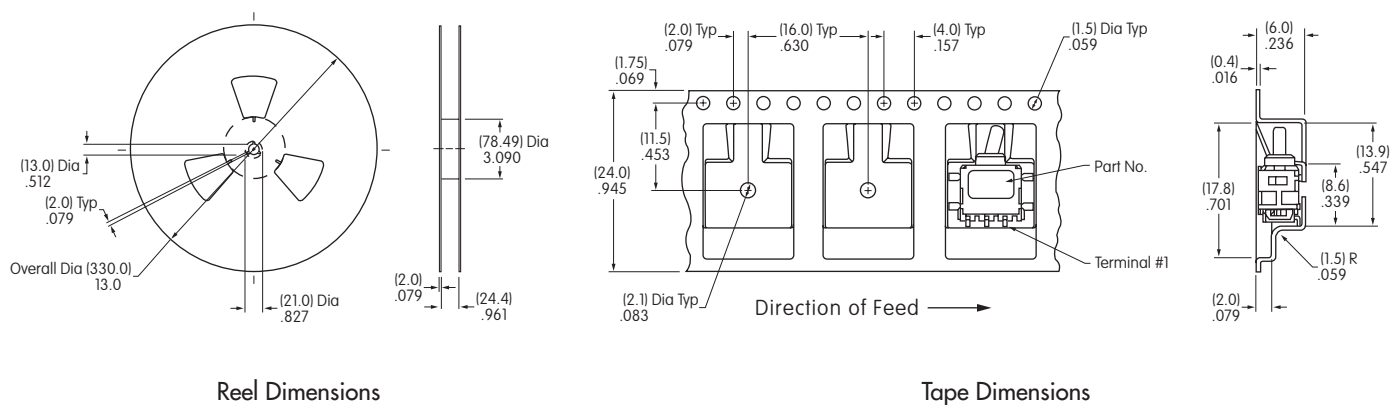


PACKAGING (CONTINUED)

Tape-Reel Packaging for Right Angle Mount

Each tape-reel of 550 pockets contains 500 switches.

Minimum Leader Length: 7.87" (200mm) Minimum Trailer Length: 1.97" (50mm)



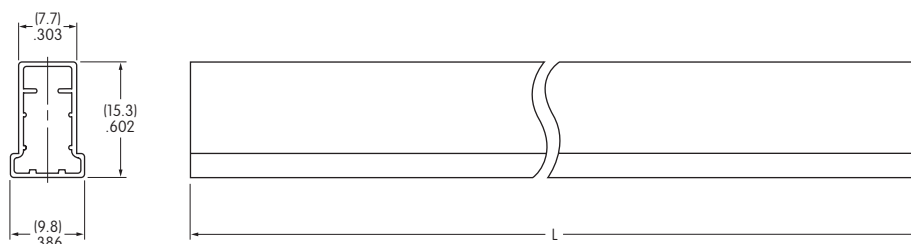
Stick-Tube Packaging for Upright Mount

Each stick-tube contains 50 switches.

L = Length

G3T Upright (code P)
18.31" (465mm)

G3T Upright with Bracket (code B)
21.26" (540mm)



A General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver):	6A @ 125V AC & 3A @ 250V AC 4A @ 30V DC for On-None-On; 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)

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:	50,000 operations minimum
Electrical Life:	50,000 operations minimum for silver at 3A @ 250V AC; 25,000 operations minimum for silver at 6A @ 125V AC; 50,000 operations minimum for gold
Angle of Throw:	25°

Environmental Data

Operating Temp Range:	-30°C through +85°C (-22°F through +185°F)
Sealing:	Waterproofing, achieved with boot at base of lever plus o-rings inside and outside of bushing, meets IP67 of IEC60529 Standards (dust tight and protection against effects of temporary immersion). See further explanation on page A51.

Processing

Soldering:	Manual Soldering for Silver: ON-NONE-ON: See Profile B in Supplement section. ON-OFF-ON and (ON)-OFF-(ON): See Profile A in Supplement section. Manual Soldering for Gold, all circuits: See Profile A in Supplement section. Note: Lever must be in OFF (center) position while soldering.
-------------------	--

Distinctive Characteristics

Inner o-ring and external rubber washer seal the switch to achieve IP67 of IEC60529 Standards (dust tight and water protected for temporary immersion).

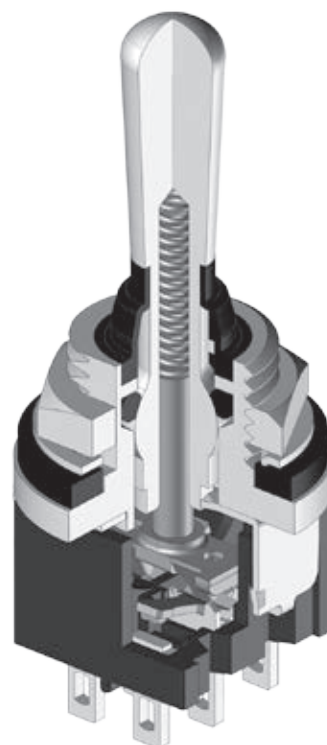
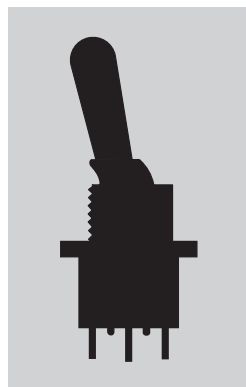
Waterproof boot at base of toggle further ensures protection against wet environments.

Actuation provides smooth, sturdy tactile feel.

Polished, chrome-plated actuator paired with the waterproof boot not only delivers in terms of sleek design, but also functionality and reliability.

Superb quality and construction design prohibit entry of harmful particles that may otherwise compromise lever operation.

Actual Size



TYPICAL SWITCH ORDERING EXAMPLE

M20

1

2

WB

G

01

Poles	
1	SPDT
2	DPDT

Circuits			
2	ON	NONE	ON
3	ON	OFF	ON
8	(ON)	OFF	(ON)
() = Momentary			

Toggle with Large Bushing	
WB	.787" (20.0mm) Bat with Large .472" (12.0mm) Threaded Bushing with D Flat

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

Terminals	
01	Solder Lug

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2012WBG01

.787" (20.0mm) Bat Lever with Waterproof Boot

.472" (12.0mm) Threaded Bushing with D Flat

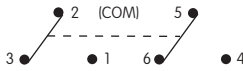
Gold Contacts with 0.4VA Rating



SPDT ON-NONE-ON Circuit

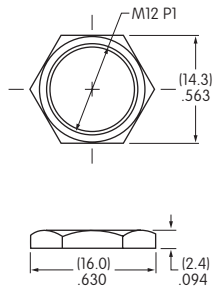
Solder Lug Terminals

POLES & CIRCUITS

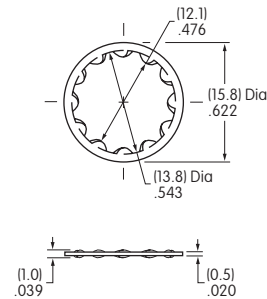
		Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
Pole	Model	Up 	Center 	Down 	Up 	Center 	Down 	Note: Terminal numbers are not actually on the switch.
SP	M2012 M2013 M2018	ON ON (ON)	NONE OFF OFF	ON ON (ON)	2-3 	OPEN	2-1	
DP	M2022 M2023 M2028	ON ON (ON)	NONE OFF OFF	ON ON (ON)	2-3 5-6 	OPEN	2-1 5-4	DPDT 

STANDARD HARDWARE

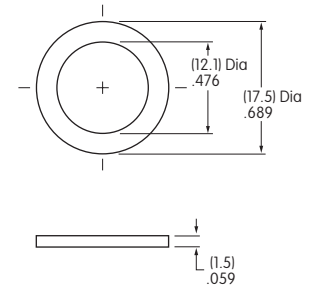
AT503M Hex Face Nut
Brass/Chrome



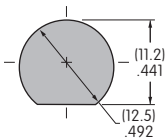
AT508 Lockwasher
Steel with Zinc/Chromate



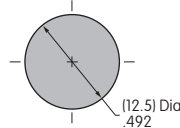
AT401P O-ring
Nitrile Butadiene Rubber



PANEL CUTOUTS & THICKNESS



Anti-rotation



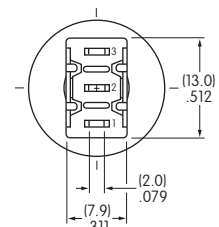
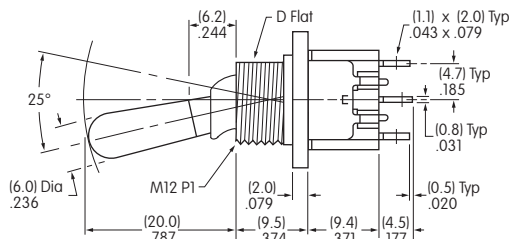
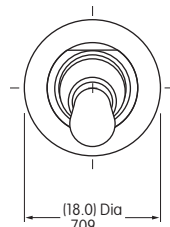
No
Anti-rotation

Maximum Effective Panel Thickness
.118" (3.0mm)

TYPICAL SWITCH DIMENSIONS

Solder Lug

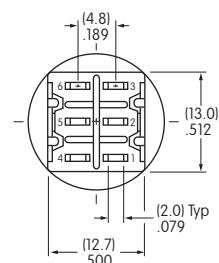
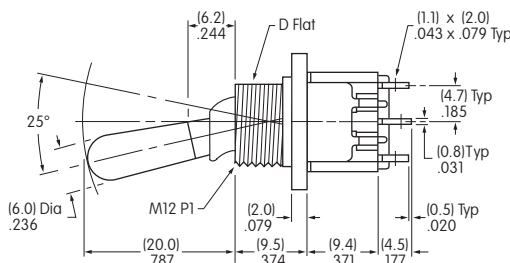
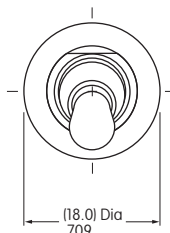
Single Pole



M2012WBG01

Solder Lug

Double Pole



M2022WBG01

APPLICATION CONSIDERATIONS

The Dual Seal Waterproof M Toggle is designed as a panel seal switch, and not to be used under water.

Material Properties

The material for the waterproof boot is silicone rubber. While silicone rubber has excellent heat, cold and weather resistant properties, it has less durability and oil resistance.

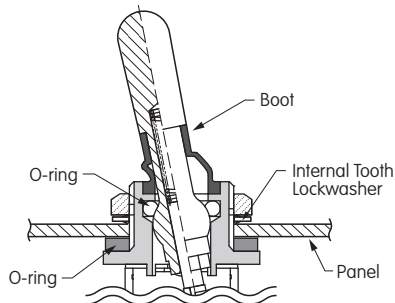
The o-rings are made of nitrile butadiene rubber, which excels in durability and oil and chemical resistance. Its performance is less durable with lower weather and ozone resistant characteristics.

Evaluate the products in regard to your application and intended environment with these properties in mind.

Repeat opening and closing same as previous test. The resulting insulation resistance and voltage capacity are both within the rated values, and water has not entered inside the switch or installation panel.

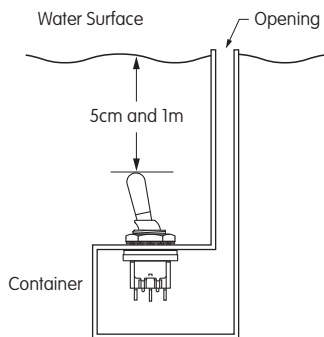
Panel Installation

For panel installation, the internal tooth lockwasher is installed above the panel. The external o-ring mounts below the panel.



Waterproof Test Conditions

Waterproofing is measured by submerging the switch 5 centimeters from the water surface (see illustration), and opening and closing 50 times at a frequency of 50 – 60 times per minute. The switch is then submersed 1 meter from the surface and left in this position for 30 minutes.



Applications

- Construction Equipment
- Medical Equipment
- Hospitality and Restaurant
- Machine Tooling
- Transportation
- Marine Equipment *

* Salt spray tested as per Mil-STD-810G section 509.5.

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

Frame: Stainless steel

Bushing: Brass with nickel plating

Support Bracket: Brass with tin plating

Case: Diallyl phthalate resin (UL94V-0)

Movable Contactor: Phosphor bronze with silver or gold plating

Movable Contacts: Silver alloy (code W); copper with gold plating (code G); or silver alloy with gold plating (code A)

Stationary Contacts: Silver with silver plating (code W); copper or brass with gold plating (code G);
or silver with gold plating (code A)

Terminals: Copper or brass with silver plating; or copper or brass with gold plating

Environmental Data

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

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

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

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

Sealing: 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.

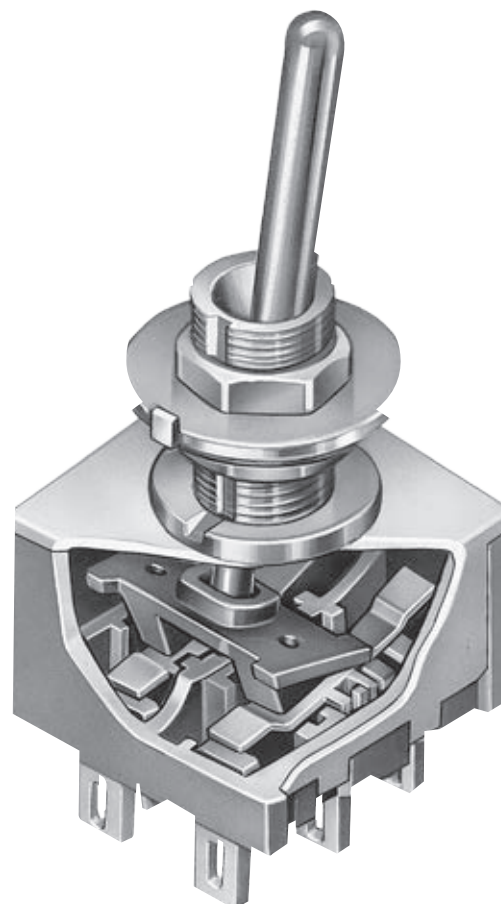
Molded diallyl phthalate case has a UL flammability rating of 94V-0.

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

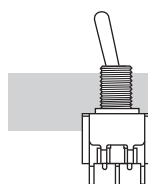
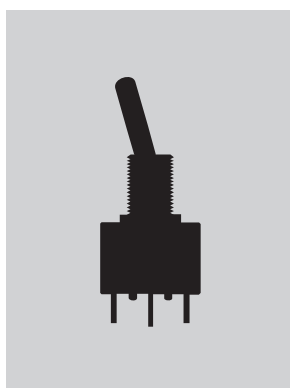
Prominent external insulating barriers increase insulation resistance and dielectric strength.

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.

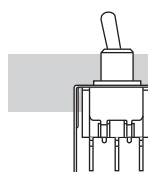


Actual Size



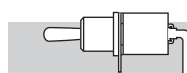
Bushing Mount

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

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

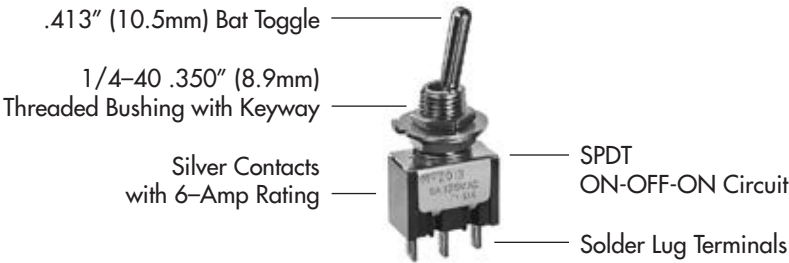
Optional Caps	
For Small Bat Toggles	
B	For S Bat Toggle
C	Conical Cap for S Bat Toggle
For Large Bat Toggles	
R	For B Toggle
V	For B2 Toggle

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

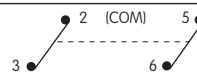
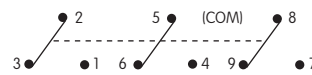
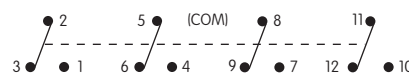
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2013SS1W01



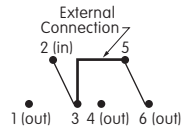
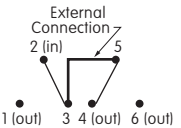
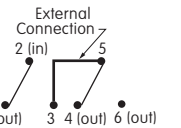
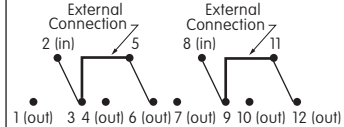
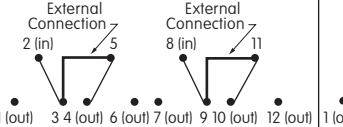
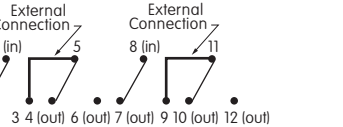
A	Toggles
	Rockers
	Pushbuttons
	Illuminated PB
	Programmable
	Keylocks
	Rotaries
	Slides
	Tactiles
	Tilt
	Touch
	Indicators
	Accessories
	Supplement

POLES & CIRCUITS

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

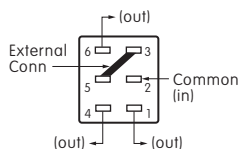
For 3 Throw (3-On)

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

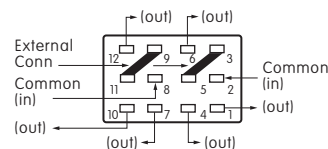
The SP3T model utilizes a double pole base.

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

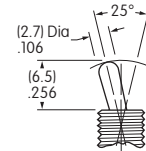
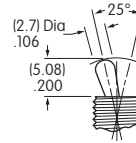
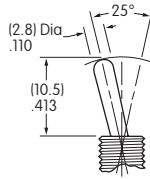
S .413" (10.5mm)
Bat

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.

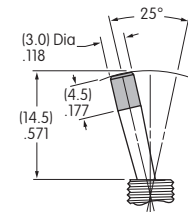
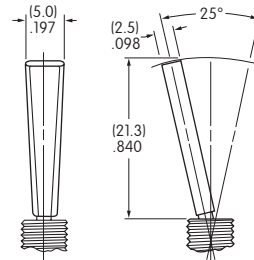
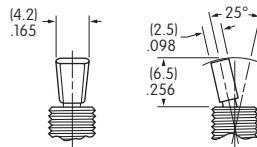
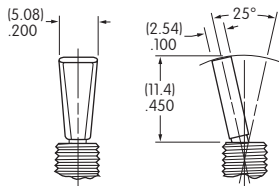
E .450" (11.4mm)
Flatted

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

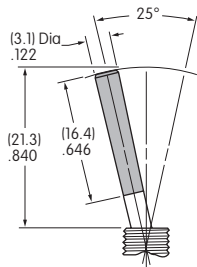
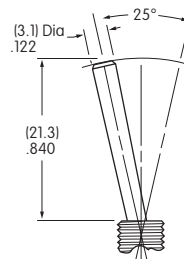
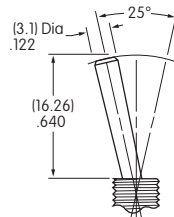
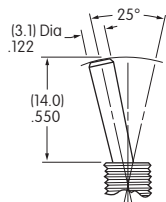
Q .550" (14.0mm)
Cone

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

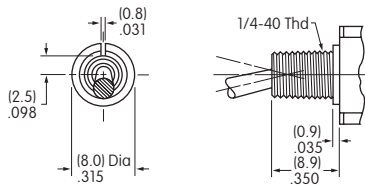
E Yellow

F Green

G Blue

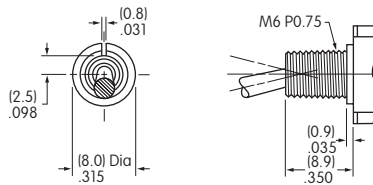
SMALL BUSHINGS

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



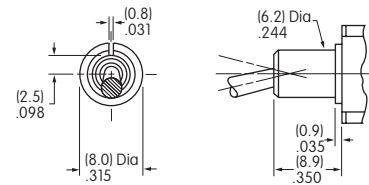
Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

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

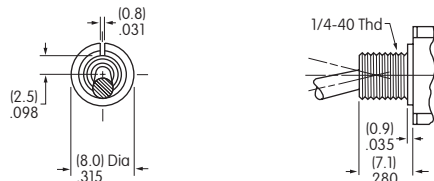


Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

S2 .350" (8.9mm) Smooth with Keyway

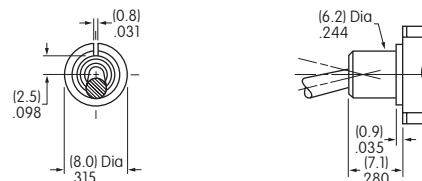


A1 1/4-40 .280" (7.1mm) Threaded with Keyway



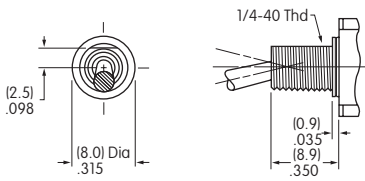
When using this bushing, toggle length is
increased by .070". Maximum Panel Thickness
with Standard Hardware: .031" (0.8mm)

A2 .280" (7.1mm) Smooth with Keyway



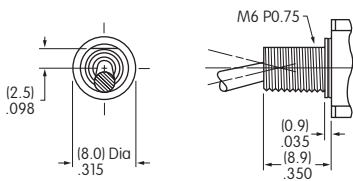
When using this bushing, toggle
length is increased by .070".

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



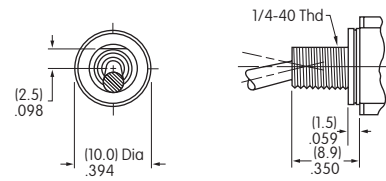
Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

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



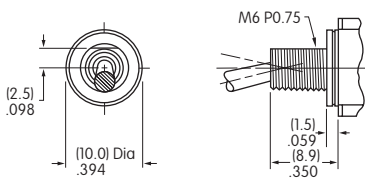
Maximum Panel Thickness with
Standard Hardware: .102" (2.6mm)

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

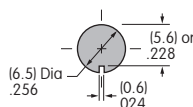


D8 combines only with S, S2 & S3 toggles.
Maximum Panel Thickness with
Standard Hardware: .193" (4.9mm)

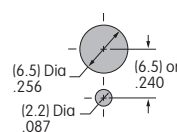
Standard Hardware Supplied for Small Bushings

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

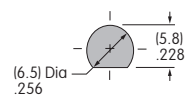
For S1, S2, A1, A2
or S4 Bushing with
Keyway & for L1
or L4 Bushing



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



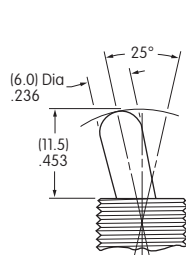
For D1, D4, D3 or
D8 Bushing with
D Flat & for L3
or L8 Bushing



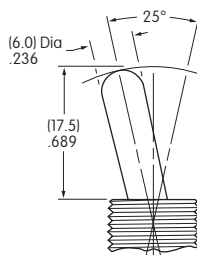
LARGE TOGGLES

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

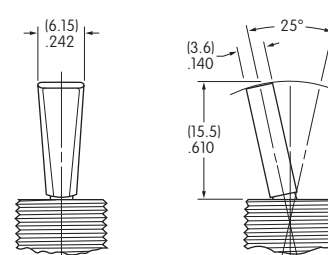
B .453" (11.5mm)
Large Bat



B2 .689" (17.5mm)
Large Bat



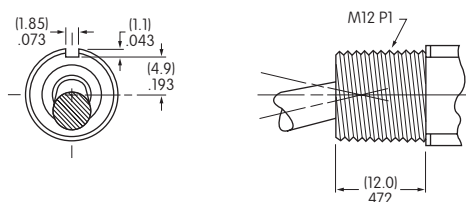
R .610" (15.5mm)
Large Flatted



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

LARGE BUSHINGS

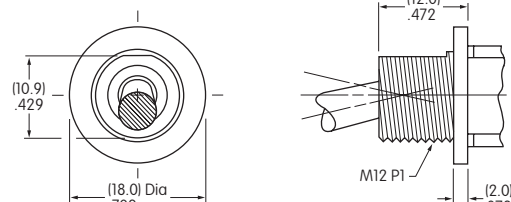
B1 Large .472" (12.0mm)
Threaded with Keyway



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

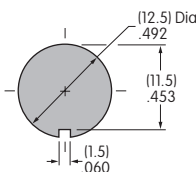


Maximum Panel Thickness with
Standard Hardware: .256" (6.5mm)

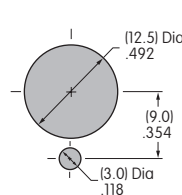
Standard Hardware for B3:
1 hex face nut AT503M
and 1 o-ring AT401P

Panel Cutouts

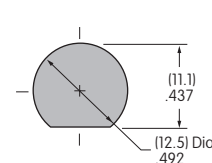
**For B1 Bushing
with Keyway**



**For B1 Bushing
with Locking Ring**

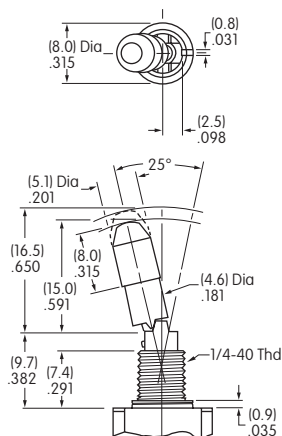


**For B3 Bushing
with D Flat**

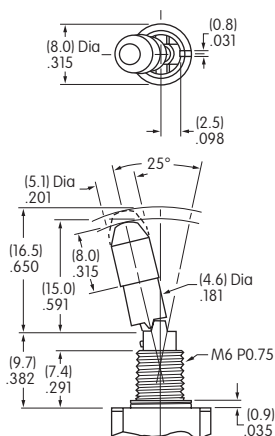


LOCKING LEVER & BUSHINGS

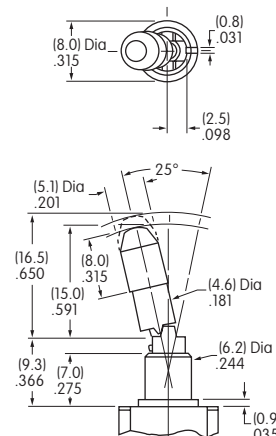
LL1 1/4-40 .291" (7.4mm) Threaded with Keyway



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

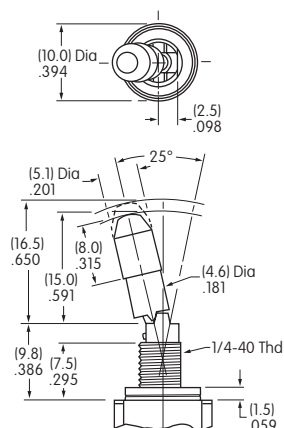


LL2 Smooth with Keyway

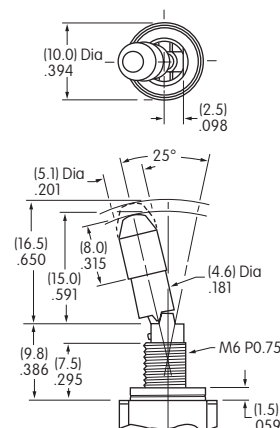


Maximum Panel Thickness with Standard Hardware: .047" (1.2mm)
Standard Hardware for L1 & L4: 2 hex nuts AT513H or AT513M,
1 locking ring AT507H or AT507M, and 1 lockwasher AT509

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)



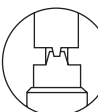
1 position locks

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



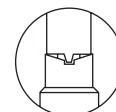
2 positions lock

on-off-on
on-on-on



3 positions lock

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

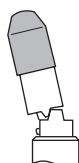


1 position locks

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

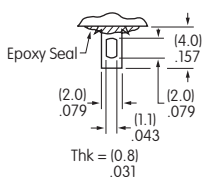
6A @ 125V AC
or 0.4VA maximum @ 28V AC/DC maximum

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

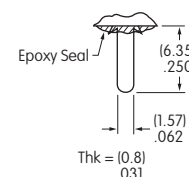
01

Solder Lug



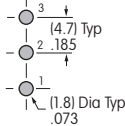
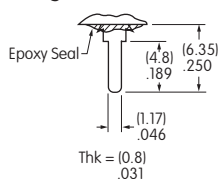
02

.062" (1.57mm) Wide Quick Connect

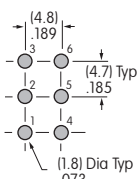


03

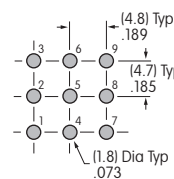
.250" (6.35mm) Straight PC



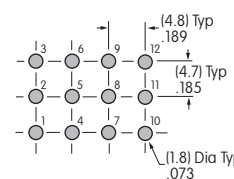
Single Pole



Double Pole



Three Pole



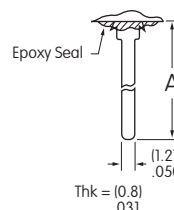
Four Pole

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.

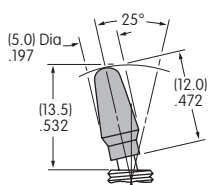
Dimension A = terminal lengths as shown beside the terminal codes at the left.

OPTIONAL CAPS & CAP COLORS

B

* AT415 Lever Cap for S Bat Toggle

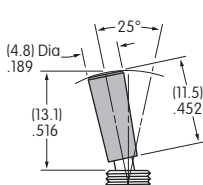
Material: Polyethylene



C

* AT444 Conical Cap for S Bat Toggle

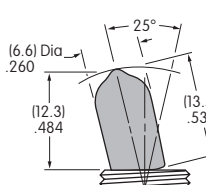
Material: Polyethylene



R

AT434 Lever Cap for B Toggle

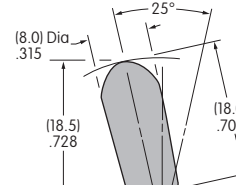
Material: Polyvinyl Chloride



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

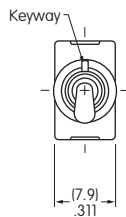
Green

G

Blue

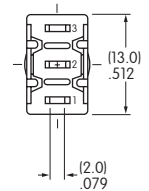
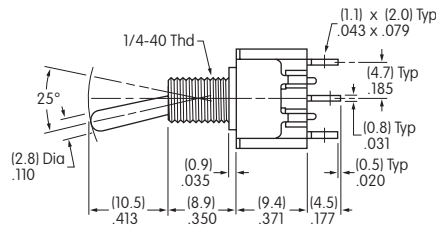
TYPICAL SWITCH DIMENSIONS

Solder Lug



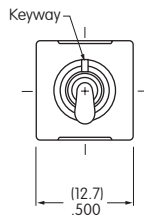
M2012SS1W01

Single Pole



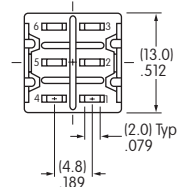
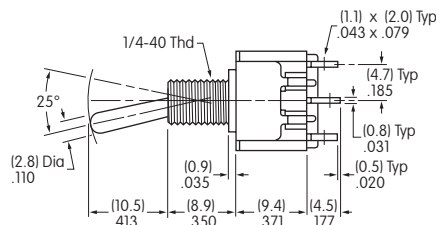
M2011 model does not have terminal 1.

Solder Lug



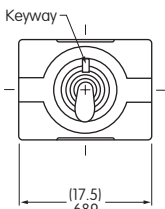
M2022SS1W01

Double Pole



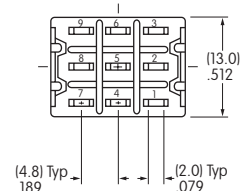
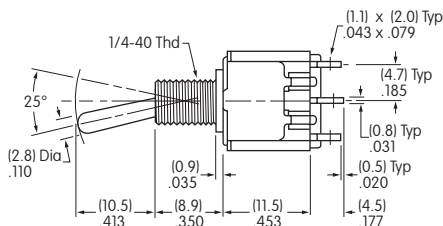
M2021 model does not have terminals 1 & 4.

Solder Lug

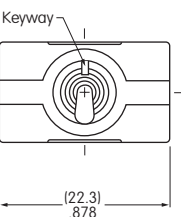


M2032SS1W01

Three Pole

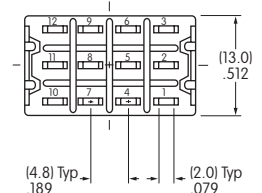
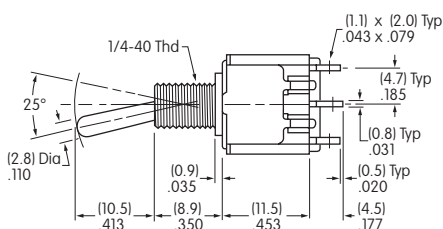


Solder Lug



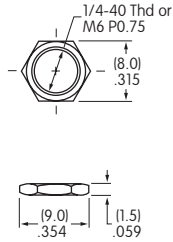
M2042SS1W01

Four Pole

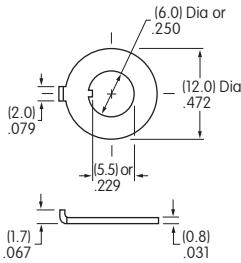


STANDARD HARDWARE FOR SMALL & LARGE BUSHINGS

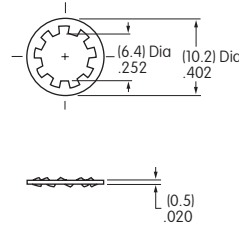
AT513H for Inch
AT513M for Metric
Hex Nut
Brass/Nickel



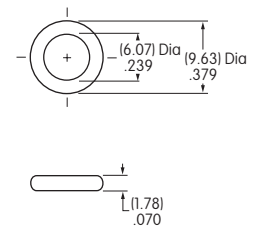
AT507H for Inch
AT507M for Metric
Locking Ring
Steel with Zinc/Chromate



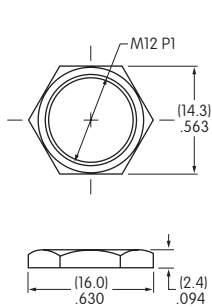
AT509
Lockwasher
Steel with Zinc/Chromate
(not supplied with splashproof models)



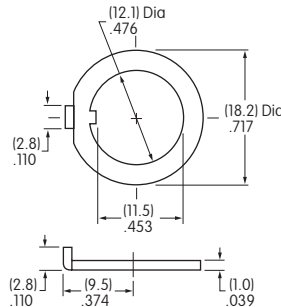
AT516
O-ring for
Splashproof Models
Nitrile Butadiene Rubber



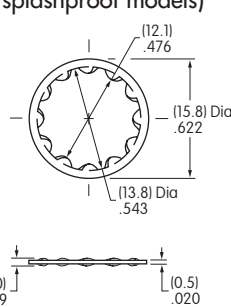
AT503M
Hex Face Nut
Brass/Chrome



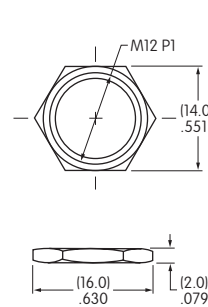
AT506M
Locking Ring
Steel with Zinc/Chromate



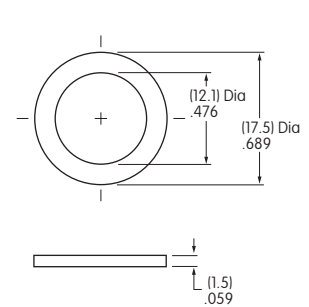
AT508
Lockwasher
Steel with Zinc/Chromate
(not supplied with splashproof models)



AT527M
Hex Nut
Steel with Nickel Plating



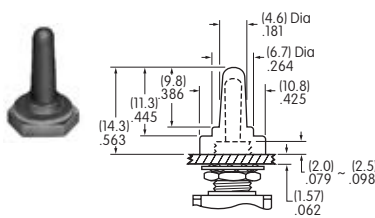
AT401P
O-ring for Splashproof Models
Nitrile butadiene rubber



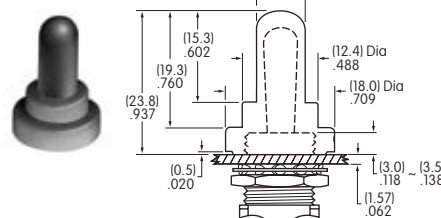
OPTIONAL SPLASHPROOF BOOTS

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

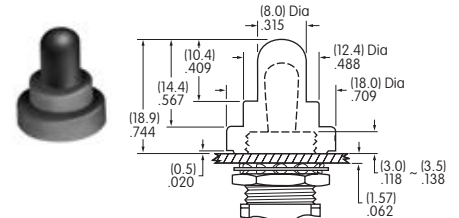
AT428 (M-metric H-Inch)
.445" (11.3mm)
Boot for S Toggle
Silicon Rubber



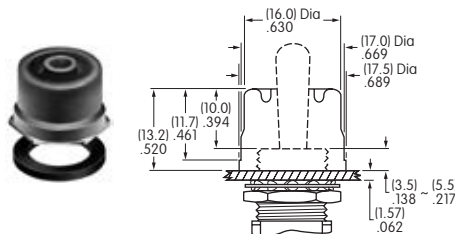
AT402
.760" (19.3mm)
Boot for B2 Toggle
Silicon Rubber



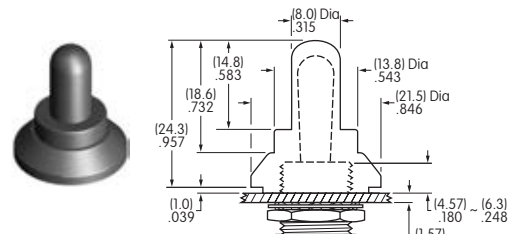
AT402S
.567" (14.4mm)
Boot for B Toggle
Silicon Rubber



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

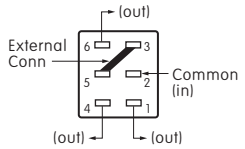
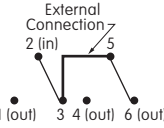
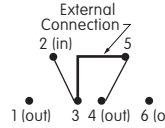
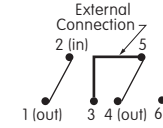
A65

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	

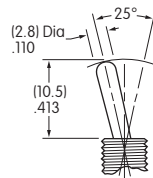
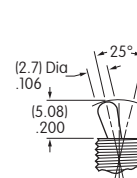
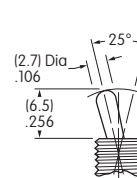
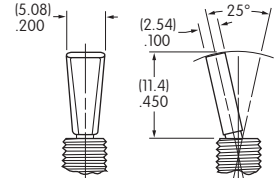
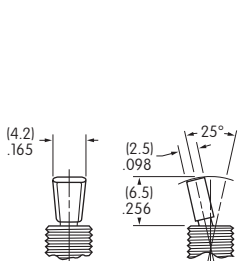
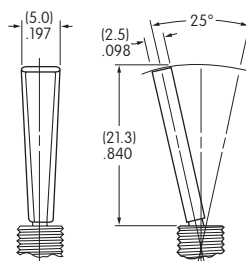
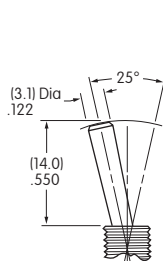
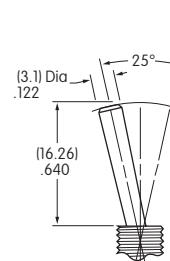
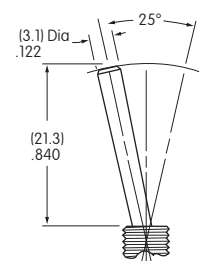
SMALL TOGGLES

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:

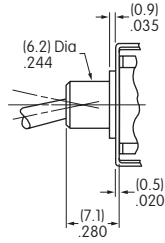
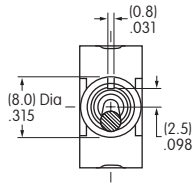
Brass with Bright Chrome
Contact factory for optional finishes.

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

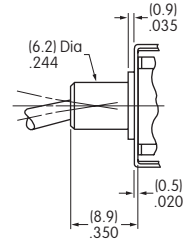
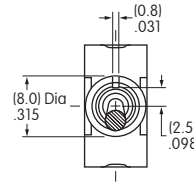
SMALL BUSHINGS

A Toggles

A2 .280" (7.1mm)
Smooth with Keyway

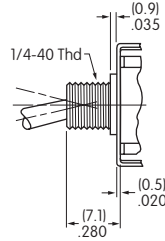
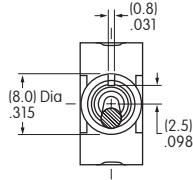


S2 .350" (8.9mm)
Smooth with Keyway

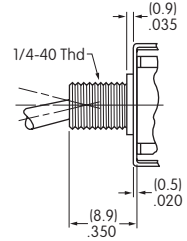
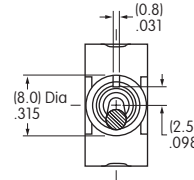


When using this bushing, toggle length is increased by .070" (1.78mm).

A1 .280" (7.1mm)
Threaded with Keyway



S1 .350" (8.9mm)
Threaded with Keyway

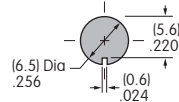


When using this bushing, toggle length is increased by .070" (1.78mm). Maximum Panel Thickness with Standard Hardware: .031" (0.8mm)

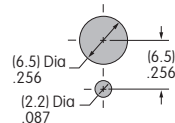
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

Panel Cutouts

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



For A1 or S1 Bushing with Locking Ring



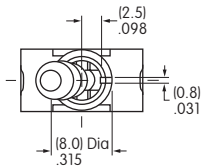
Standard Hardware:

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

For dimensions, see Accessories & Hardware section.

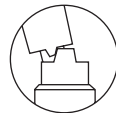
LOCKING LEVER & BUSHING

LL2 Smooth with Keyway



Locking Mechanism

on-none-on



2 positions lock

on-none-(on)



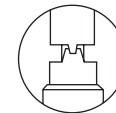
1 position locks

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



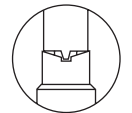
2 positions lock

on-off-on
on-on-on



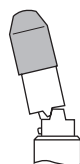
3 positions lock

(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

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

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

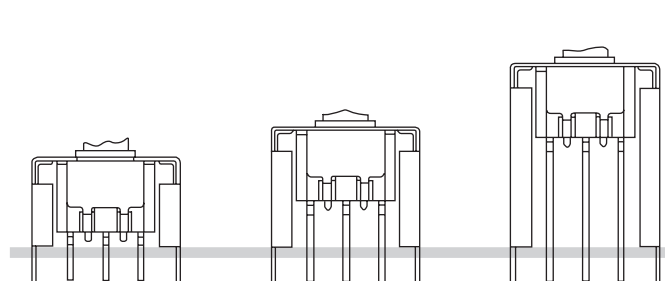
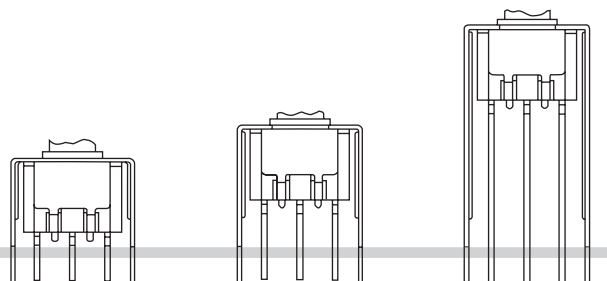
Power Level
or Logic Level6A @ 125V AC
or 0.4VA maximum @ 28V AC/DC maximum

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

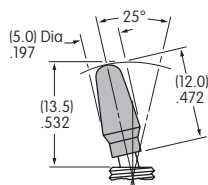
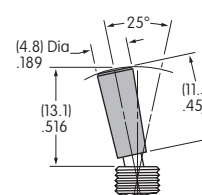
Straight PC Mount with Bracket

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 ToggleMaterial:
Polyethylene**C*** AT444
Conical Cap for
S Bat ToggleMaterial:
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

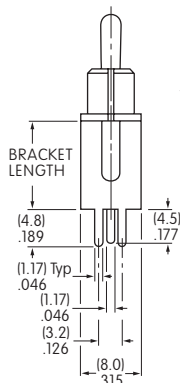
Green

G

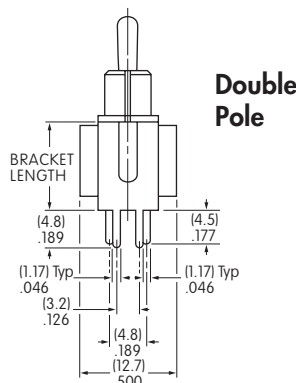
Blue

TYPICAL SWITCH DIMENSIONS

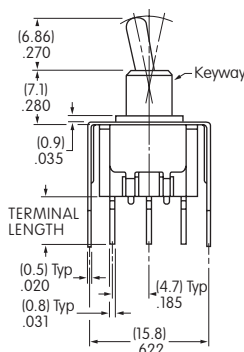
Straight PC • Bracket



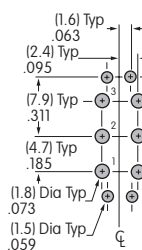
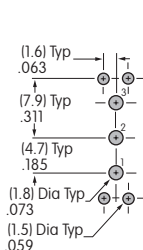
Single Pole



Double Pole

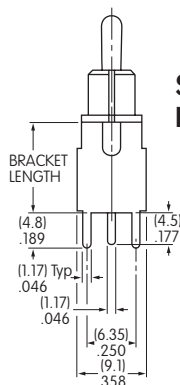


M2012S2A2G13

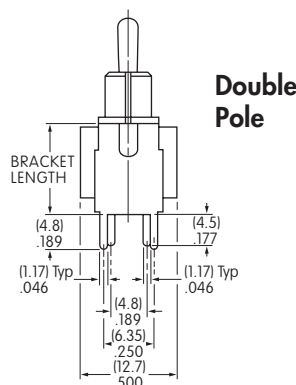


Terminal Code:	Terminal Length:	Bracket Length:
13	.250" (6.35mm)	.465" (11.8mm)
15	.425" (10.8mm)	.630" (16.0mm)
17	.964" (24.5mm)	1.150" (29.2mm)

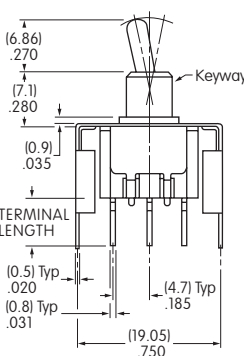
Straight PC • Reinforced Bracket



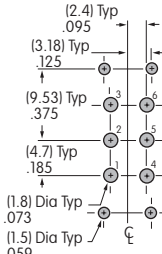
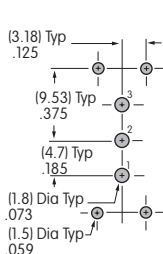
Single Pole



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

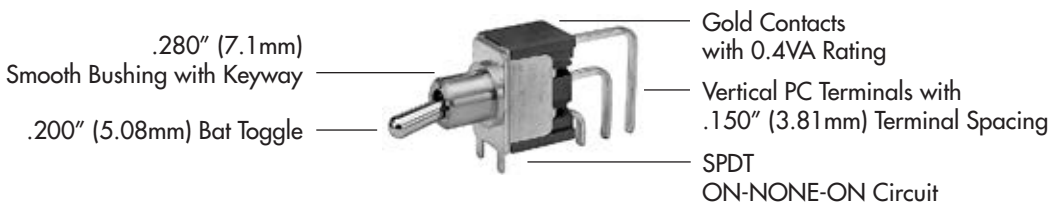
Terminals	
30	.150" (3.81mm) Right Angle PC (1-3 Pole)
32	Right Angle PCB (1 Pole & 0.4VA Rating Only)
40	.150" (3.81mm) Vertical PC (1-4 Pole)
45	.100" (2.54mm) Vertical PC (1-4 Pole)

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

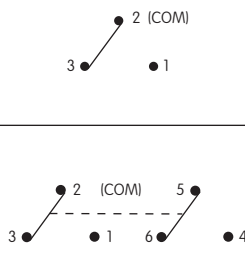
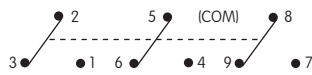
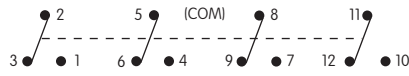
Cap Colors	
A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE
M2012S2A2G40



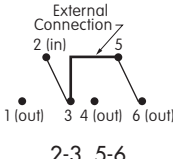
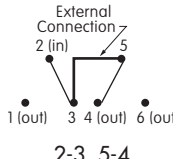
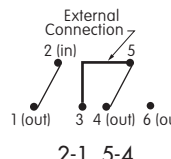
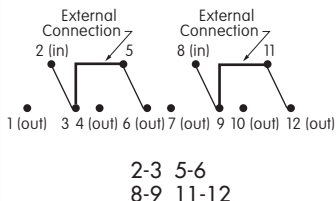
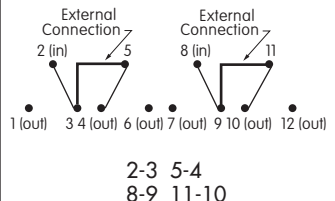
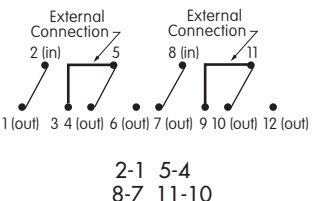
A	Toggles
	Rockers
	Pushbuttons
	Illuminated PB
	Programmable
	Keylocks
	Rotaries
	Slides
	Tactiles
	Tilt
	Touch
	Indicators
	Accessories
	Supplement

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)				

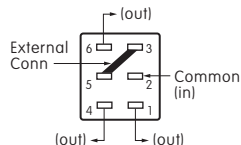
For 3 Throw (3-On)

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)			

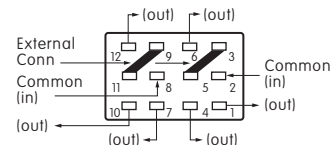
The SP3T model utilizes a double pole base.

External connection must be made during field installation.



The DP3T model utilizes a four pole base.

External connection must be made during field installation.

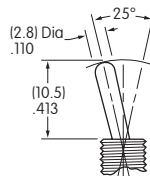


SMALL TOGGLES

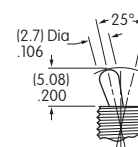
Important:

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).

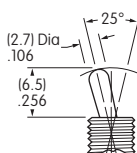
S .413" (10.5mm) Bat



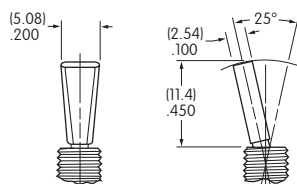
S2 .200" (5.08mm) Bat



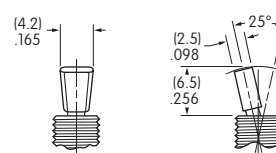
S3 .256" (6.5mm) Bat



E .450" (11.4mm) Flatted



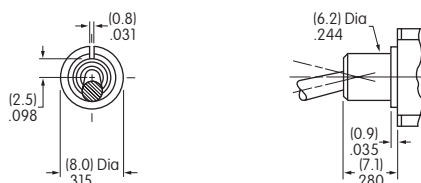
E2 .256" (6.5mm) Flatted



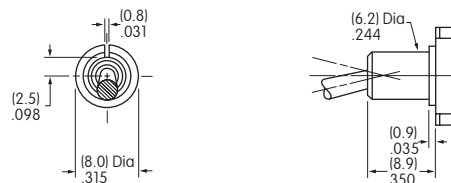
Standard Material & Finish: Brass with Bright Chrome
Contact factory for optional finishes.

SMALL BUSHINGS

A2 .280" (7.1mm) Smooth with Keyway

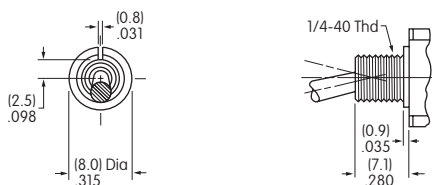


S2 .350" (8.9mm) Smooth with Keyway

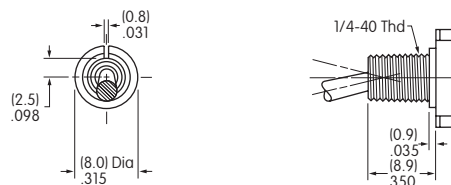


When using this bushing, toggle length is increased by .070" (1.78mm).

A1 .280" (7.1mm) Threaded with Keyway



S1 .350" (8.9mm) Threaded with Keyway

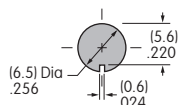


When using this bushing, toggle length is increased by .070" (1.78mm). Maximum Panel Thickness with Standard Hardware: .031" (0.8mm)

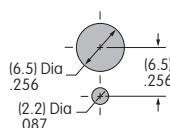
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

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)

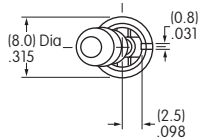
For dimensions, see Accessories & Hardware section.

LOCKING LEVER & BUSHING

LL2

Smooth with Keyway

Locking Mechanism



on-none-on



2 positions lock

on-none-(on)



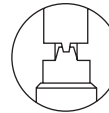
1 position locks

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



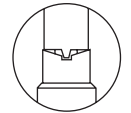
2 positions lock

on-off-on
on-on-on



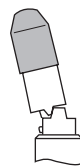
3 positions lock

(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

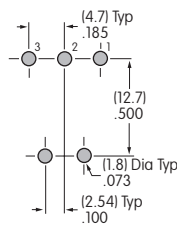
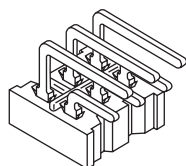
6A @ 125V AC
or 0.4VA maximum @ 28V AC/DC maximum

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.

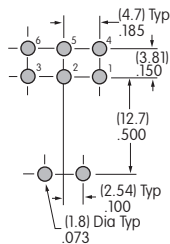
TERMINALS

30

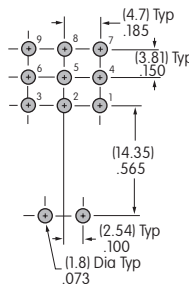
.150" (3.81mm)
Right Angle PC (1-3 Pole)



Single Pole



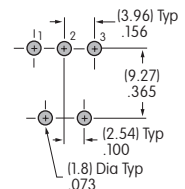
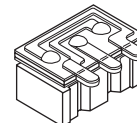
Double Pole



Three Pole

32

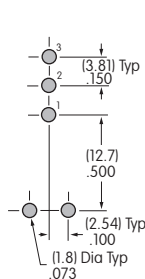
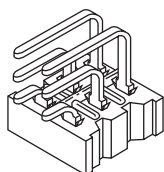
Right Angle PCB
with Reverse Circuit
(1 Pole & 0.4VA Rating Only)



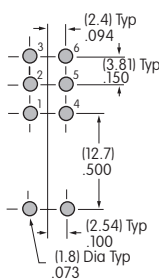
Terminal dimensions are shown on the Typical Switch Dimensions pages which follow.

TERMINALS (Continued)

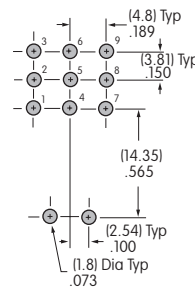
40 .150" (3.81mm) Vertical PC (1-4 Pole)



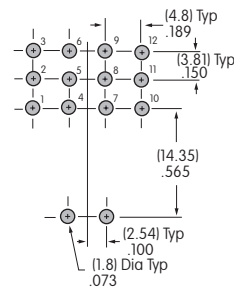
Single Pole



Double Pole

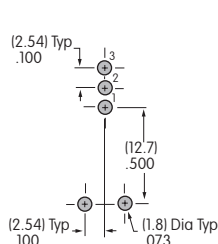
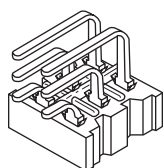


Three Pole

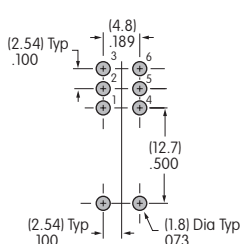


Four Pole

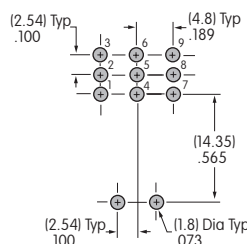
45 .100" (2.54mm) Vertical PC (1-4 Pole)



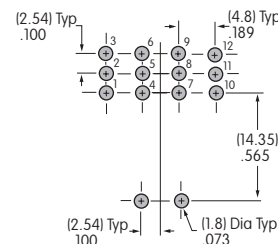
Single Pole



Double Pole



Three Pole



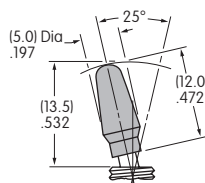
Four Pole

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

OPTIONAL CAPS & CAP COLORS

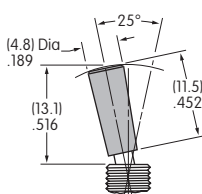
B * AT415 for S Bat Toggle

Material:
Polyethylene



C * AT444 Conical Cap for S Bat Toggle

Material:
Polyethylene



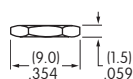
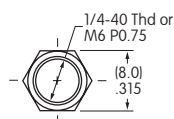
Colors Available

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

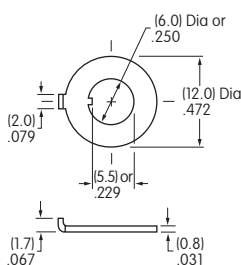
* AT415 and AT444 for use with S toggles only, not S2 or S3 toggles.

STANDARD HARDWARE

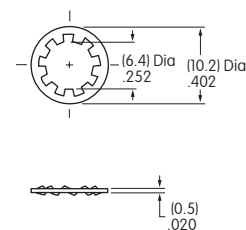
AT513H for Inch
AT513M for Metric
Hex Nut (2 per switch)
Brass/Nickel



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



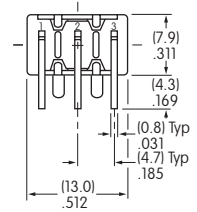
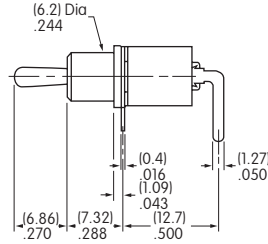
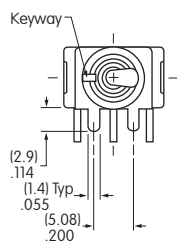
AT509
Lockwasher (1 per switch, none
with splashproof)
Steel with Zinc/Chromate



TYPICAL SWITCH DIMENSIONS

.150" (3.81mm) Right Angle PC

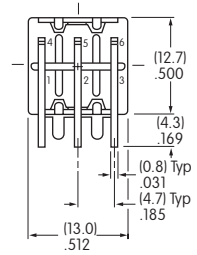
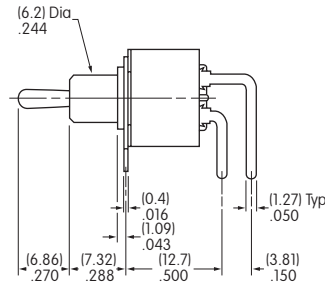
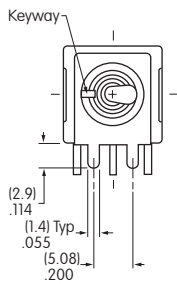
Single Pole



M2012S2A2G30

.150" (3.81mm) Right Angle PC

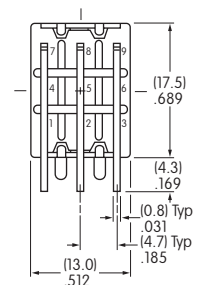
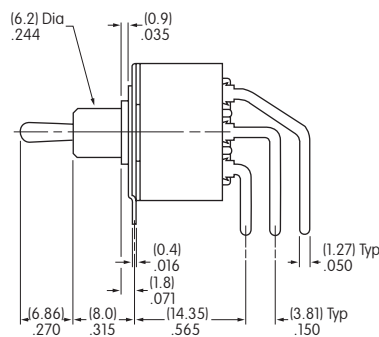
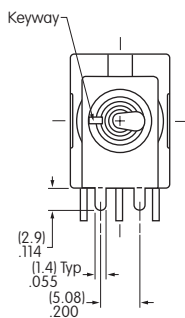
Double Pole



M2022S2A2G30

.150" (3.81mm) Right Angle PC

Three Pole

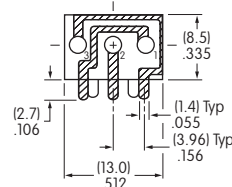
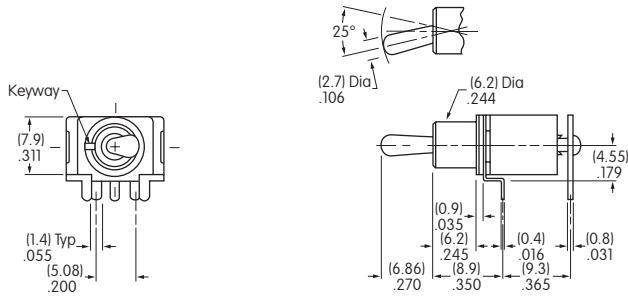


M2032S2A2G30

TYPICAL SWITCH DIMENSIONS

Single Pole • Reverse Circuit

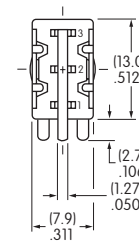
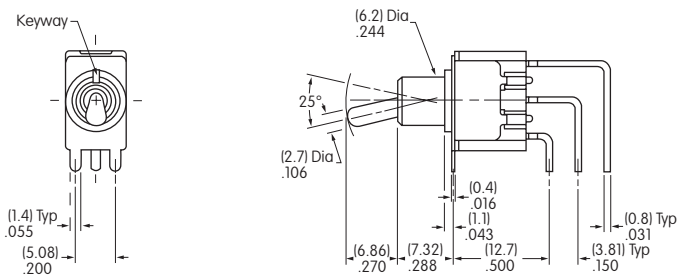
Right Angle PCB



M2012S2A2G32

Single Pole

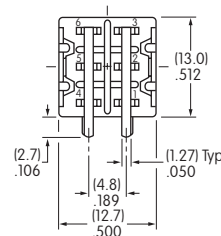
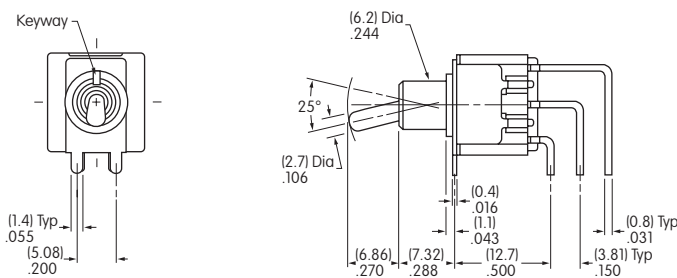
.150" (3.81mm) Vertical PC



M2012S2A2G40

Double Pole

.150" (3.81mm) Vertical PC

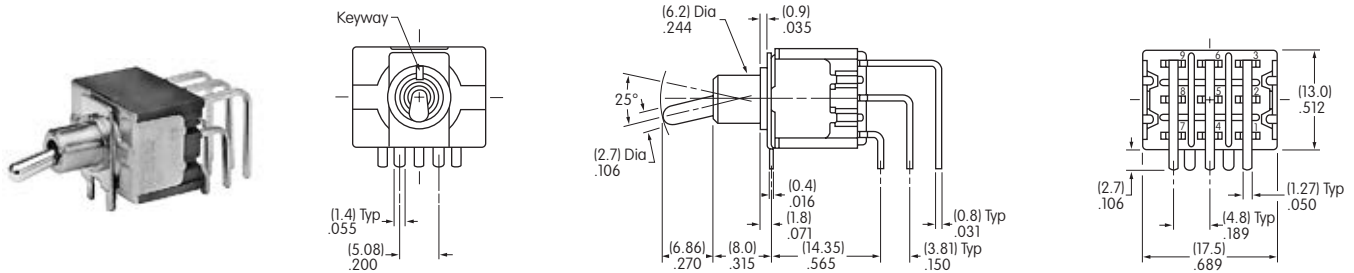


M2022S2A2G40

TYPICAL SWITCH DIMENSIONS

.150" (3.81mm) Vertical PC

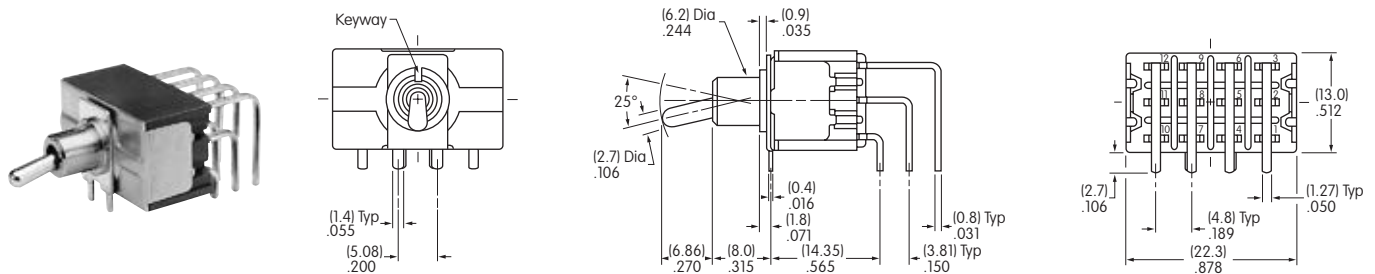
Three Pole



M2032S2A2G40

.150" (3.81mm) Vertical PC

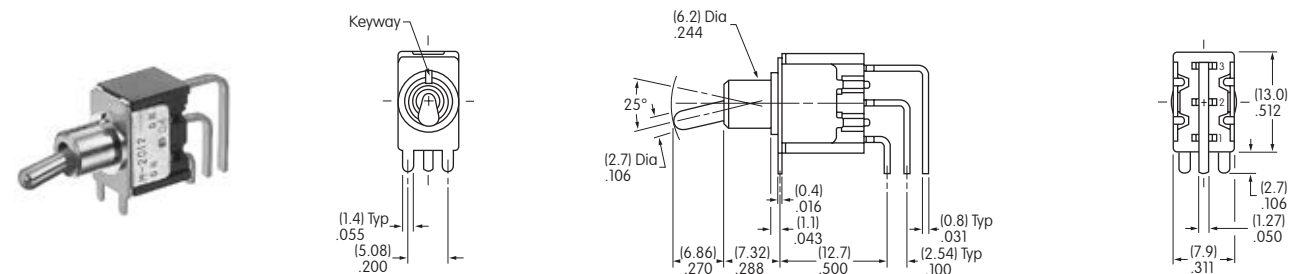
Four Pole



M2042S2A2G40

.100" (2.54mm) Vertical PC

Single Pole

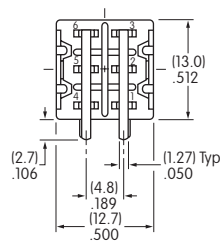
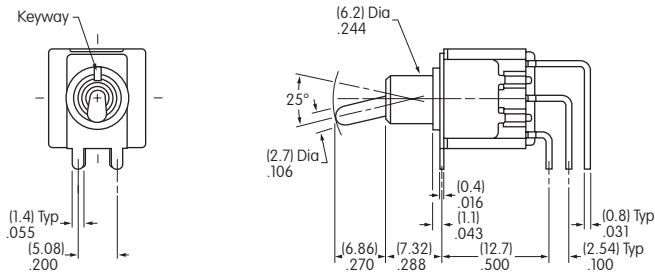


M2012S2A2G45

TYPICAL SWITCH DIMENSIONS

Double Pole

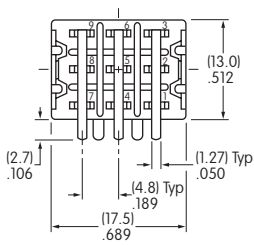
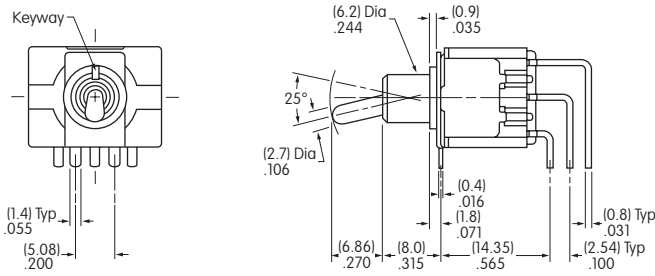
.100" (2.54mm) Vertical PC



M2022S2A2G45

Three Pole

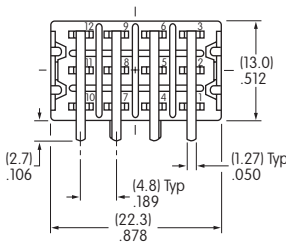
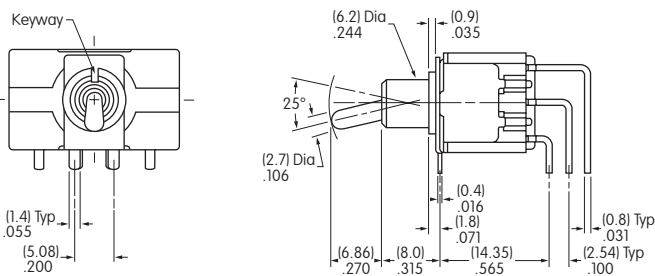
.100" (2.54mm) Vertical PC



M2032S2A2G45

Four Pole

.100" (2.54mm) Vertical PC



M2042S2A2G45

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

General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver):	6A @ 125V AC or 3A @ 250V AC or 3A @ 30V DC
Logic Level (gold):	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V) Note: Find additional explanation of 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 & case for 1 minute minimum		
Mechanical Life:	50,000 operations minimum		
Electrical Life:	25,000 operations minimum		
Nominal Operating Force:		On-to-On Position	Off-to-On Position
	Single Pole	3.19N	3.92N
	Double Pole	4.41N	7.06N
Angle of Throw:	20°		

Materials & Finishes

Bushing:	Brass with nickel plating
Housing:	Stainless steel
Mounting Bracket:	Steel with tin plating
Movable Contacts:	Silver alloy or silver alloy with gold plating
Stationary Contacts:	Silver with silver plating or copper or brass with gold plating
Lamp Contacts:	Phosphor bronze
Base:	Diallyl phthalate (UL94V-0)
Switch Terminals:	Copper with silver or gold plating
Lamp Terminals:	Brass with silver or gold plating

Environmental Data

Operating Temp Range:	-10°C through +55°C (+14°F through +131°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)

Installation

Mounting Torque:	1.47Nm (13 lb•in) for double nut; .67Nm (6 lb•in) for single nut
Soldering Time & Temp:	Wave Soldering (PC version): See Profile B in Supplement section. Manual Soldering: See Profile B in Supplement section. Note: Lever must be in center position while soldering.
Cleaning:	PC mountable device is not process sealed. Hand clean locally using alcohol based solution.

Standards & Certifications

Flammability Standards:	UL94V-0 base
UL:	File No. E44145 - Recognized only when ordered with marking on switch. Add "/U" to end of part number to order UL recognized switch. Single pole with synchronous circuits & single color LEDs & solder lug or PC recognized at 6A @ 125V AC.
CSA:	File No. 023535_0_000 - Certified only when ordered with marking on switch. Add "/C" to end of part number to order CSA certified switch. All single pole with synchronous circuits & single color LEDs certified at 6A @ 125V AC.

Distinctive Characteristics

Industry's first LED illumination at tip of toggle switches.

Single color LEDs of red, yellow, and green, plus bicolor red/green, to meet varied design requirements.

LEDs can operate independently from or synchronously with switching operation.

Antijamming feature to protect contacts from damage due to excessive downward force on the toggle.

High torque bushing prevents the bushing from rotating or separating from the metal frame during installation.

Stainless steel frame resists corrosion.

Silver contacts are of specially composed alloy for hardness.

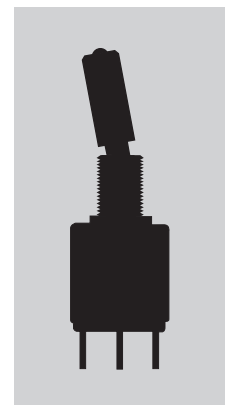
High insulating barriers protect against crossover in double pole devices.

Terminals are molded in and epoxy sealed to lock out flux, dust, and other contaminants.

1,500V dielectric strength between switch contacts and case is accomplished by clinching the frame away from the terminals.



Actual Size



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE

M21

1

2

T

C

W

01

Poles	
1	SPDT
* 2	DPDT
* Available only with Terminals 01, 02, 03	

LED Circuits & Actuator Types	
L	Isolated
T	Synchronous

Contact Materials & Ratings	
W	Silver; Rated 6A @ 125V AC
G	Gold; Rated 0.4VA max @ 28V AC/DC max

Threaded Bushings	
No Code	1/4-40 Thread (Inch)
/M	6mm Thread (Metric)

Circuits			
2	ON	NONE	ON
3	ON	OFF	ON

LED Colors	
Single Color	
C	Red
E	Yellow
F	Green
Bicolor	
CF	Red/Green

Terminals & Mounting Types	
01	Solder Lug with Threaded Bushing
02	Quick Connect with Threaded Bushing
03	Straight PC with Threaded Bushing
30	Right Angle PC with Smooth Bushing (available with gold contacts only)

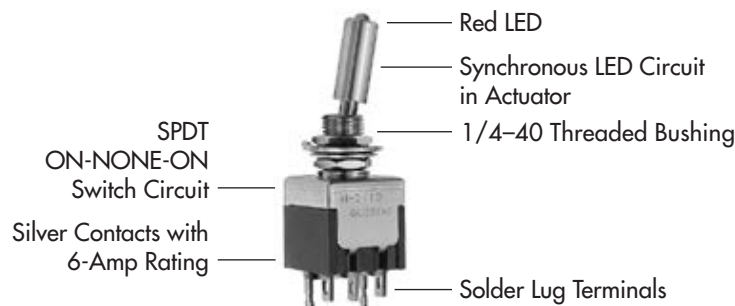
IMPORTANT:



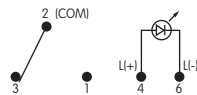
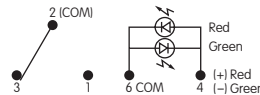
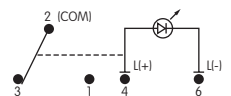
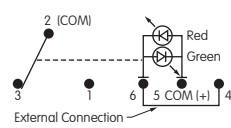
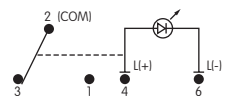
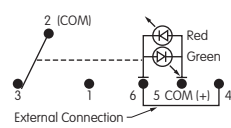
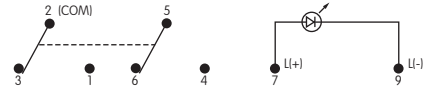
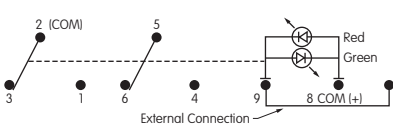
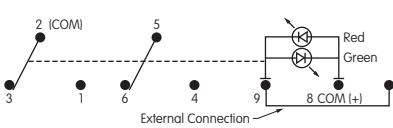
Switches are supplied without UL & CSA marking unless specified.
UL & CSA recognized only when ordered with marking on the switch.
Specific models, ratings, & ordering instructions are noted on the General Specifications page.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112TCW01



POLES & CIRCUITS & LED ILLUMINATION

Model		Pole & Throw	Toggle Position & Terminal Numbers			Schematics	
			Down 	Center 	Up 	Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.	
M2112 SPDT Connected Power Terminals			ON 2-3	NONE NONE	ON 2-1	Isolated Single Color LED  Isolated Bicolor LED  Synchronous Single Color LED  Synchronous Bicolor LED 	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 4-6	NONE NONE	ON 4-6			
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	NONE NONE	OFF OPEN			
	Synchronous Bicolor LED Connected LED Terminals	Red 5-6	NONE NONE	Green 5-4			
M2113 SPDT Connected Power Terminals			ON 2-3	OFF OPEN	ON 2-1	Synchronous Single Color LED  Synchronous Bicolor LED 	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 4-6	ON 4-6	ON 4-6			
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	OFF OPEN	ON 4-6			
	Synchronous Bicolor LED Connected LED Terminals	Red 5-6	OFF OPEN	Green 5-4			
M2122 DPDT Connected Power Terminals			ON 2-3 5-6	NONE NONE	ON 2-1 5-4	Isolated Single Color LED  Isolated Bicolor LED  Synchronous Single Color LED  Synchronous Bicolor LED 	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 7-9	NONE NONE	ON 7-9			
	Synchronous Single Color LED Connected LED Terminals	ON 7-9	NONE NONE	OFF OPEN			
	Synchronous Bicolor LED Connected LED Terminals	Red 8-9	NONE NONE	Green 8-7			
M2123 DPDT Connected Power Terminals			ON 2-3 5-6	OFF OPEN	ON 2-1 5-4	Synchronous Single Color LED  Synchronous Bicolor LED 	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 7-9	ON 7-9	ON 7-9			
	Synchronous Single Color LED Connected LED Terminals	ON 7-9	OFF OPEN	ON 7-9			
	Synchronous Bicolor LED Connected LED Terminals	Red 8-9	OFF OPEN	Green 8-7			

A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

LED COLORS & SPECIFICATIONS

The electrical specifications shown are determined at a basic temperature of 25°C. LED circuit is isolated and requires an external power source. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula in Supplement Section.

The LED is an integral part of the switch and not available separately. Bicolor LED is translucent white when unlit.		Single Color			Bicolor	
		C Red	E Yellow	F Green	CF Red/Green	Units
Maximum Forward Current	I_{FM}	30	30	30	25	mA
Typical Forward Current	I_F	20	20	20	10	mA
Forward Voltage	V_F	2.2	2.1	2.2	1.7/2.0	V
Maximum Reverse Voltage	V_{RM}	4	4	4	—	V
Current Reduction Rate Above 25°C	ΔI_F	0.38	0.38	0.38	0.33/0.33	mA/°C
Ambient Temperature Range		-10° ~ +55°C				

LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS



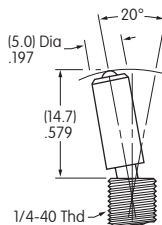
Toggle with Isolated LED Circuit



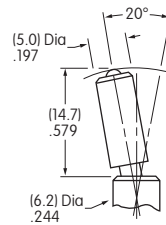
Toggle with Synchronous LED Circuit

Finish: Brushed aluminum

Standard Hardware: 2 AT513H Hex Nuts, 1 AT507H Locking Ring, 1 AT509 Lockwasher Standard & optional hardware details in Accessories & Hardware section.

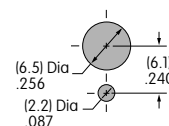


Threaded Bushing combines with Terminal codes 01, 02, & 03.

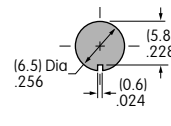


Smooth Bushing combines with Terminal code 30.

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

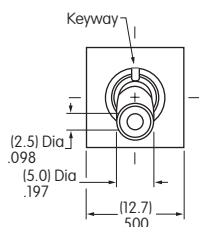


Max. Panel Thickness without Locking Ring .134" (3.4mm)

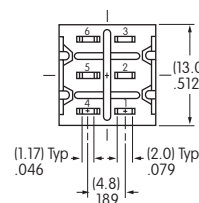
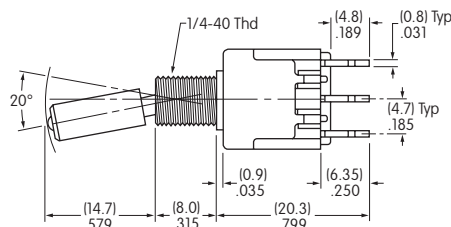


TYPICAL SWITCH DIMENSIONS

Solder Lug



Single Pole



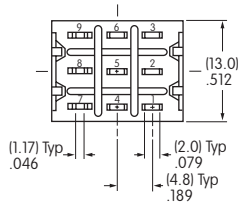
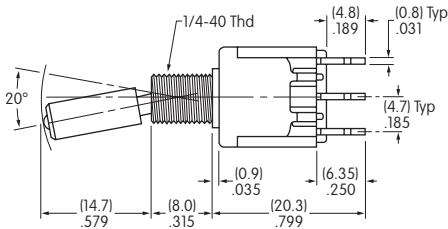
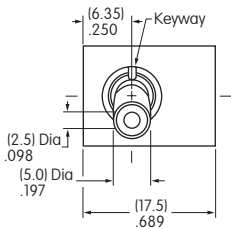
M2112TCFW01

Single color LED switch does not have terminal 5.

TYPICAL SWITCH DIMENSIONS

Double Pole

Solder Lug

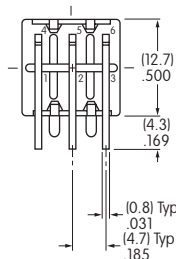
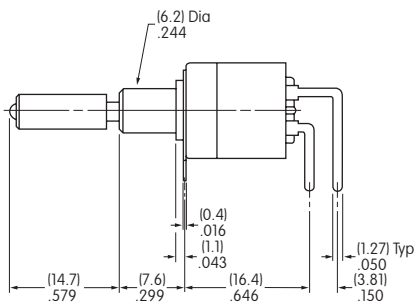
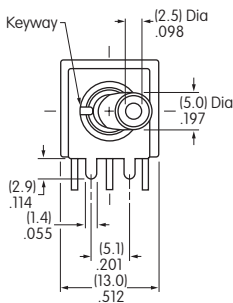


Single color LED switch does not have terminal 8.

M2122TCFW01

Single Pole Only

Right Angle PC



Single color LED switch does not have terminal 5.

Gold contact material only

M2112TCFG30

CONTACT MATERIALS & RATINGS



Silver over Silver

Power Level

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



Gold over Brass or Copper

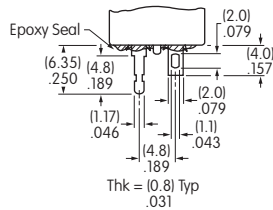
Logic Level

0.4VA maximum @ 28V AC/DC maximum

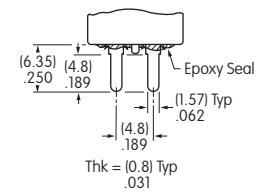
Complete explanation of operating range in Supplement section.

TERMINALS

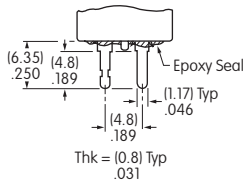
01 Solder Lug with Turret LED Terminal



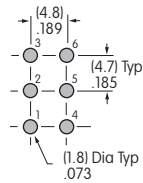
02 Quick Connect



03 Straight PC with Turret LED Terminal

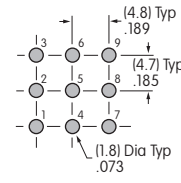


Single Pole



Single color LED & isolated bicolor LED switches do not have terminal 5.

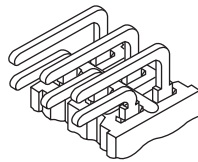
Double Pole



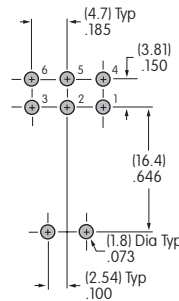
Single color LED & isolated bicolor LED switches do not have terminal 8.

30 Right Angle PC

LED terminals only available in brass with silver plating



Single Pole

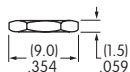
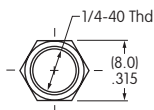


Single color LED & isolated bicolor LED switches do not have terminal 5.

STANDARD MOUNTING HARDWARE

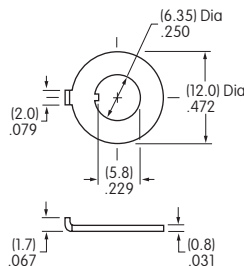
AT513H Hexagon Nut (2 per switch)

Material:
Brass with nickel plating



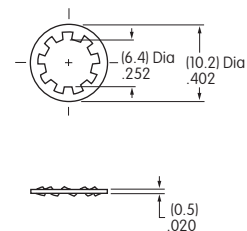
AT507H Locking Ring (1 per switch)

Material:
Steel with chromate over zinc



AT509 Lockwasher (1 per switch)

Material:
Steel with chromate over zinc



Optional Hardware: Knurled nuts, dress nuts, and ON-OFF plates are available; see details in Accessories & Hardware section.

General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver):	6A @ 125V AC or 3A @ 250V AC; 4A @ 30V DC (On-On circuit) & 3A @ 30V DC (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 & case for 1 minute minimum
Mechanical Life:	100,000 operations minimum
Electrical Life:	25,000 operations minimum for silver; 50,000 operations minimum for gold
Contact Timing:	Nonshorting (break-before-make)
Angle of Throw:	26°

Materials & Finishes

Toggle/Lever:	Brass with nickel plating
Support Bracket:	Brass with tin plating
Bushing/Housing:	Glass fiber reinforced polyamide (UL94V-0)
Sealing Ring:	Nitrile butadiene rubber
Base:	Glass fiber reinforced polyamide (UL94V-0)
Movable Contacts:	Silver alloy with silver plating (code W); copper or phosphor bronze with gold plating (code G); or silver alloy with gold plating (code A)
Stationary Contacts:	Silver alloy with silver plating (code W); copper or brass with gold plating (code G); or silver alloy with gold plating (code A)
Terminals:	Copper or brass with silver or gold plating

Environmental Data

Operating Temp Range:	-30°C through +85°C (-22°F through +185°F)
Humidity:	90 ~ 95% humidity for 96 hours @ 40°C (104°F)
Vibration:	10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning in 1 minute; 3 right angled directions for 2 hours
Shock:	50G (490m/s ²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

PCB Processing

Soldering:	Wave Soldering Recommended: See Profile B in Supplement section.
Cleaning:	Automated cleaning. See Cleaning specifications in Supplement section.

Standards & Certifications

Flammability Standards:	UL94V-0 rated bushing/housing & base
UL:	File No. E44145 - Recognized only when ordered with marking on switch. Add "/U" or "/CUL" before first dash in part number to order UL recognized switch. All models recognized at 6A @ 125V AC, 3A @ 250V AC, & 4A @ 30V DC or 0.4A @ 28V DC.
CSA:	File No. 023535_0_000 - Certified only when ordered with marking on switch. Add "/C" to end of part number to order CSA certified switch. All models certified at 6A @ 125V AC, 3A @ 250V AC, & 4A @ 30V DC.

Distinctive Characteristics

Antijamming actuator design protects against mechanism damage from downward force on the toggle.

Single unit construction of the bushing and top of the housing gives protection from cleaning fluids or other liquids.

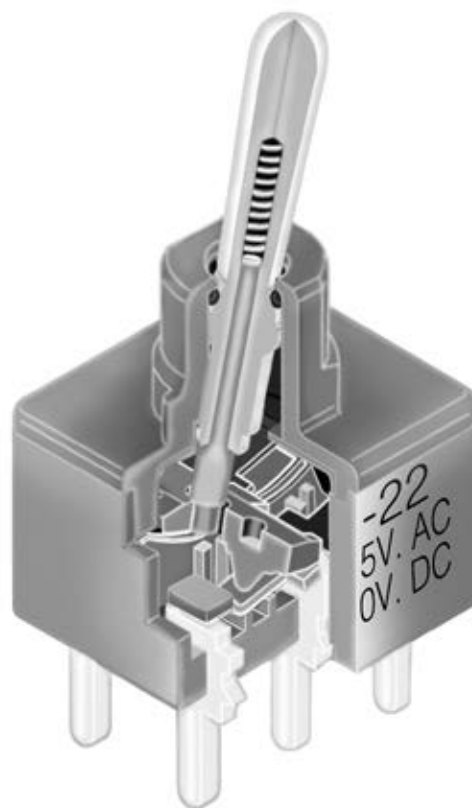
O-ring surrounding actuator at top of bushing interior prevents liquids from reaching switch mechanism.

Ultrasonic welding of upper and lower housing seals out contaminants and allows automated soldering and cleaning.

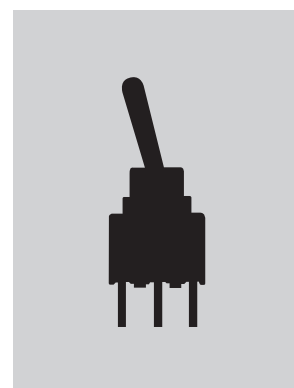
Terminals are epoxy sealed to prevent entry of flux, solvents, and other contaminants.

Bracketed models have crimped legs to ensure secure PC mounting and prevent dislodging during automated soldering.

Logic level and power capabilities are available to suit varying applications.



Actual Size



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE

M2T

1

2

S

A5

G

03

Poles

1	SPDT
2	DPDT

Bushing

A5	.250" (6.35mm) Double Flatted
----	----------------------------------

PC Terminals

03	Straight
13	Straight with .460" (11.7mm) Bracket
30	.150" (3.81mm) Right Angle
40	.150" (3.81mm) Vertical
05	.390" (9.9mm) Extended PC
06	.728" (18.5mm) Extended PC
07	.945" (24.0mm) Extended PC

Circuits

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

() = Momentary

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

Actuators

S	.500" (12.7mm) Bat Lever (standard combination with code 03 straight terminals)
S4	.300" (7.62mm) Bat Lever (standard combinations with codes 13, 30 & 40 bracketed terminals)

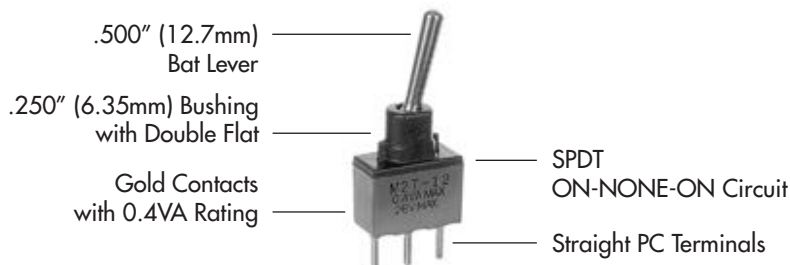
IMPORTANT:



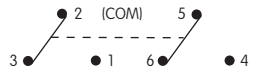
Switches are supplied without UL, cULus & CSA marking unless specified.
UL, cULus & CSA recognized only when ordered with marking on the switch.
Specific models, ratings & ordering instructions are noted on the General Specifications page.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2T12SA5G03



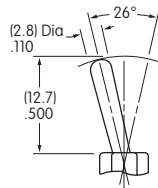
POLES & CIRCUITS

Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Down 	Center 	Up 	Down 	Center 	Up 	
SP	M2T12	ON	NONE	ON	2-3	OPEN	2-1	Note: Terminal numbers are not actually on the switch. SPDT 
	M2T13	ON	OFF	ON				
	M2T15	ON	NONE	(ON)				
	M2T18	(ON)	OFF	(ON)				
	M2T19	ON	OFF	(ON)				
DP	M2T22	ON	NONE	ON	2-3 5-6	OPEN	2-1 5-4	DPDT 
	M2T23	ON	OFF	ON				
	M2T25	ON	NONE	(ON)				
	M2T28	(ON)	OFF	(ON)				
	M2T29	ON	OFF	(ON)				

ACTUATORS

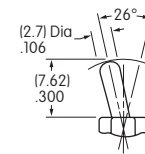
S .500" (12.7mm)
Bat Lever

Material:
Nickel over Brass



S4 .300" (7.62mm)
Bat Lever

Material:
Nickel over Brass

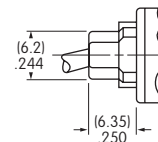
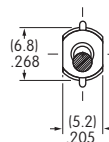


Standard Combinations: S Bat Lever with straight terminals (code 03) with silver or gold contacts.

Standard Combinations: S4 Bat Lever with bracketed terminals (codes 13, 30, 40) with silver or gold contacts.

BUSHING

A5 .250" (6.35mm) Double Flatted



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
Complete explanation of operating range in Supplement section.

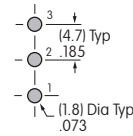
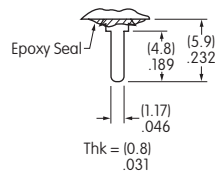
A Gold over Silver **Power Level or Logic Level** 6A @ 125V AC or 0.4VA maximum @ 28V AC/DC maximum

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 for complete explanation of dual rating and operating range.

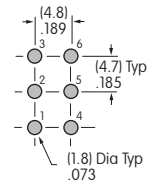
PC TERMINALS

03

Straight



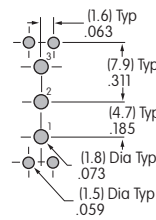
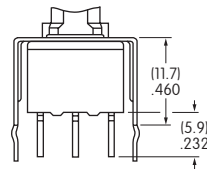
Single Pole



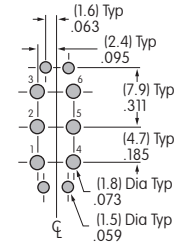
Double Pole

13

Straight with .460" (11.7mm) Bracket



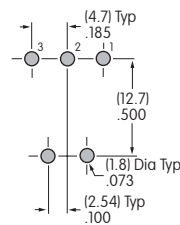
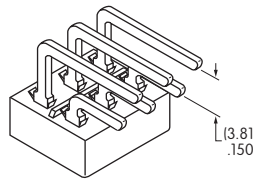
Single Pole



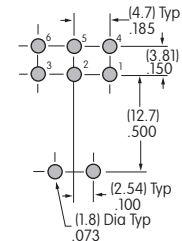
Double Pole

30

.150" (3.81mm) Right Angle



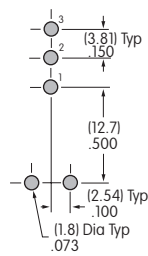
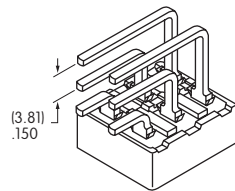
Single Pole



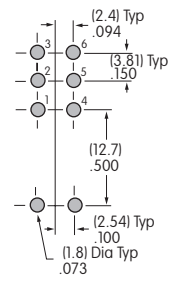
Double Pole

40

.150" (3.81mm) Vertical



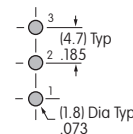
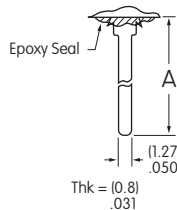
Single Pole



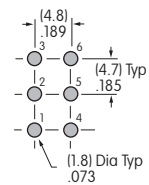
Double Pole

05

.390" (9.9mm) Extended PC



Single Pole



Double Pole

06

.728" (18.5mm) Extended PC

07

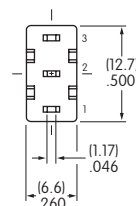
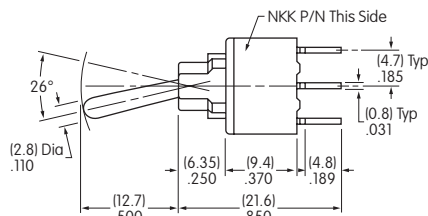
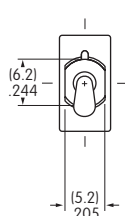
.945" (24.0mm) Extended PC

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

TYPICAL SWITCH DIMENSIONS

Single Pole

Straight PC

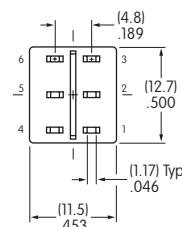
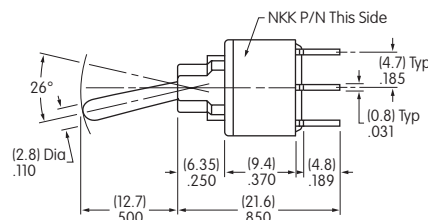
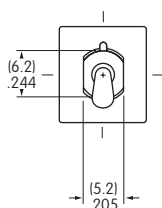


Actuator in Down Position

M2T12SA5G03

Double Pole

Straight PC

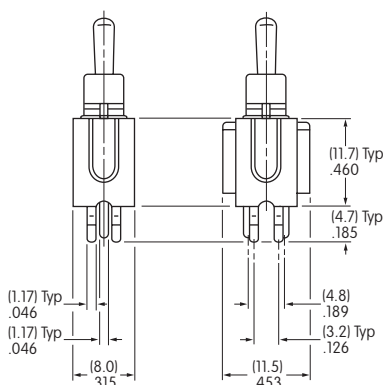
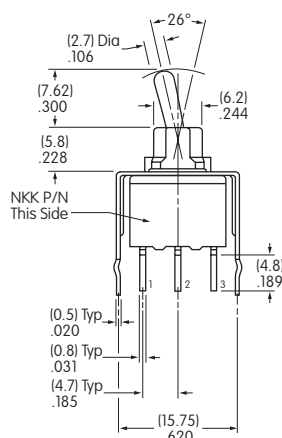


Actuator in Down Position

M2T22SA5G03

Single & Double Pole

Straight PC • Bracket



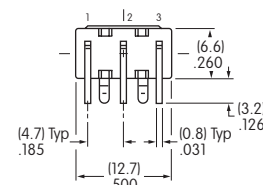
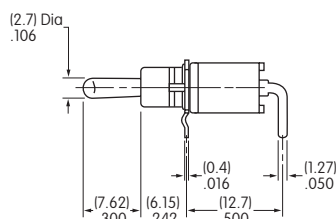
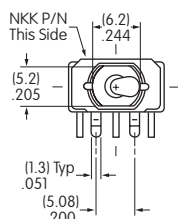
Actuator in Down Position

M2T12S4A5G13

TYPICAL SWITCH DIMENSIONS

Right Angle PC

Single Pole

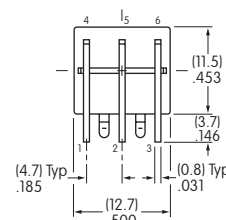
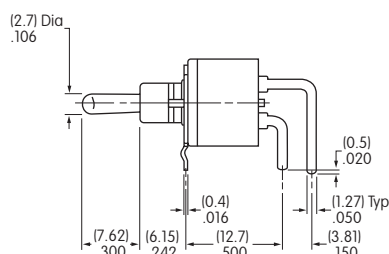
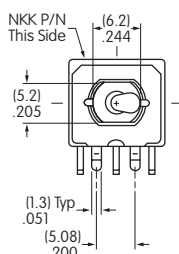


M2T12S4A5G30

Actuator in Down Position

Right Angle PC

Double Pole

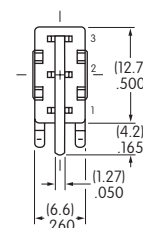
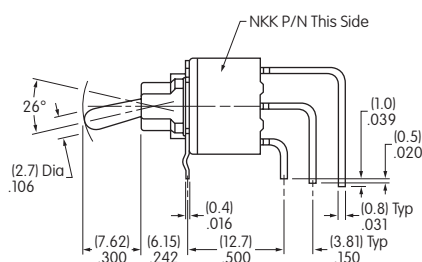
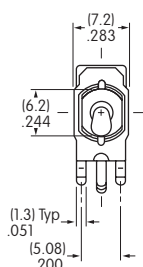


M2T22S4A5G30

Actuator in Down Position

Vertical PC

Single Pole



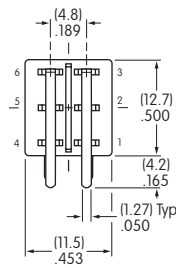
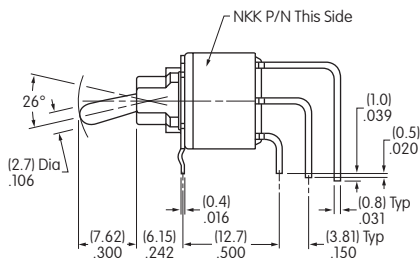
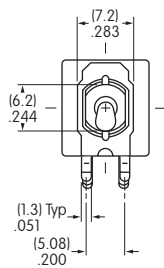
M2T12S4A5G40

Actuator in Down Position

TYPICAL SWITCH DIMENSIONS

Double Pole

Vertical PC



Actuator in Down Position

M2T22S4A5G40

HANDLING PRECAUTION

When an application employs M2T model with silver contacts, 5 to 6A @ 125V AC, and the switch will be actuated 100 or more times per day, note these instructions:
Peel off the film seal on the switch body situated over the part number after cleaning.

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

General Specifications

Electrical Capacity

Resistive Load:	10A @ 125V AC or 6A @ 250V AC
Motor Load:	400W @ 125V AC
Lamp Load:	2A @ 125V AC for On-Off-On circuit & 3A @ 125V AC for other circuits

Other Ratings

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum between contacts for 1 minute minimum; 4,000V AC minimum between contacts & case for 1 minute minimum
Mechanical Life:	100,000 operations minimum
Electrical Life:	25,000 operations minimum
Angle of Throw:	25°

Materials & Finishes

Toggle Cap:	Polypropylene for No Code, Code D; Polyvinyl chloride for Code B (see Ordering Example)
Lever:	Brass with chrome plating
Bushing:	Brass with nickel plating
Frame:	Stainless steel
Case/Base:	Diallyl phthalate resin (UL94V-0)
Movable Contacts:	Silver alloy with silver plating
Stationary Contacts:	Pure silver with silver plating
Terminals:	Copper with silver plating

Environmental Data

Operating Temp Range:	-10°C through +85°C (+14°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)

Installation

Soldering Time & Temp:	Wave Soldering Recommended (Straight PC): See Profile A in Supplement section. Manual Soldering: See Profile A in Supplement section.
Cleaning:	These devices are not process sealed. Hand clean locally using alcohol based solution.

Standards & Certifications

Flammability Standards:	UL94V-0 rated case/base
UL:	File No. E44145 - Recognized only when ordered with marking on switch. Add "/U" or "/CUL" to end of part number to order UL recognized switch. Models with No Code, E, F & D are recognized at 10A @ 125V AC & 6A @ 250V AC.
CSA:	File No. 023535_0_000 - Certified only when ordered with marking on switch. Add "/C" to end of part number to order CSA certified switch. Models with No Code, E, F and D are certified at 10A @ 125V AC & 6A @ 250V AC.
VDE:	License No. 119174 Models with No Code, B & D are approved at 10A @ 125V AC & 6A @ 250V AC. Models with No Code, B & D meet EN 61058-1 standard.

Distinctive Characteristics

Meets EN 61058-1 standard.

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

Stainless steel frame resists corrosion and increases environmental safety.

Case/base of heat resistant resin meets UL94V-0 flammability standard.

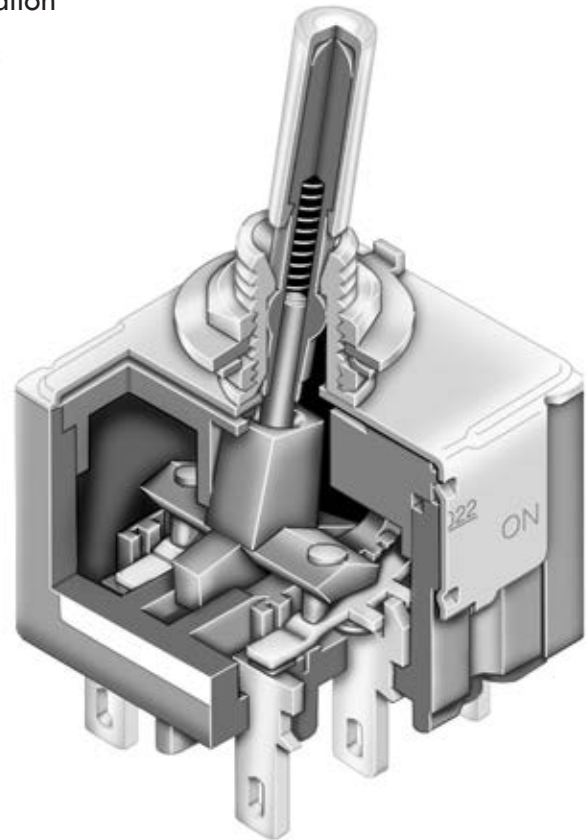
Contacts of special silver alloy resist arcing and guarantee stable electrical contact and long life.

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

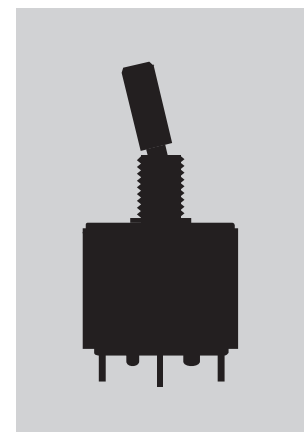
Prominent external insulating barriers increase insulation resistance and dielectric strength.

Epoxy sealed terminals prevent entry of flux, solvents, and other contaminants.

Clinching of the frame to the case well above the base and terminals provides 4,000V dielectric strength.



Actual Size



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE

P20

22

B

Poles & Circuits				
11	SPST	ON	NONE	OFF
12	SPDT	ON	NONE	ON
13	SPDT	ON	OFF	ON
21	DPST	ON	NONE	OFF
22	DPDT	ON	NONE	ON
23	DPDT	ON	OFF	ON

Toggles & Bushings	
No Code	.512" (13.0mm) White Cap with 6mm Bushing
E	.450" (11.4mm) Flatted with 6mm Bushing
B	.689" (17.5mm) Large Bat & AT406B Cap with 12mm Bushing
F	.689" (17.5mm) Large Bat with 12mm Bushing
D	.748" (19.0mm) White Capped Column with 12mm Bushing

Terminals	
No Code	Solder Lug
P	Straight PC
Z	.187" (4.75mm) Quick Connect

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

P2022F

.689" (17.5mm) Large Bat with 12mm Bushing

DPDT
ON-NONE-ON Circuit

Solder Lug Terminals



IMPORTANT:

VDE is marked on all models except those with codes E & F. 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.



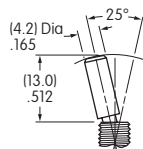
POLES & CIRCUITS

		Toggle Position			Connected Terminals			Throw & Schematics
Pole	Model	Down Keyway	Center	Up	Down Keyway	Center	Up	
SP	P2011	ON	NONE	OFF	1-1b	OPEN	OPEN	SPST
SP	P2012 P2013	ON ON	NONE OFF	ON ON	1-1b	OPEN	1-1a	SPDT
DP	P2021	ON	NONE	OFF	1-1b 2-2b	OPEN	OPEN	DPST
DP	P2022 P2023	ON ON	NONE OFF	ON ON	1-1b 2-2b	OPEN	1-1a 2-2a	DPDT

TOGGLES & BUSHINGS

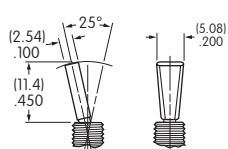
No Code

.512" (13.0mm) White Cap with 6mm Bushing



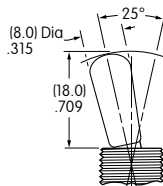
E

.450" (11.4mm) Flatted with 6mm Bushing



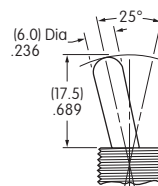
B

.689" (17.5mm) Large Bat & AT406B Cap with 12mm Bushing



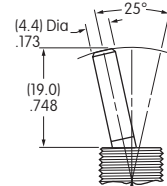
F

.689" (17.5mm) Large Bat with 12mm Bushing



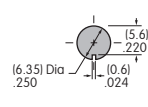
D

.748" (19.0mm) White Capped Column with 12mm Bushing

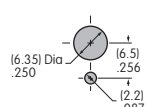


Panel Cutouts

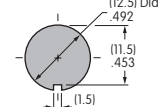
Panel Thickness with Keyway
.134" (3.4mm) maximum



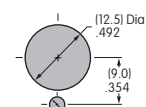
Panel Thickness with Locking Ring
.102" (2.6mm) maximum



Panel Thickness with Keyway
.256" (6.5mm) maximum



Panel Thickness with Locking Ring
.217" (5.5mm) maximum



Standard Hardware

For 6mm Bushing: 1 Locking Ring AT507M, 1 Internal Tooth Lockwasher AT509, 2 Hex Nuts AT513M

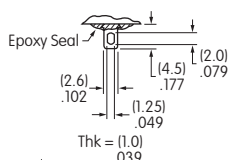
For 12mm Bushing: 1 Hex Face Nut AT503M, 1 Locking Ring AT506M, 1 Internal Tooth Lockwasher AT508, 1 Hex Mounting Nut AT527M

Optional Splashproof Boot Assemblies (for code F): AT401 & AT4181 boots plus hex nut & o-ring; see Accessories & Hardware section.

TERMINALS

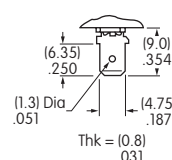
No Code

Solder Lug



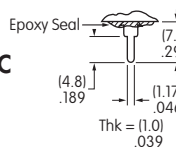
Z

.187" (4.75mm) Quick Connect

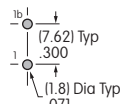


P

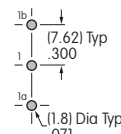
Straight PC



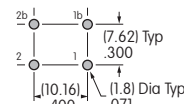
SPST



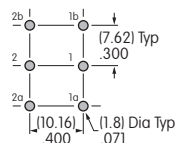
SPDT



DPST

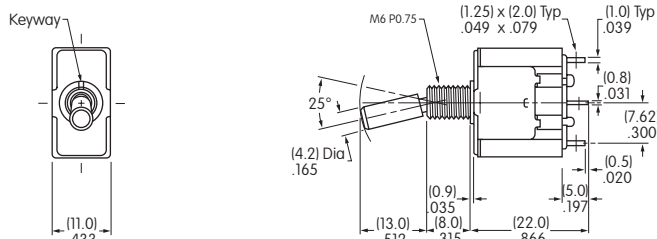


DPDT



TYPICAL SWITCH DIMENSIONS

P2011, P2012, P2013



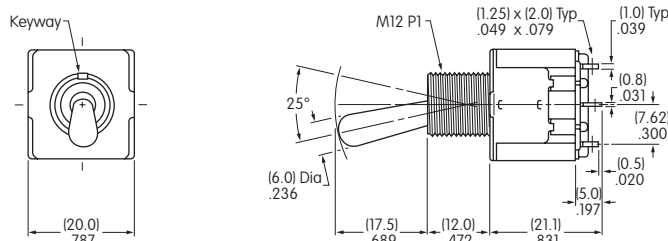
P2011 models do not have terminal 1a.

6mm Bushing



P2012

P2021F, P2022F, P2023F



P2021 models do not have terminals 1a & 2a.

12mm Bushing



P2022F

Contents for Standard Size Toggles



Low Capacity Page A101

5A Power Level
Solder Lug Terminals
Bushing Mount
Double Pole



Medium Capacity Page A103

15~20A Power Level
Solder Lug, Quick Connect Terminals
Bushing Mount
Single & Double Pole



Medium/High Capacity Page A108

15~25A Power Level
Solder Lug, Screw Lug, Quick Connect Terminals
Bushing Mount
One through Four Pole



High Capacity Page A119

30~50A Power Level
Screw Lug Terminals
Bushing Mount or Mounting Screws
Double Pole & Three Pole

GENERAL SPECIFICATIONS FOR S100s

A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

Electrical Capacity (Resistive & Inductive Load)

Power Level: Shown in the following table

Other Ratings

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	200 megohms minimum @ 500V DC
Dielectric Strength:	1,500V AC minimum for 1 minute minimum
Mechanical Life:	30,000 operations minimum
Electrical Life:	10,000 operations minimum
Operating Temp Range:	-10°C through +70°C (+14°F through +158°F)

Materials & Finishes

Toggle:	Brass with chrome plating
Bushing:	Brass with chrome or nickel plating
Case:	Phenolic resin
Case Cover:	Steel with zinc plating
Movable Contactor Plate:	Copper with silver plating
Movable & Stationary Contacts:	Silver alloy plus copper with silver plating
Terminals:	Copper with silver plating

Environmental Data

Operating Temp Range: -10°C through +70°C (+14°F through +158°F)

Installation

Mounting Torque:	2.94Nm (26 lb•in) for double nut
Soldering Time & Temperature:	Manual Soldering: See Profile A in Supplement section.

Standards & Certifications

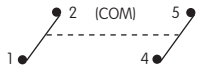
CSA: File No. 023535_0_000 - Certified only when ordered with marking on switch.
Add "/C" to end of part number to order CSA certified switch.
Certified at 5A @ 125V AC & 2A @ 250V AC.

DOUBLE POLE WITH SOLDER LUG

* CSA certified only when ordered with marking on switch (see General Specs)			Toggle Position/Connected Terminals					Electrical Capacity				
Model	* Approvals		Pole & Throw	Down	Center	Up		Resistive			Inductive	Angle of Throw
							AC 125V	AC 250V	DC 30V	AC 125V PF 0.6		
S114	—	✓	DPST	ON 2-1 5-4	NONE	OFF	—	5A	2A	5A	3A	25°
S116	—	✓	DPDT	ON 2-1 5-4	NONE	ON	2-3 5-6	5A	2A	5A	3A	25°
S116R	—	—	DPDT	ON 2-1 5-4	NONE	ON	2-3 5-6	5A	2A	5A	3A	25°

Throw & Schematics:

DPST



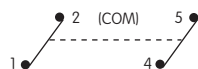
DPDT



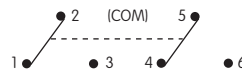
Note: Terminal numbers are actually on the switch

Throw & Schematics:

DPST



DPDT



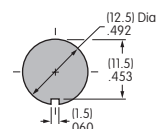
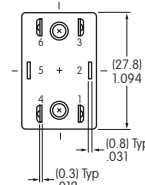
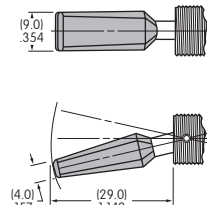
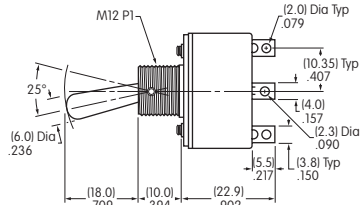
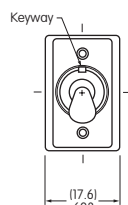
Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT504M Knurled Nut, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.

Optional Splashproof Boot Assemblies (only for bat lever models): AT401 & AT4181 boots plus hex nut and o-ring. See Accessories & Hardware section.

S114 & S116

S116R Black Polyamide Paddle



S116

S114 does not have terminals 3 & 6

Maximum Panel Thickness: .158" (4.0mm)

GENERAL SPECIFICATIONS FOR S1 ~ S29

A
Toggles

Electrical Capacity (Resistive & Inductive Load)

Power Level: Shown in the following tables

Rockers

Other Ratings

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum for 1 minute minimum
Mechanical Life:	30,000 operations minimum for S5AW, S8AW, S9AW, S25AW, S28AW, S29AW 50,000 operations minimum for all other models
Electrical Life:	25,000 operations minimum
Angle of Throw (α):	Shown in tables on following pages

Pushbuttons

Illuminated PB

Materials & Finishes

Toggle:	Brass with chrome plating
Bushing:	Brass with chrome plating
Case:	Phenolic resin
Case Cover:	Steel with zinc plating
Movable Contactor:	Copper with silver plating
Movable Contacts:	Silver alloy capped on copper with silver plating
Stationary Contacts:	Silver alloy capped on copper with silver plating
Terminals:	Brass with tin plating

Programmable

Keylocks

Rotaries

Environmental Data

Operating Temp Range:	-30°C through +70°C (-22°F through +158°F) for Splashproof models; -10°C through +70°C (+14°F through +158°F) for all other models
Sealing:	Splashproof & lever lock panel seal models meet IP67 standard

Slides

Installation

Mounting Torque:	1.47Nm (13 lb•in) for single nut on AW & AL models 2.94Nm (26 lb•in) for double nut on other models
Maximum Panel Thickness:	Shown beneath panel cutout in switch dimension drawings
Soldering Time & Temperature:	Manual Soldering: See Profile A in Supplement section.

Tactiles

Tilt

Standards & Certifications

UL:	File No. E44145 - Recognized only when ordered with marking on switch. Add "/U" or "/CUL" to end of part number to order UL recognized switch. UL or cULus recognition designated beside part numbers on following pages. See Supplement section to find UL or cULus rating details.
CSA:	File No. 023535_0_000 - Certified only when ordered with marking on switch. Add "/C" to end of part number to order CSA certified switch. CSA certification designated beside part numbers on following pages. See Supplement section to find CSA rating details.

Touch

Indicators

Accessories

Supplement

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

SINGLE POLE WITH SOLDER LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals				Electrical Capacity				Angle of Throw
Model	* Approvals			Pole & Throw	Down 	Center 	Up 	Resistive			Inductive	
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S1A	✓	✓	✓	SPST	ON 1-3	NONE	OFF —	15A	6A	20A	8A	25°
S2A	✓	✓	✓	SPDT	ON 2-3	NONE	ON 2-1	15A	6A	20A	8A	25°
S3A	✓	✓	✓	SPDT	ON 2-3	OFF	ON 2-1	15A	6A	20A	8A	25°

Throw & Schematics:

SPST



SPDT

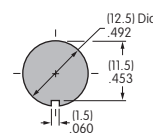
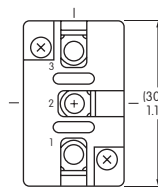
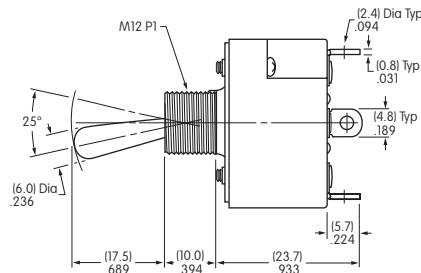
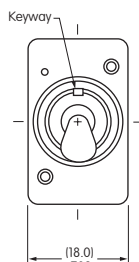


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT504M Knurled Nut, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S2A



Maximum Panel Thickness: .158" (4.0mm)

S1A does not have terminal 2

DOUBLE POLE WITH SOLDER LUG

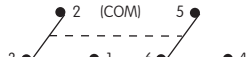
* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals				Electrical Capacity				α = Angle of Throw
Model	* Approvals			Pole & Throw	Down 	Center 	Up 	Resistive			Inductive	
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S21A	—	—	—	DPST	ON 1-3 4-6	NONE	OFF —	15A	15A	15A	8A	21°
S6A	✓	✓	✓	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	20A	10A	20A	8A	21°
S7A	—	—	✓	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	20A	10A	20A	8A	28°

Throw & Schematics:

DPST



DPDT

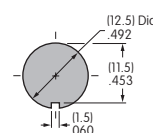
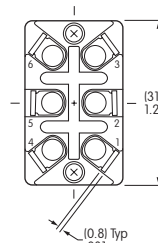
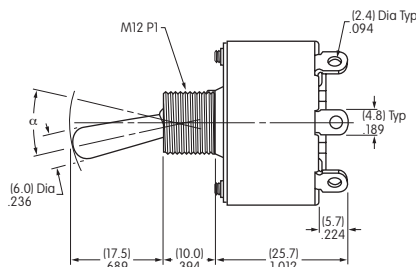
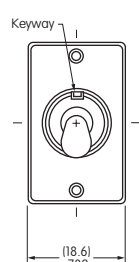


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT504M Knurled Nut, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



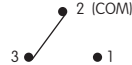
S6A



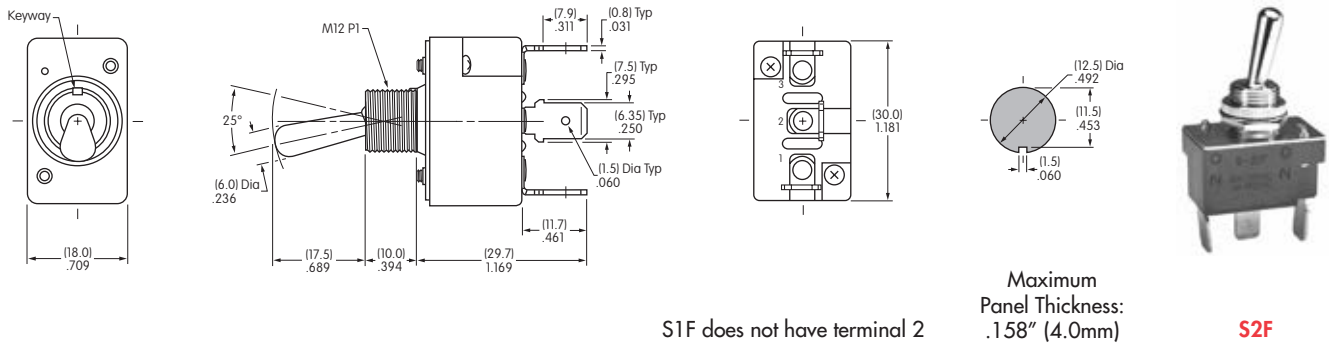
Maximum Panel Thickness: .158" (4.0mm)

S21A does not have terminals 2 & 5

SINGLE POLE WITH QUICK CONNECT

			Toggle Position/Connected Terminals				Electrical Capacity				
Model	Approvals		Pole & Throw	Down	Center	Up	Resistive			Inductive	Angle of Throw
				 Keyway			AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S1F	—	—	SPST	ON 1-3	NONE	OFF —	15A	6A	20A	8A	25°
S2F	—	—	SPDT	ON 2-3	NONE	ON 2-1	15A	6A	20A	8A	25°
S3F	—	—	SPDT	ON 2-3	OFF	ON 2-1	15A	6A	20A	8A	25°
Throw & Schematics:								Note: Terminal numbers are actually on the switch			
SPST 				SPDT 							

Notes: Standard Hardware: AT504M Knurled Nut, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



DOUBLE POLE WITH QUICK CONNECT

			Toggle Position/Connected Terminals				Electrical Capacity					
Model	Approvals  	Pole & Throw	Down 		Center 	Up 		Resistive			Inductive	α = Angle of Throw
				Keyway 				AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S21F	— —	DPST	ON	1-3 4-6	NONE	OFF	—	15A	15A	15A	8A	21°
S6F	— —	DPDT	ON	2-3 5-6	NONE	ON	2-1 5-4	20A	10A	20A	8A	21°
S7F	— —	DPDT	ON	2-3 5-6	OFF	ON	2-1 5-4	20A	10A	20A	8A	28°

Throw & Schematics:

DPST



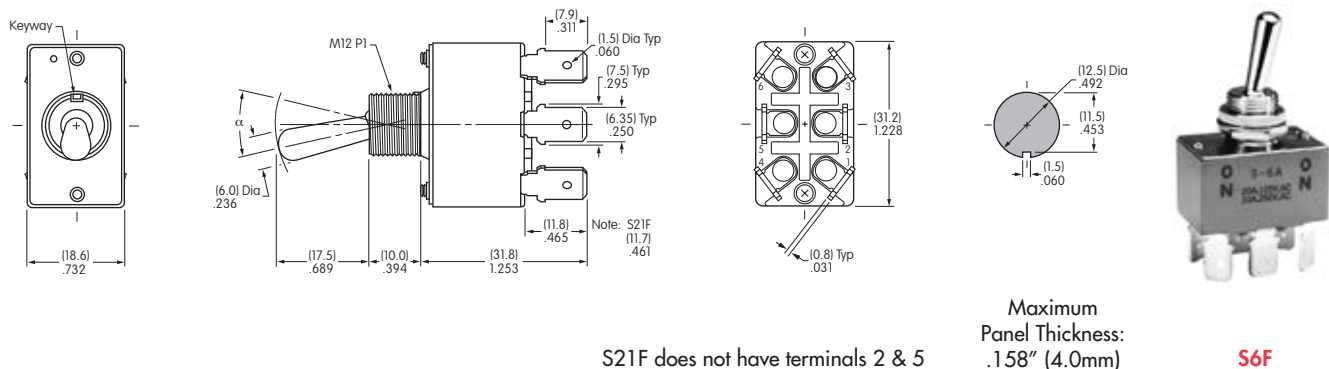
INTERNAL CONNECTION

DPDT

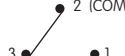


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT504M Knurled Nut, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



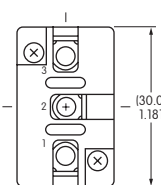
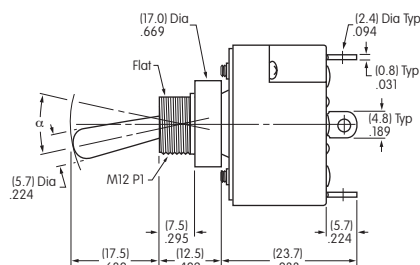
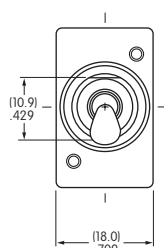
SINGLE POLE SOLDER LUG WITH PANEL SEAL

			Toggle Position/Connected Terminals () = Momentary				Electrical Capacity			
Model	Approvals		Pole & Throw	Down 	Center 	Up 	Resistive			α = Angle of Throw
							AC 125V	AC 250V	DC 30V	
S1AW	—	—	SPST	ON 1-3	NONE	OFF —	15A	6A	20A	24°
S2AW	—	—	SPDT	ON 2-3	NONE	ON 2-1	15A	6A	20A	24°
S3AW	—	—	SPDT	ON 2-3	OFF	ON 2-1	15A	6A	20A	28°
S5AW	—	—	SPDT	ON 2-3	NONE	(ON) 2-1	15A	6A	20A	20°
S8AW	—	—	SPDT	(ON) 2-3	OFF	(ON) 2-1	15A	6A	20A	24°
S9AW	—	—	SPDT	ON 2-3	OFF	(ON) 2-1	15A	6A	20A	24°
Throw & Schematics:							Note: Terminal numbers are actually on the switch			
SPST										
			SPDT							

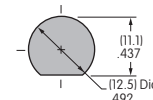
Notes: Standard Hardware: AT503M Face Hex Nut, AT508 Lockwasher, AT537 O-ring. See Accessories & Hardware section.
For .250" Quick Connect terminals, add "F" to end of part number. See Quick Connect terminal dimensions on previous page.
For further information, contact factory.



S2AW



S1AW does not have terminal 2



Maximum Panel Thickness: .158" (4.0mm)

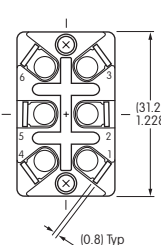
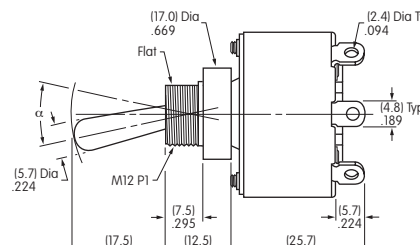
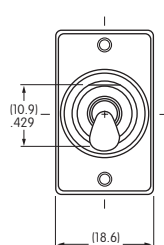
DOUBLE POLE SOLDER LUG WITH PANEL SEAL

			Toggle Position/Connected Terminals () = Momentary				Electrical Capacity				
Model	Approvals		Pole & Throw	Down 		Center 	Up 	Resistive			α = Angle of Throw
							AC 125V	AC 250V	DC 30V		
S21AW	—	—	DPST	ON	1-3 4-6	NONE	OFF —	15A	15A	15A	22°
S6AW	—	—	DPDT	ON	2-3 5-6	NONE	ON 2-1 5-4	20A	10A	20A	22°
S7AW	—	—	DPDT	ON	2-3 5-6	OFF	ON 2-1 5-4	20A	10A	20A	28°
S25AW	—	—	DPDT	ON	2-3 5-6	NONE	(ON) 2-1 5-4	15A	6A	20A	20°
S28AW	—	—	DPDT	(ON)	2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	22°
S29AW	—	—	DPDT	ON	2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	22°
Throw & Schematics:			DPST				DPDT				Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT508 Lockwasher, AT537 O-ring. See Accessories & Hardware section.
For .250" Quick Connect terminals, add "F" to end of part number. See Quick Connect terminal dimensions on previous page.
For further information, contact factory.



S6AW



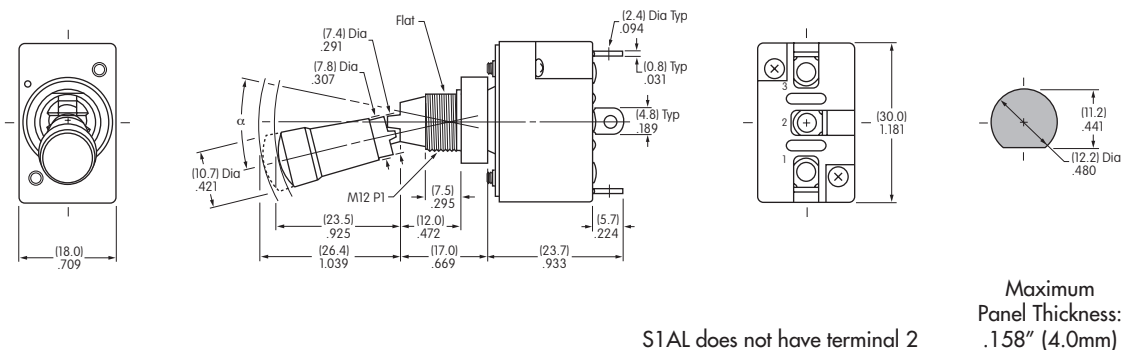
S21AW does not have terminals 2 & 5

Maximum Panel Thickness: .158" (4.0mm)

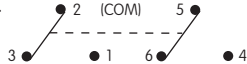
SINGLE POLE SOLDER LUG WITH LOCKING LEVER & PANEL SEAL

Model	Approvals  	Pole & Throw	Toggle Position/Connected Terminals			Electrical Capacity				$\alpha =$ Angle of Throw
			Down 	Center 	Up 	Resistive			Inductive	
						AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S1AL	—	SPST	ON 1-3	NONE	OFF —	15A	6A	20A	8A	24°
S2AL	—	SPDT	ON 2-3	NONE	ON 2-1	15A	6A	20A	8A	24°
S3AL	—	SPDT	ON 2-3	OFF	ON 2-1	15A	6A	20A	8A	28°
Throw & Schematics:			SPST  INTERNAL CONNECTION SPDT  2 (COM)			Note: Terminal numbers are actually on the switch				

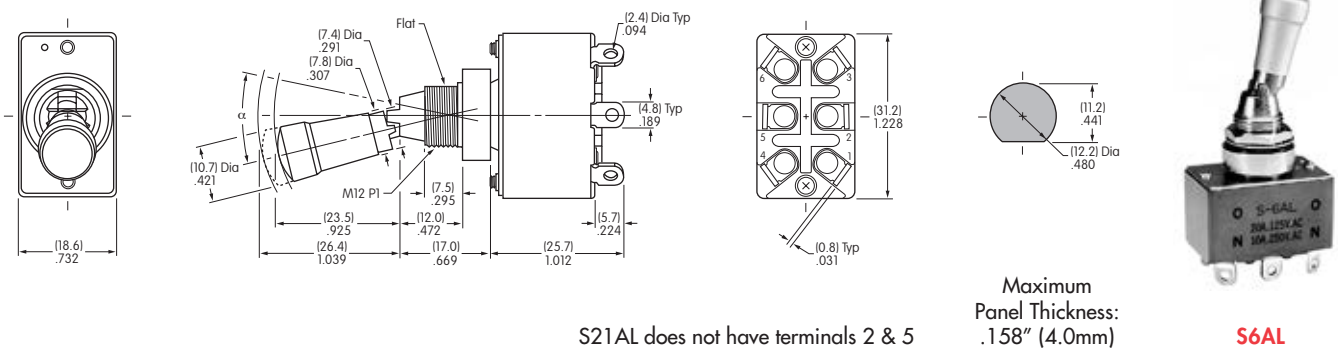
Notes: Standard Hardware: AT503M Face Hex Nut, AT508 Lockwasher, AT537 O-ring. See Accessories & Hardware section.



DOUBLE POLE SOLDER LUG WITH LOCKING LEVER & PANEL SEAL

Model	* Approvals  	Pole & Throw	Toggle Position/Connected Terminals			Electrical Capacity				$\alpha =$ Angle of Throw
			Down 	Center 	Up 	Resistive			Inductive	
						AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S21AL	—	DPST	ON 1-3 4-6	NONE	OFF —	15A	15A	15A	8A	22°
S6AL	✓	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	20A	10A	20A	8A	22°
S7AL	—	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	20A	10A	20A	8A	28°
Throw & Schematics:			DPST  INTERNAL CONNECTION DPDT  2 (COM)			Note: Terminal numbers are actually on the switch				

Notes: Standard Hardware: AT503M Face Hex Nut, AT508 Lockwasher, AT537 O-ring. See Accessories & Hardware section.



GENERAL SPECIFICATIONS FOR S301 ~ S339

Electrical Capacity (Resistive & Inductive Load)

Power Level: Shown in the following tables

Other Ratings

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum for 1 minute minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	6,000 operations minimum for S331F; 15,000 operations minimum for all other S331s; 25,000 operations minimum for all others
Angle of Throw (α):	Shown on following tables

Materials & Finishes

Toggle:	PBT for flatted lever; brass with chrome plating for all others
Bushing:	Brass with chrome plating
Case:	Melamine phenol
Case Cover:	Steel with zinc plating
Movable Contactor:	Copper with silver plating
Movable & Stationary Contacts:	Silver alloy capped on copper with silver plating
Terminals:	Brass with tin plating

Environmental Data

Operating Temperature Range: $-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$ ($+14^{\circ}\text{F} \sim +158^{\circ}\text{F}$)

Installation

Mounting Torque: 2.94Nm (26 lb•in) for double nut; 1.47Nm (13 lb•in) for single nut
Soldering Time & Temperature: Manual Soldering: See Profile A in Supplement section.

Standards & Certifications

- UL:** File No. E44145 - Recognized only when ordered with marking on switch.
 Add "/U" or "/CUL" to end of part number to order UL recognized switch.
 UL or cULus recognition designated beside part numbers on following pages.
 See Supplement section to find UL or cULus rating details.
- CSA:** File No. 023535_0_000 - Certified only when ordered with marking on switch.
 Add "/C" to end of part number to order CSA certified switch.
 CSA certification designated beside part numbers on following pages.
 See Supplement section to find CSA rating details

SINGLE POLE WITH SOLDER LUG

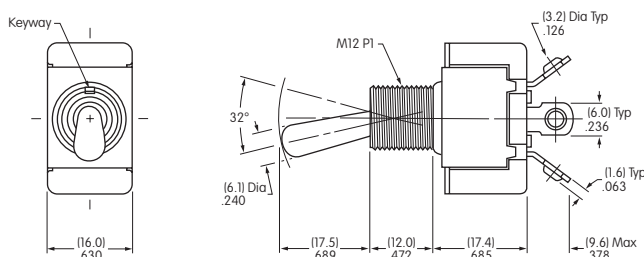
* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals () = Momentary				Electrical Capacity				
Model	* Approvals			Pole & Throw	Down Keyway	Center	Up	Resistive			Inductive	Angle of Throw
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S301	✓	✓	✓	SPST	ON 1-3	NONE	OFF —	15A	6A	20A	10A	32°
S302	✓	✓	✓	SPDT	ON 2-3	NONE	ON 2-1	15A	6A	20A	10A	32°
S303	✓	✓	✓	SPDT	ON 2-3	OFF	ON 2-1	15A	6A	20A	10A	32°
S305	—	—	✓	SPDT	ON 2-3	NONE	(ON) 2-1	15A	6A	20A	8A	32°
S308	—	—	✓	SPDT	(ON) 2-3	OFF	(ON) 2-1	15A	6A	20A	8A	32°
S309	—	—	✓	SPDT	ON 2-3	OFF	(ON) 2-1	15A	6A	20A	8A	32°
Throw & Schematics:									Note: Terminal numbers are actually on the switch			
				SPST		INTERNAL CONNECTION		SPDT				

Throw & Schematics:

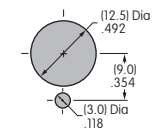


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S301 does not have terminal 2



Maximum Panel Thickness: .185" (4.7mm)



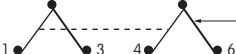
S301

DOUBLE POLE WITH SOLDER LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals () = Momentary					Electrical Capacity				
Model	* Approvals			Pole & Throw	Down 	Center 	Up 	Resistive			Inductive	α = Angle of Throw	
					AC 125V	AC 250V	DC 30V	AC 125V PF 0.6					
S331	✓	✓	✓	DPST	ON 1-3 4-6	NONE	OFF —	25A	25A	25A	10A	25°	
S332	✓	✓	✓	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	25A	15A	25A	10A	25°	
S333	✓	✓	✓	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	25A	15A	25A	10A	30°	
S335	✓	✓	✓	DPDT	ON 2-3 5-6	NONE	(ON) 2-1 5-4	15A	6A	20A	8A	25°	
S338	✓	✓	—	DPDT	(ON) 2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	8A	25°	
S339	✓	✓	—	DPDT	ON 2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	8A	25°	

Throw & Schematics:

DPST

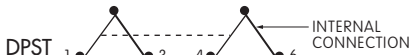


INTERNAL CONNECTION



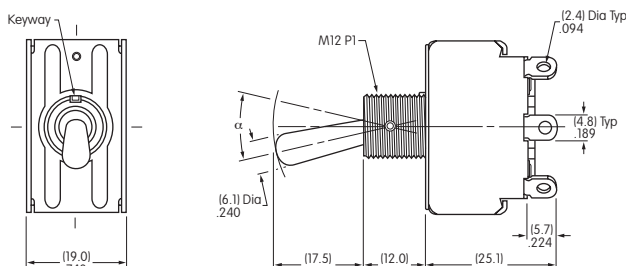
Note: Terminal numbers are actually on the switch

Throw & Schematics:

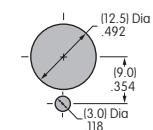


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S331 does not have terminals 2 & 5



Maximum Panel Thickness: .185" (4.7mm)



S331

DOUBLE POLE WITH SOLDER LUG & FLATTED LEVER

* UL & cULus recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals () = Momentary						Electrical Capacity				
Model	* Approvals			Pole & Throw	Down	Center	Up	Resistive			Inductive	α = Angle of Throw		
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6			
S331R	✓	✓	—	DPST	ON 1-3 4-6	NONE	OFF —	25A	25A	25A	10A	25°		
S332R	✓	✓	—	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	25A	15A	25A	10A	25°		
S333R	✓	✓	—	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	25A	15A	25A	10A	30°		
S338R	✓	✓	—	DPDT	(ON) 2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	8A	25°		
S339R	✓	✓	—	DPDT	ON 2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	8A	25°		

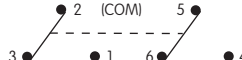
Throw & Schematics:

DPST



INTERNAL CONNECTION

DPDT



Note: Terminal numbers are actually on the switch

Throw & Schematics:

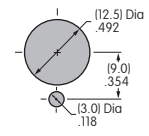
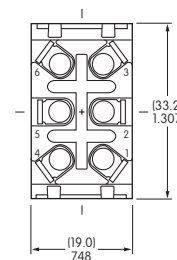
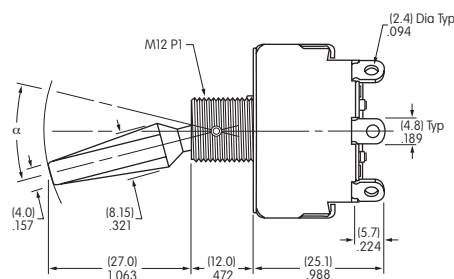
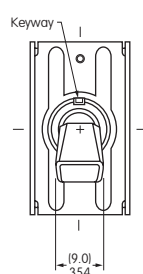


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT504M Knurled Nut, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.



S331R



S331R does not have terminals 2 & 5

Maximum Panel Thickness: .220" (5.6mm)

SINGLE POLE WITH SCREW LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)			Toggle Position/Connected Terminals () = Momentary					Electrical Capacity				α = Angle of Throw
Model	* Approvals			Pole & Throw	Down 	Center 	Up 	Resistive			Inductive	
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S301T	✓	✓	✓	SPST	ON 1-3	NONE	OFF —	15A	6A	20A	10A	32°
S302T	✓	✓	✓	SPDT	ON 2-3	NONE	ON 2-1	15A	6A	20A	10A	32°
S303T	✓	✓	✓	SPDT	ON 2-3	OFF	ON 2-1	15A	6A	20A	10A	32°
S305T	—	—	✓	SPDT	ON 2-3	NONE	(ON) 2-1	15A	6A	20A	8A	32°
S308T	—	—	✓	SPDT	(ON) 2-3	OFF	(ON) 2-1	15A	6A	20A	8A	32°
S309T	—	—	✓	SPDT	ON 2-3	OFF	(ON) 2-1	15A	6A	20A	8A	32°

Throw & Schematics:

SPST

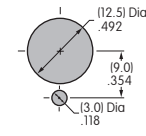
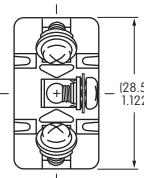
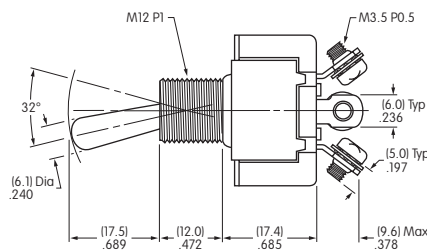
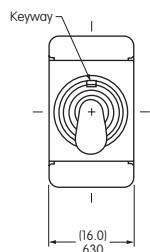


SPDT



Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



Maximum Panel Thickness: .185" (4.7mm)



S301T

S301T does not have terminal 2

DOUBLE POLE WITH SCREW LUG

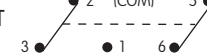
* UL & cULus recognized only when ordered with marking on switch (see General Specs)			Toggle Position/Connected Terminals () = Momentary					Electrical Capacity				α = Angle of Throw
Model	* Approvals			Pole & Throw	Down 	Center 	Up 	Resistive			Inductive	
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S331T	✓	✓	—	DPST	ON 1-3 4-6	NONE	OFF —	15A	15A	15A	10A	25°
S332T	✓	✓	—	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	15A	15A	15A	10A	25°
S333T	✓	✓	—	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	15A	15A	15A	10A	30°
S335T	✓	✓	—	DPDT	ON 2-3 5-6	NONE	(ON) 2-1 5-4	15A	6A	20A	8A	25°
S338T	✓	✓	—	DPDT	(ON) 2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	8A	25°
S339T	✓	✓	—	DPDT	ON 2-3 5-6	OFF	(ON) 2-1 5-4	15A	6A	20A	8A	25°

Throw & Schematics:

DPST

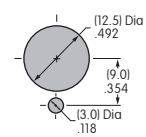
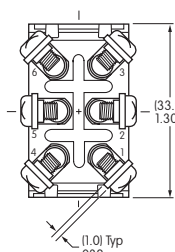
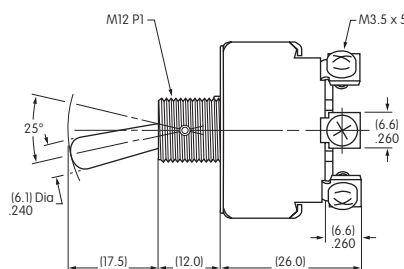
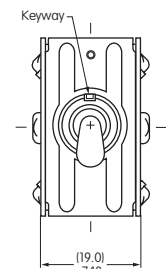


DPDT



Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



Maximum Panel Thickness: .185" (4.7mm)



S331T

S331T does not have terminals 2 & 5

SINGLE POLE WITH QUICK CONNECT

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)					Toggle Position/Connected Terminals				Electrical Capacity				α = Angle of Throw
Model	*Approvals			Pole & Throw	Down	Center	Up	Resistive			Inductive		
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6		
S301F	✓	✓	✓	SPST	ON 1-3	NONE	OFF —	15A	6A	20A	10A		

Throw & Schematics:

SPST

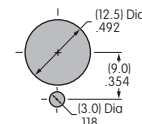
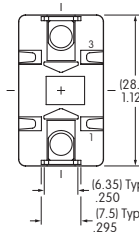
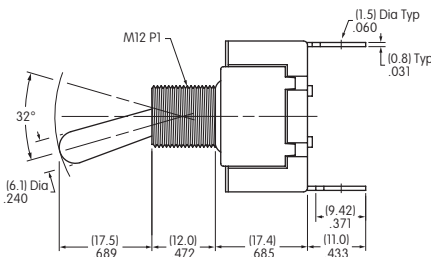
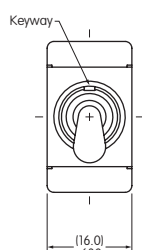


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S301F



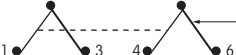
Maximum Panel Thickness: .185" (4.7mm)

DOUBLE POLE WITH QUICK CONNECT

* UL & cULus recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals () = Momentary				Electrical Capacity				
Model	*Approvals			Pole & Throw	Down	Center	Up	Resistive			Inductive	α = Angle of Throw
					 Keyway			AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	
S331F	✓	✓	—	DPST	ON 1-3 4-6	NONE	OFF —	25A	25A	25A	10A	25°
S332F	✓	✓	—	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	25A	15A	25A	10A	25°
S333F	✓	✓	—	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	25A	15A	25A	10A	30°
S335F	✓	✓	—	DPDT	ON 2-3 5-6	NONE	(ON) 2-1 5-4	15A	6A	20A	8A	25°

Throw & Schematics:

DPST



INTERNAL CONNECTION

DPDT

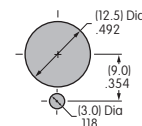
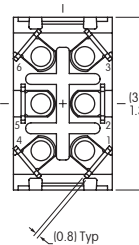
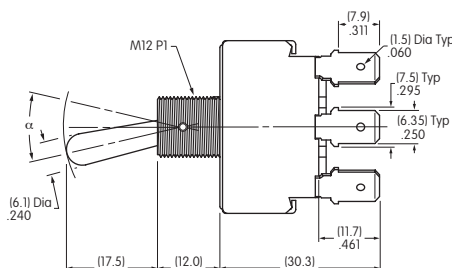
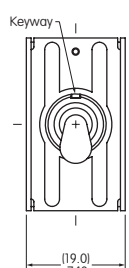


Note: Terminal numbers are actually on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S332F



Maximum Panel Thickness: .185" (4.7mm)

S331F does not have terminals 2 & 5

GENERAL SPECIFICATIONS FOR S31 ~ S49

Electrical Capacity (Resistive & Inductive Load)

Power Level: Shown in the following tables

Other Ratings

Contact Resistance: 10 milliohms maximum
Insulation Resistance: 1,000 megohms minimum @ 500V DC
Dielectric Strength: 2,000V AC minimum for 1 minute minimum
Mechanical Life: 50,000 operations minimum
Electrical Life: 25,000 operations minimum
Angle of Throw (α): Shown on following tables

Materials & Finishes

Toggle: PBT resin for flatted lever; brass with chrome plating for all others
Bushing: Brass with chrome plating
Case: Phenolic resin
Case Cover: Steel with chromate plating over zinc plating
Movable Contact: Copper with silver plating
Movable Contacts: Silver alloy capped on copper with silver plating
Stationary Contacts: Silver alloy capped on copper with silver plating
Terminals: Brass with tin plating

Environmental Data

Operating Temp Range: -10°C through +70°C (+14°F through +158°F)

Installation

Mounting Torque: 2.94Nm (26 lb•in) for double nut
Maximum Panel Thickness: Shown beneath panel cutout in switch dimension drawings
Soldering Time & Temperature: Manual Soldering: See Profile A in Supplement section.

Standards & Certifications

UL: File No. E44145 - Recognized only when ordered with marking on switch.
 Add "/U" or "/CUL" to end of part number to order UL recognized switch.
 UL or cULus recognition designated beside part numbers on following pages.
 See Supplement section to find UL or cULus rating details.

CSA: File No. 023535_0_000 - Certified only when ordered with marking on switch.
 Add "/C" to end of part number to order CSA certified switch.
 CSA certification designated beside part numbers on following pages.
 See Supplement section to find CSA rating details.

A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

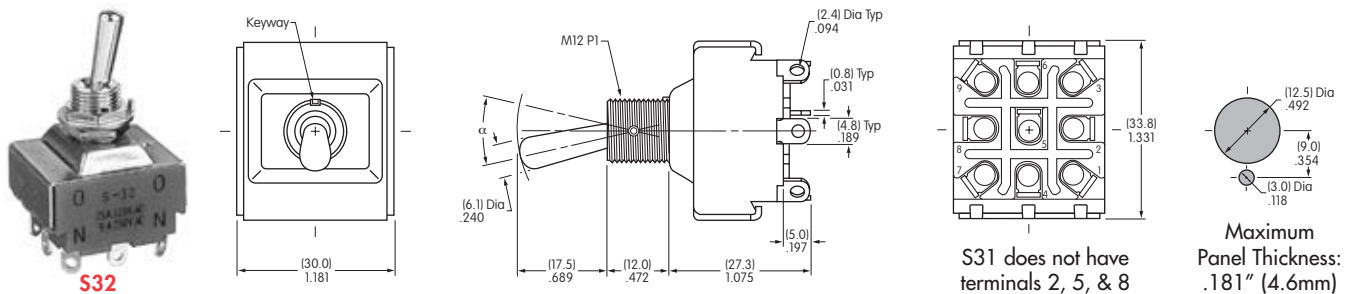
Supplement

THREE POLE WITH SOLDER LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals () = Momentary						Electrical Capacity				
Model	* Approvals			Pole & Throw	Down Keyway	Center	Up		Resistive			Inductive	α = Angle of Throw	
									AC 125V	AC 250V	DC 30V	AC 125V PF 0.6		
S31	✓	✓	✓	3PST	ON 1-3 4-6 7-9	NONE	OFF	—	25A	9A	20A	10A	25°	
S32	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	NONE	ON	2-1 5-4 8-7	25A	9A	20A	10A	25°	
S33	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	OFF	ON	2-1 5-4 8-7	25A	9A	20A	10A	30°	
S35	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	NONE	(ON)	2-1 5-4 8-7	15A	6A	20A	8A	25°	
S38	✓	✓	✓	3PDT	(ON) 2-3 5-6 8-9	OFF	(ON)	2-1 5-4 8-7	15A	6A	15A	8A	25°	
S39	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	OFF	(ON)	2-1 5-4 8-7	15A	6A	15A	8A	25°	

Throw & Schematics: 3PST INTERNAL CONNECTION 3PDT Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut and o-ring. See Accessories & Hardware section.

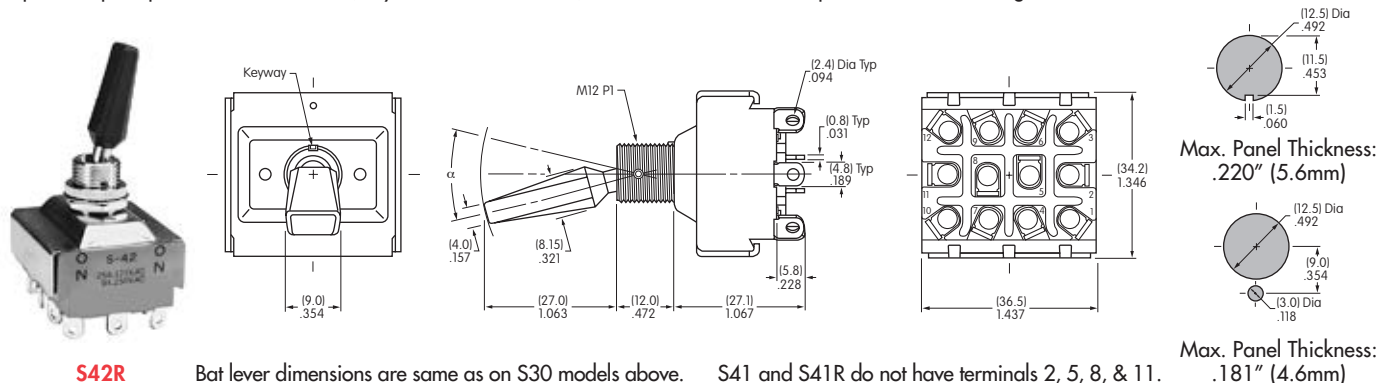


FOUR POLE WITH SOLDER LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals () = Momentary								Electrical Capacity								
Model Suffix R = Flatted Lever	* Approvals			Pole & Throw	Down Keyway 				Center 	Up 				Resistive			Inductive	α = Angle of Throw		
												AC 125V	AC 250V	DC 30V	AC 125V PF 0.6					
S41/S41R	✓	✓	✓	4PST	ON	1-3	4-6	7-9	10-12	NONE	OFF	—				25A	9A	20A	10A	25°
S42/S42R	✓	✓	✓	4PDT	ON	2-3	5-6	8-9	11-12	NONE	ON	2-1	5-4	8-7	11-10	25A	9A	20A	10A	25°
S43/S43R	✓	✓	✓	4PDT	ON	2-3	5-6	8-9	11-12	OFF	ON	2-1	5-4	8-7	11-10	25A	9A	20A	10A	30°
S45 —	✓	✓	—	4PDT	ON	2-3	5-6	8-9	11-12	NONE	(ON)	2-1	5-4	8-7	11-10	15A	6A	20A	8A	25°
S48/S48R	✓	✓	—	4PDT	(ON)	2-3	5-6	8-9	11-12	OFF	(ON)	2-1	5-4	8-7	11-10	15A	6A	20A	8A	25°
S49/S49R	✓	✓	—	4PDT	ON	2-3	5-6	8-9	11-12	OFF	(ON)	2-1	5-4	8-7	11-10	15A	6A	20A	8A	25°

Throw & Schematics: 4PST INTERNAL CONNECTION 4PDT Note: Terminal numbers are on the switch

Notes: Standard Hardware for **Bat Lever**: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut;
for **Flatted Lever (R)**: AT504M Knurled Face Nut, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies (only for bat lever models): AT401 & AT4181 boots plus hex nut and o-ring. See Accessories & Hardware section.



S42R

Bat lever dimensions are same as on S30 models above. S41 and S41R do not have terminals 2, 5, 8, & 11.

Max. Panel Thickness:
.181" (4.6mm)

THREE POLE WITH SCREW LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals				Electrical Capacity					
Model	* Approvals			Pole & Throw	Down 	Center 	Up 	Resistive			Inductive		α = Angle of Throw
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6	AC 250V PF 0.6	
S31T	✓	✓	✓	3PST	ON 1-3 4-6 7-9	NONE	OFF —	25A	9A	20A	10A	5A	25°
S32T	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	NONE	ON 2-1 5-4 8-7	25A	9A	20A	10A	5A	25°
S33T	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	OFF	ON 2-1 5-4 8-7	25A	9A	20A	10A	5A	30°

Throw & Schematics:

3PST



INTERNAL CONNECTION

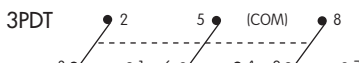
3PDT



(COM)

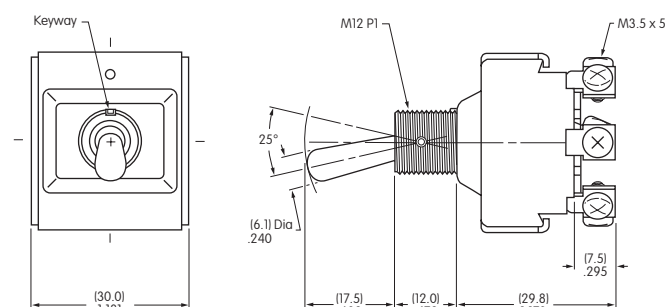
Note: Terminal numbers are on the switch

Throw & Schematics:

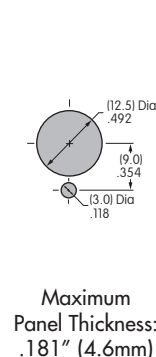


Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S31T does not have terminals 2, 5, & 8



S32T

FOUR POLE WITH SCREW LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals							Electrical Capacity							
Model	* Approvals			Pole & Throw	Down 				Center 	Up 	Resistive			Inductive		α = Angle of Throw		
					AC 125V	AC 250V	DC 30V	AC 125V PF 0.6			AC 250V PF 0.6							
S41T	✓	✓	✓	4PST	ON	1-3	4-6	7-9	10-12	NONE	OFF	—	25A	9A	20A	10A	5A	25°
S42T	✓	✓	✓	4PDT	ON	2-3	5-6	8-9	11-12	NONE	ON	2-1 5-4 8-7 11-10	25A	9A	20A	10A	5A	25°
S43T	✓	✓	✓	4PDT	ON	2-3	5-6	8-9	11-12	OFF	ON	2-1 5-4 8-7 11-10	25A	9A	20A	10A	5A	30°

Throw & Schematics:

4PST



INTERNAL CONNECTION

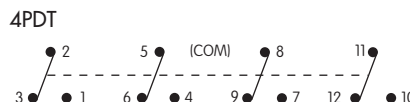
4PDT



(COM)

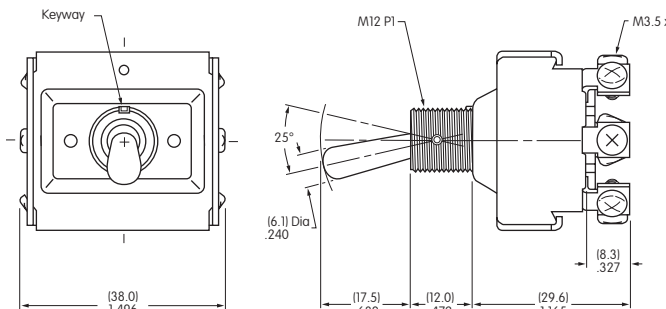
Note: Terminal numbers are on the switch

Throw & Schematics:

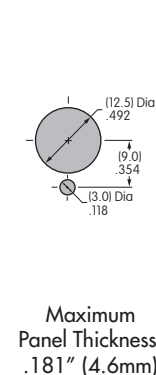


Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S41T does not have terminals 2, 5, 8, & 11



S42T

THREE POLE WITH QUICK CONNECT

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals					Electrical Capacity				
Model	* Approvals			Pole & Throw	Down		Center	Up	Resistive			Inductive	α = Angle of Throw
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6		
S31F	✓	✓	✓	3PST	ON	1-3 4-6 7-9	NONE	OFF —	25A	9A	20A	10A	25°
S32F	✓	✓	✓	3PDT	ON	2-3 5-6 8-9	NONE	ON 2-1 5-4 8-7	25A	9A	20A	10A	25°
S33F	✓	✓	✓	3PDT	ON	2-3 5-6 8-9	OFF	ON 2-1 5-4 8-7	25A	9A	20A	10A	30°

Throw & Schematics:

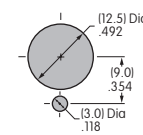
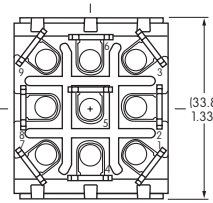
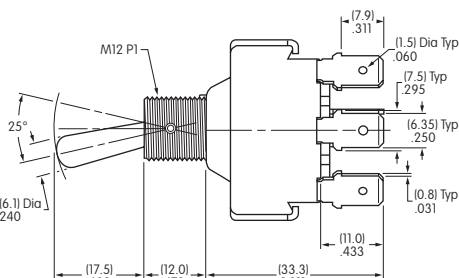
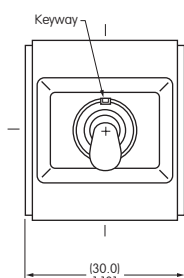


Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S32F



Maximum Panel Thickness: .181" (4.6mm)

S31F does not have terminals 2, 5, & 8

FOUR POLE WITH QUICK CONNECT

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)					Toggle Position/Connected Terminals							Electrical Capacity						
Model	* Approvals			Pole & Throw	Down				Center	Up				Resistive			Inductive	α = Angle of Throw
								AC 125V	AC 250V	DC 30V	AC 125V PF 0.6							
								ON 1-3 4-6 7-9 10-12	NONE	OFF	—	25A	9A	20A	10A			
S41F	✓	✓	✓	4PST	ON 1-3 4-6 7-9 10-12	NONE	OFF	—	25A	9A	20A	10A	25°					
S42F	✓	✓	✓	4PDT	ON 2-3 5-6 8-9 11-12	NONE	ON	2-1 5-4 8-7 11-10	25A	9A	20A	10A	25°					
S43F	✓	✓	✓	4PDT	ON 2-3 5-6 8-9 11-12	OFF	ON	2-1 5-4 8-7 11-10	25A	9A	20A	10A	30°					

Throw & Schematics:

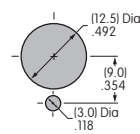
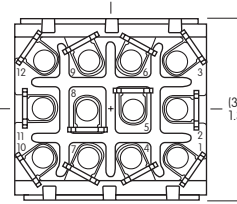
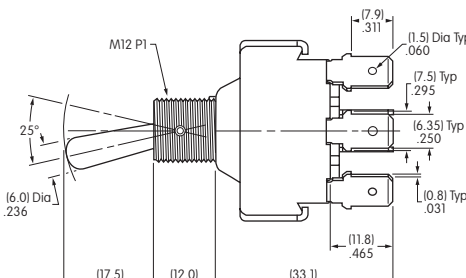
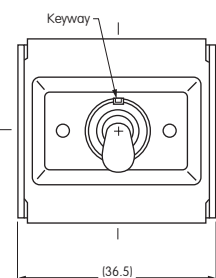


Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section. Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S42F



Maximum Panel Thickness: .181" (4.6mm)

S41F does not have terminals 2, 5, 8, & 11

GENERAL SPECIFICATIONS FOR S421 ~ S429

A
Toggles

Electrical Capacity (Resistive & Inductive Load)

Power Level: Shown in the following tables

Other Ratings

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum for 1 minute minimum
Mechanical Life:	50,000 operations minimum
Electrical Life:	15,000 operations minimum
Angle of Throw (α):	Shown in tables on following pages

Materials & Finishes

Toggle:	Brass with chrome plating
Bushing:	Brass with chrome plating
Case:	Melamine phenol
Case Cover:	Steel with chromate plating over zinc plating
Movable Contact:	Copper with silver plating
Movable Contacts:	Silver alloy capped on copper with silver plating
Stationary Contacts:	Silver alloy capped on copper with silver plating
Terminals:	Brass with tin plating

Environmental Data

Operating Temp Range: -10°C through $+70^{\circ}\text{C}$ ($+14^{\circ}\text{F}$ through $+158^{\circ}\text{F}$)

Installation

Mounting Torque:	2.94Nm (26 lb•in) for double nut
Maximum Panel Thickness:	Shown beneath panel cutout in switch dimension drawings
Soldering Time & Temperature:	Manual Soldering: See Profile A in Supplement section.

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

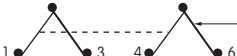
Touch

Indicators

Accessories

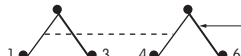
Supplement

DOUBLE POLE WITH SOLDER LUG

			Toggle Position/Connected Terminals () = Momentary				Electrical Capacity						
Model	Approvals  	Pole & Throw	Down 		Center 	Up 		Resistive		Inductive		Motor Load	α = Angle of Throw
							AC 125V	AC 250V	PF 0.75 - 0.8		AC 125V		
									AC 125V	AC 250V			
S421	— —	DPST	ON 1-3 4-6	NONE	OFF —	25A	25A	25A	25A	750W	24°		
S422	— —	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	25A	25A	25A	25A	750W	24°		
S423	— —	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	25A	25A	25A	25A	750W	28°		
S425	— —	DPDT	ON 2-3 5-6	NONE	(ON) 2-1 5-4	15A	15A	15A	15A	400W	24°		
S428	— —	DPDT	(ON) 2-3 5-6	OFF	(ON) 2-1 5-4	15A	15A	15A	15A	400W	24°		
S429	— —	DPDT	ON 2-3 5-6	OFF	(ON) 2-1 5-4	15A	15A	15A	15A	400W	24°		
Throw & Schematics:												Note: Terminal numbers are on the switch	
DPST  INTERNAL CONNECTION								DPDT 					

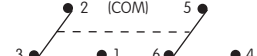
Throw & Schematics:

DPST



INTERNAL CONNECTION

DPDT

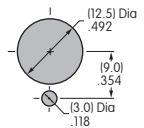
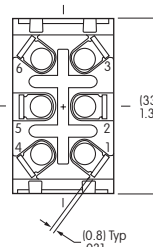
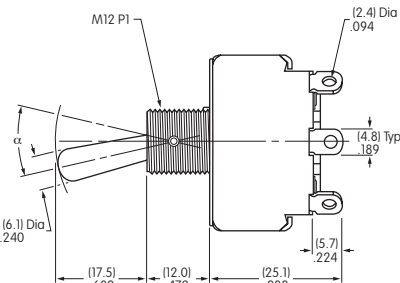
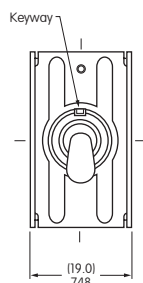


Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



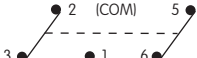
S422



Maximum Panel Thickness: .185" (4.7mm)

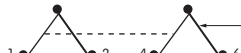
S421 does not have terminals 2 & 5

DOUBLE POLE WITH SCREW LUG

			Toggle Position/Connected Terminals () = Momentary				Electrical Capacity						
Model	Approvals  	Pole & Throw	Down 		Center 	Up 		Resistive		Inductive		Motor Load	α = Angle of Throw
			Keyway				AC 125V	AC 250V	PF 0.75 - 0.8		AC 125V		
									AC 125V	AC 250V			
S421T	— —	DPST	ON 1-3 4-6	NONE	OFF —	20A	20A	20A	20A	750W	24°		
S422T	— —	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	20A	20A	20A	20A	750W	24°		
S423T	— —	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	20A	20A	20A	20A	750W	28°		
S425T	— —	DPDT	ON 2-3 5-6	NONE	(ON) 2-1 5-4	15A	15A	15A	15A	400W	24°		
S428T	— —	DPDT	(ON) 2-3 5-6	OFF	(ON) 2-1 5-4	15A	15A	15A	15A	400W	24°		
S429T	— —	DPDT	ON 2-3 5-6	OFF	(ON) 2-1 5-4	15A	15A	15A	15A	400W	24°		
Throw & Schematics:													
DPST 			INTERNAL CONNECTION			DPDT 			Note: Terminal numbers are on the switch				

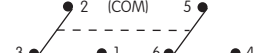
Throw & Schematics:

DPST



INTERNAL CONNECTION

DPDT

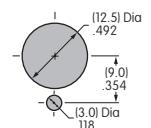
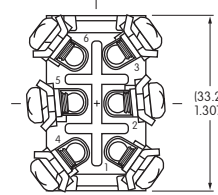
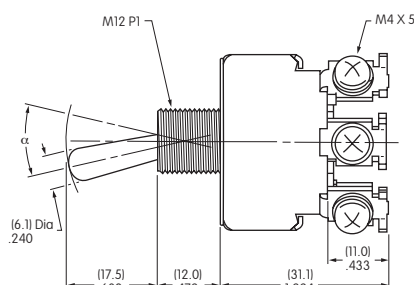
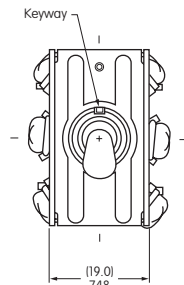


Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assemblies: AT401 & AT4181 boots plus hex nut & o-ring. See Accessories & Hardware section.



S423T



Maximum Panel Thickness: .185" (4.7mm)

S421T does not have terminals 2 & 5

GENERAL SPECIFICATIONS FOR S800s ~ S732

Electrical Capacity (Resistive & Inductive Load)

Power Level: Shown in the following tables

Other Ratings

Contact Resistance:	10 milliohms maximum
Insulation Resistance:	1,000 megohms minimum @ 500V DC
Dielectric Strength:	2,000V AC minimum for 1 minute minimum for S800s & S800Ds 3,000V AC minimum for 1 minute minimum for S732
Mechanical Life:	50,000 operations minimum
Electrical Life:	10,000 operations minimum for S800Ds 25,000 operations minimum for S800s & S732

Materials & Finishes

Toggle:	Brass with nickel plating for S732 Brass with chrome plating for S800s & S800Ds
Bushing:	Brass with chrome plating
Case:	Phenolic resin for S732; melamine phenol for S800s
Case Cover:	Steel with chromate plating over zinc plating
Movable Contactor Plate:	Copper with silver plating
Movable & Stationary Contacts:	Silver alloy capped on copper with silver plating
Common Terminals:	Brass
Contact Terminals:	Brass with silver or nickel plating

Environmental Data

Operating Temp Range: -10°C through +70°C (+14°F through +158°F)

Installation

Mounting Torque:	2.94Nm (26 lb•in) for double nut
Maximum Panel Thickness:	Shown beneath panel cutout in switch dimension drawings

Standards & Certifications

UL:	File No. E44145 - Recognized only when ordered with marking on switch. Add "/U" or "/CUL" to end of part number to order UL recognized switch. UL or cULus recognition designated beside part numbers on following pages. See Supplement section to find UL or cULus rating details.
CSA:	File No. 023535_0_000 - Certified only when ordered with marking on switch. Add "/C" to end of part number to order CSA certified switch. CSA certification designated beside part numbers on following pages. See Supplement section to find CSA rating details.

A
Toggles

Rockers

Pushbuttons

Pushbuttons
Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

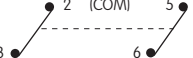
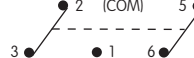
Indicators

Accessories

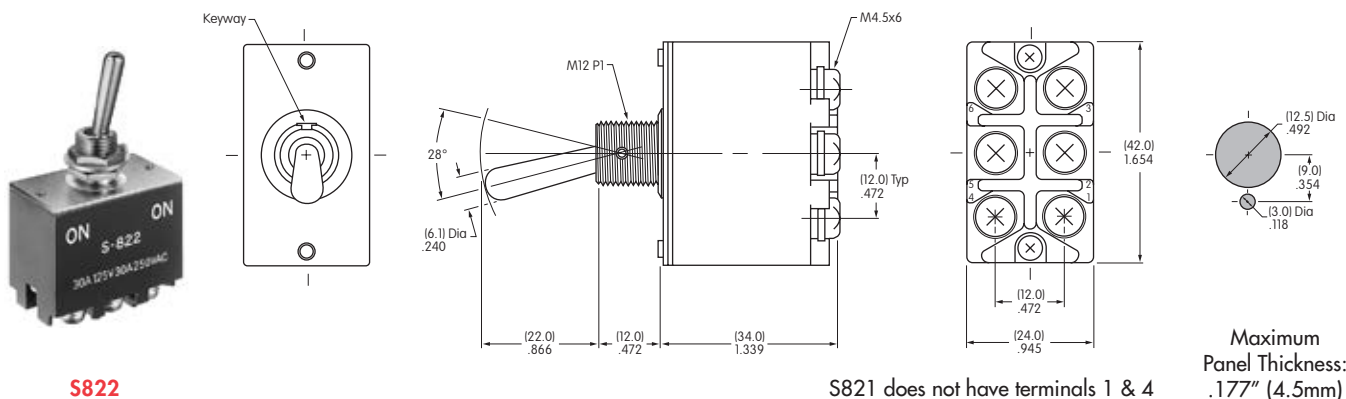
Supplement

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

DOUBLE POLE WITH SCREW LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals				Electrical Capacity						
Model	* Approvals			Pole & Throw	Down	Center	Up	Resistive				Inductive		Motor Load
								AC 125V	AC 250V	DC 30V	DC 125V	AC 125V PF 0.6	AC 250V PF 0.6	AC 125V
S821	✓	✓	✓	DPST	ON 2-3 5-6	NONE	OFF —	30A	30A	30A	1A	30A	15A	750W
S822	✓	✓	✓	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	30A	30A	30A	1A	30A	15A	—
S823	✓	✓	✓	DPDT	ON 2-3 5-6	OFF	ON 2-1 5-4	30A	30A	30A	1A	30A	15A	—
Throw & Schematics:		DPST 				DPDT 				Note: Terminal numbers are on the switch				

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assembly: AT401 boot plus hex nut & o-ring. See Accessories & Hardware section.



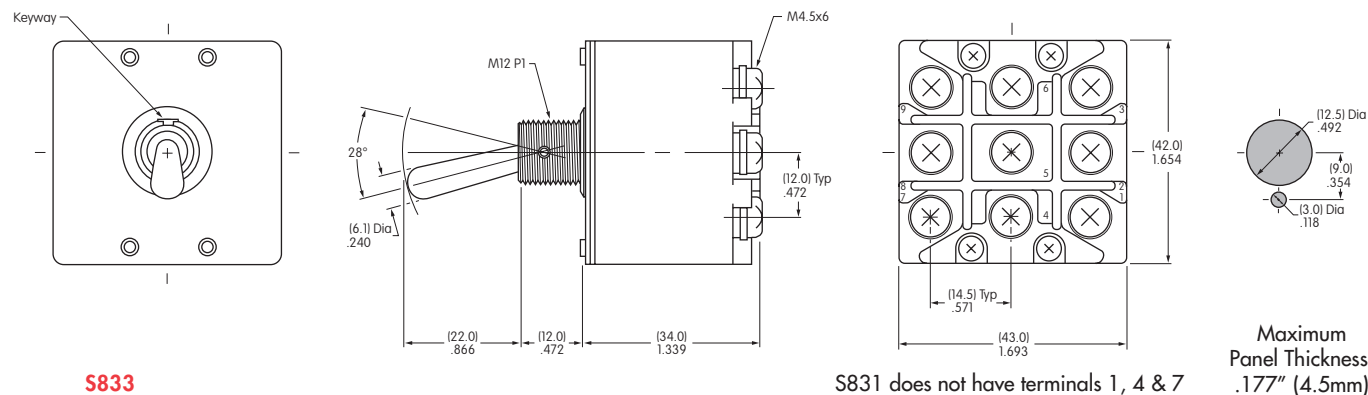
S822

S821 does not have terminals 1 & 4

THREE POLE WITH SCREW LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals					Electrical Capacity								
Model	* Approvals			Pole & Throw	Down 			Center 	Up 	Resistive				Inductive			
					AC 125V	AC 250V	DC 30V	DC 125V	AC 125V PF 0.6	AC 250V PF 0.6							
S831	✓	✓	✓	3PST	ON	2-3	5-6	8-9	NONE	OFF	—	30A	30A	30A	1A	30A	15A
S832	✓	✓	✓	3PDT	ON	2-3	5-6	8-9	NONE	ON	2-1 5-4 8-7	30A	30A	30A	1A	30A	15A
S833	✓	✓	✓	3PDT	ON	2-3	5-6	8-9	OFF	ON	2-1 5-4 8-7	30A	30A	30A	1A	30A	15A
Throw & Schematics:				3PST					3PDT					Note: Terminal numbers are on the switch			

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.
Optional Splashproof Boot Assembly: AT401 boot plus hex nut & o-ring. See Accessories & Hardware section.



S833

S831 does not have terminals 1, 4 & 7

DOUBLE POLE WITH SCREW LUG & FLATTED LEVER

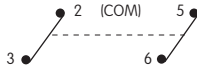
* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)				Toggle Position/Connected Terminals						Electrical Capacity								
Model	* Approvals			Pole & Throw	Down		Center	Up		Resistive					Inductive L/R = 3ms			
								DC 30V	DC 48V	DC 125V	DC 250V	DC 400V	DC 24V	DC 48V	DC 125V	DC 250V		
S821D	✓	✓	✓	DPST	ON	2-3 5-6	NONE	OFF	—	30A	30A	20A	15A	4A (10A)	15A	10A	6A	3A
S822D	✓	✓	✓	DPDT	ON	2-3 5-6	NONE	ON	2-1 5-4	30A	30A	20A	15A	4A	15A	10A	6A	3A
S823D	✓	✓	✓	DPDT	ON	2-3 5-6	OFF	ON	2-1 5-4	30A	30A	15A	7.5A	—	15A	10A	6A	3A

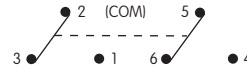
() capacity is due to wiring. Refer to instructions below.

Throw & Schematics:

DPST

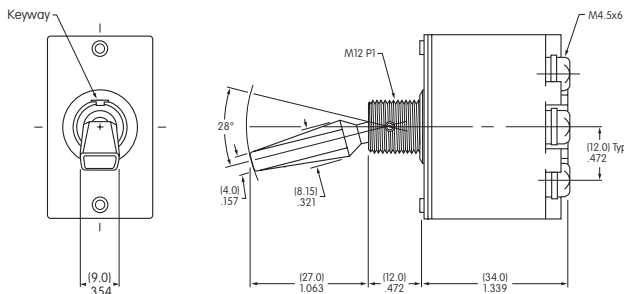


DPDT

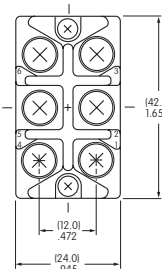


Note: Terminal numbers are on the switch

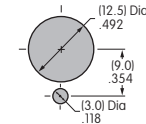
Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.



Double Pole



S821D does not have terminals 1 & 4



Maximum Panel Thickness: .177" (4.5mm)



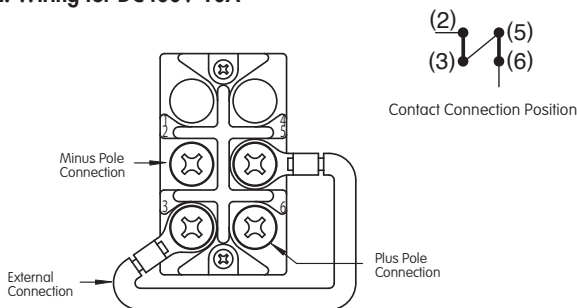
S822D

400V DC WIRING INSTRUCTIONS

1. DC Switch Use

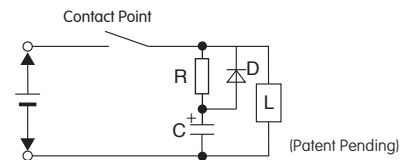
- Middle terminal shall be the minus pole when using DC circuit. Switch case is marked with (+) and (-).
- Do not store near (5cm) highly magnetic items.
- If actuation is interrupted when switching from ON to OFF, arcing may continue and switch could be burned.

2. Wiring for DC400V 10A



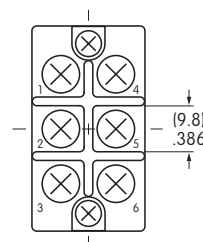
3. Inductive Load

Inductive loads produce an arc caused by counter-electromotive force when opening the circuit. Recommend inserting spark elimination circuit. Contact factory for details.



4. Compressed Terminal Connection

When connecting screw terminal with compressed terminal, select compressed terminal using drawing below.



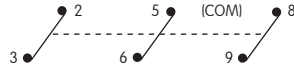
THREE POLE WITH SCREW LUG & FLATTED LEVER

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)

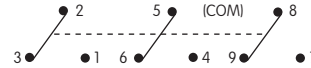
Model	* Approvals			Pole & Throw	Toggle Position/Connected Terminals			Electrical Capacity							
	UL	cULus	CSA		Down 	Center 	Up 	Resistive				Inductive L/R = 3ms			
								DC 30V	DC 48V	DC 125V	DC 250V	DC 24V	DC 48V	DC 125V	DC 250V
S831D	✓	✓	✓	3PST	ON 2-3 5-6 8-9	NONE	OFF —	30A	30A	15A	7.5A	15A	10A	6A	3A
S832D	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	NONE	ON 2-1 5-4 8-7	30A	30A	15A	7.5A	15A	10A	6A	3A
S833D	✓	✓	✓	3PDT	ON 2-3 5-6 8-9	OFF	ON 2-1 5-4 8-7	30A	30A	15A	7.5A	15A	10A	6A	3A

Throw & Schematics:

3PST

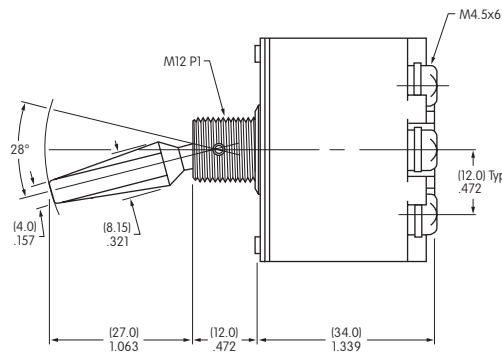
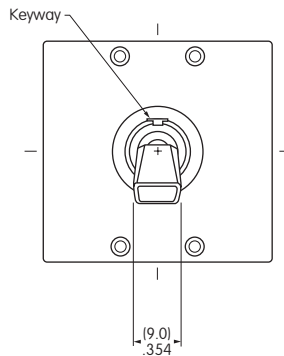


3PDT

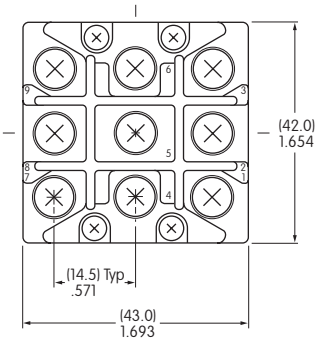


Note: Terminal numbers are on the switch

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.



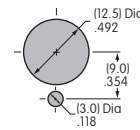
Three Pole



S831D does not have terminals 1, 4 & 7.
Positive (+) must be connected to end terminals
& negative to common terminals.

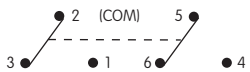


S832D

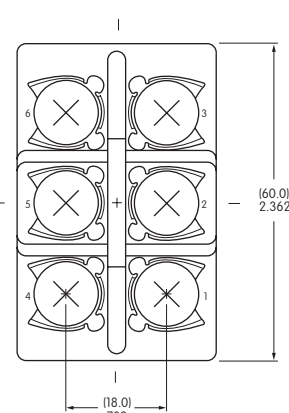
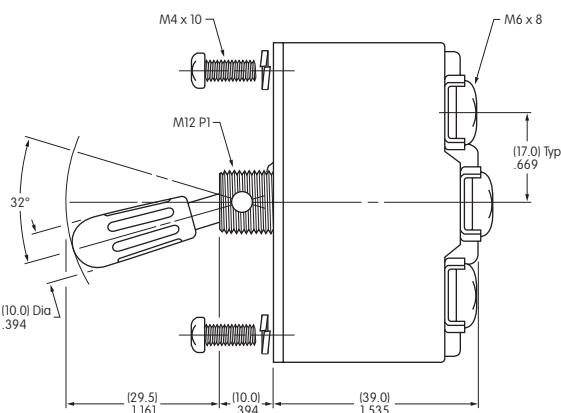
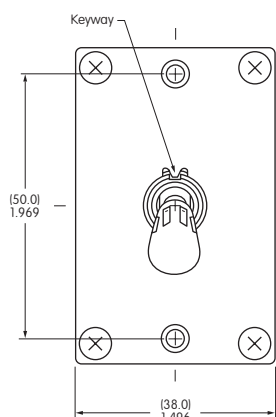


Maximum
Panel Thickness:
.177" (4.5mm)

DOUBLE POLE WITH SCREW LUG

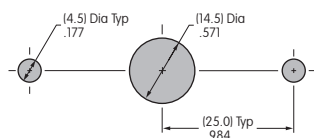
Model	Approvals UL SP	Pole & Throw	Toggle Position/Connected Terminals			Electrical Capacity			
			Down 	Center 	Up 	Resistive			Inductive
			Keyway 			AC 125V	AC 250V	DC 30V	AC 125V PF 0.6
S732	— —	DPDT	ON 2-3 5-6	NONE	ON 2-1 5-4	50A	30A	50A	25A
Throw & Schematics:						Note: Terminal numbers are on the switch			

Notes: Standard Hardware: AT503M Face Hex Nut, AT506M Locking Ring, AT508 Lockwasher, AT527M Backup Hex Nut. See Accessories & Hardware section.



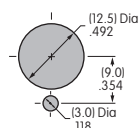
Cap of phenolic resin is black

Panel Mount with Mounting Screws

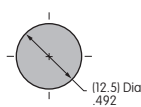


Maximum
Panel Thickness:
.158" (4.0mm)

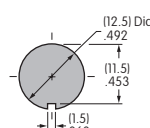
Panel Mount with Bushing Hardware



Maximum
Panel Thickness:
.079" (2.0mm)



Maximum
Panel Thickness:
.118" (3.0mm)



Maximum
Panel Thickness:
.118" (3.0mm)



S732

General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver): 6A @ 125V AC or 3A @ 250V AC or 6A @ 12V DC for silver
Logic Level (gold): 0.4VA maximum @ 28V AC/DC maximum for gold
 (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
 Note: See Supplement Index for explanation of operating range.

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 & case for 1 minute minimum
Mechanical Life: 50,000 operations minimum
Electrical Life: 25,000 operations minimum for silver; 50,000 operations minimum for gold
Static Capability: Withstands 20 kilovolts ESD minimum
Nominal Operating Force: 1.9N for .689" (17.5mm) toggle; 2.5N for .433" (11.0mm) toggle
Angle of Throw: 25°

Materials & Finishes

Toggle: Polycarbonate
Housing: Glass fiber reinforced polyamide
Sealing Ring: Nitrile butadiene rubber
Base: Diallyl phthalate (UL94V-0)
Movable Contactor: Phosphor bronze with silver or gold plating
Movable Contacts: Silver alloy or copper with gold plating
Stationary Contact: Silver plus copper with silver plating or copper with gold plating
Lamp Contacts: Beryllium copper with silver plating
Power Terminals: Copper with silver or gold plating
Lamp Terminals: Brass with silver plating

Environmental Data

Operating Temperature Range: -10°C through +55°C (+14°F through +131°F)
Humidity: 90 ~ 95% humidity for 240 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 1.75 hours
Shock: 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

Installation

Mounting Torque: .98Nm (8.67 lb•in) maximum
Soldering Time & Temperature: Manual Soldering: See Profile B in Supplement section.

Standards & Certifications

Flammability Standards: UL94V-0 base

Distinctive Characteristics

Choice of long or short toggles in translucent colors combine with bright LEDs available in red, amber, and green, plus super bright LEDs available in white, green, and blue.

Black face nut enhances front panel appearance.

Antistatic material used for toggle withstands 20 kilovolts electrostatic discharge.

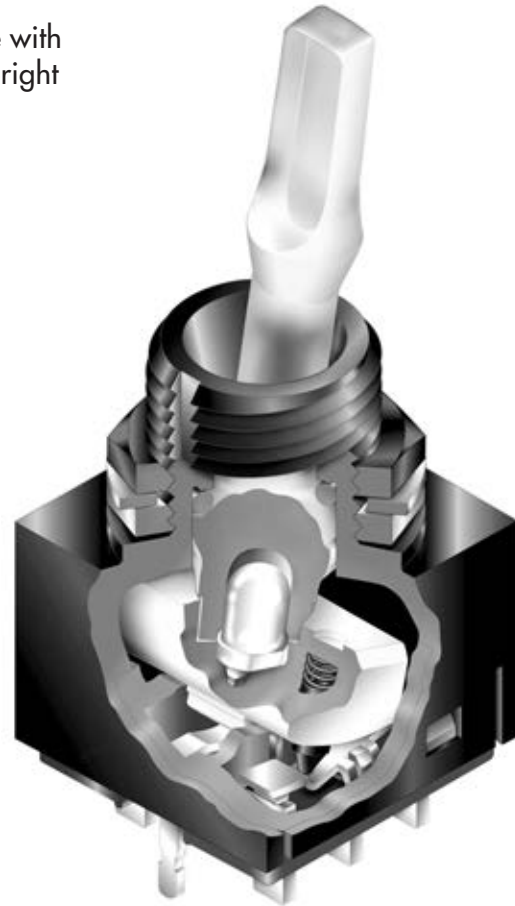
Panel seal, achieved with use of optional exterior o-ring, conforms to IP65 of IEC60529 Standards.

Interior o-ring protects contacts from oil, dust, water, and other contaminants.

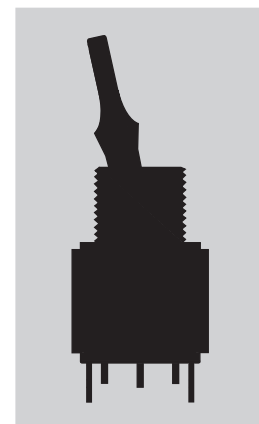
UL94V-0 flammability rated for base.

High insulating barriers protect against crossover.

Terminals are molded in and epoxy sealed to lock out flux, dust, and other contaminants.



Actual Size



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

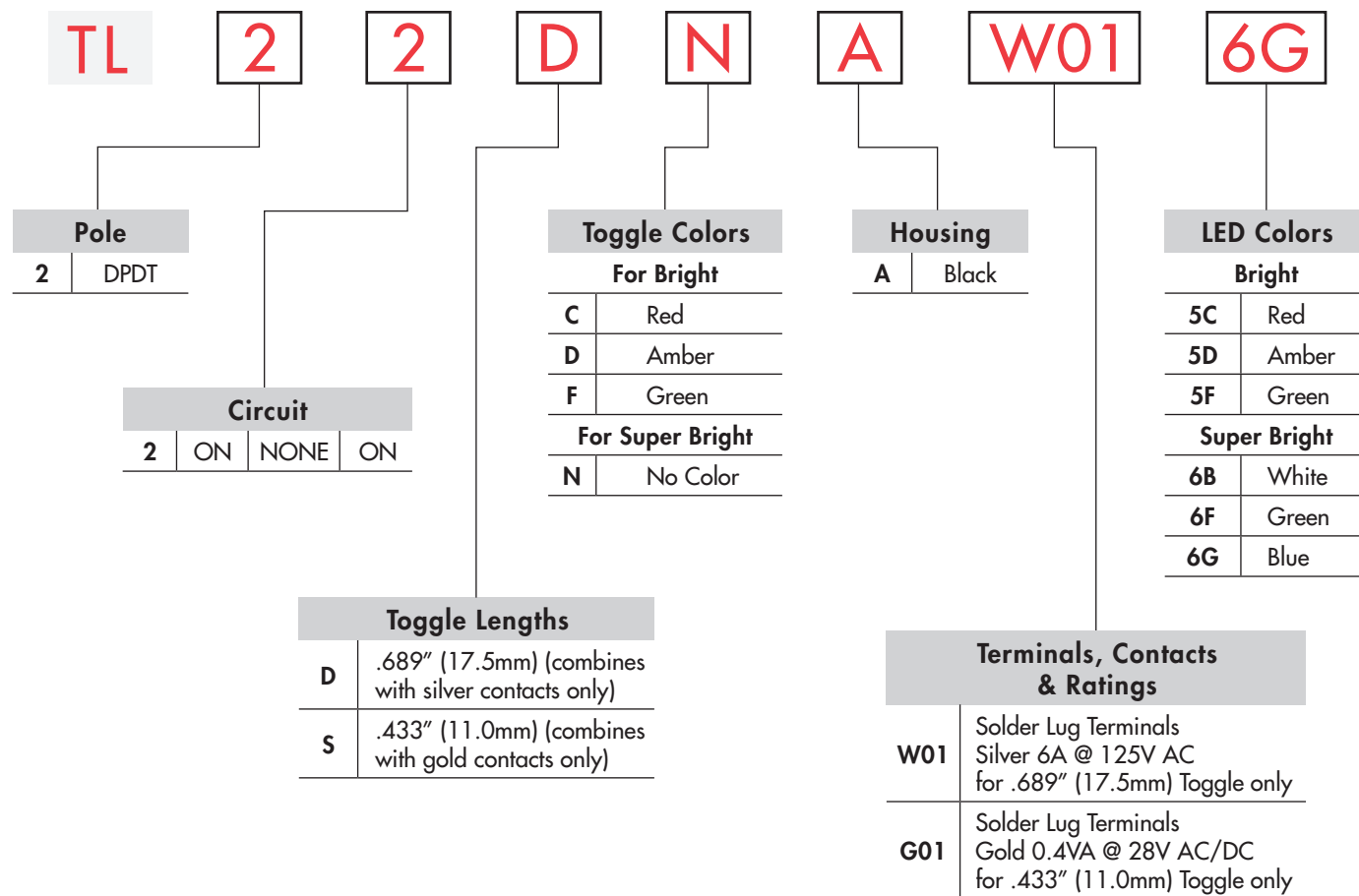
Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE



DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

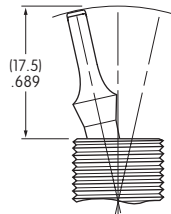
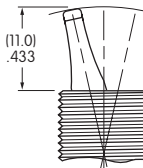
TL22DNAW016G



POLE & CIRCUIT

		Toggle Position			Connected Terminals			Throw & Power/Lamp Schematics
Pole	Model	Down 	Center	Up 	Down 	Center	Up 	Notes: Terminal numbers are not actually on switch. Lamp circuit is isolated and requires an external power source.
DP	TL22	ON	NONE	ON	1-1b 2-2b	OPEN	1-1a 2-2a	DPDT 

TOGGLE LENGTHS & COLORS

D .689" (17.5mm)Combines with
Silver Contacts onlyMaterial:
Polycarbonate**S** .433" (11.0mm)Combines with
Gold Contacts onlyMaterial:
Polycarbonate

Colors Available for Bright LED

C Red **D** Amber **F** Green

Color Available for Super Bright LED

N No Color (Appearance is matte finish of clear material)

HOUSING

A Black

The housing consists of the one-piece bushing/case of glass fiber reinforced polyamide in black color only.

The diallyl phthalate material used for the base is UL flammability rated 94V-0; housing material is not.

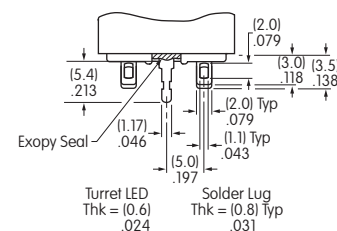
CONTACT MATERIALS, RATINGS, & TERMINALS

W Silver Contacts **Power Level**
 6A @ 125V AC & 3A @ 250V AC
 & 6A @ 12V DC

01 Solder Lug Terminals

G Gold Contacts **Logic Level**
 0.4VA maximum @ 28V AC/DC

See Supplement Index for complete explanation of operating range.



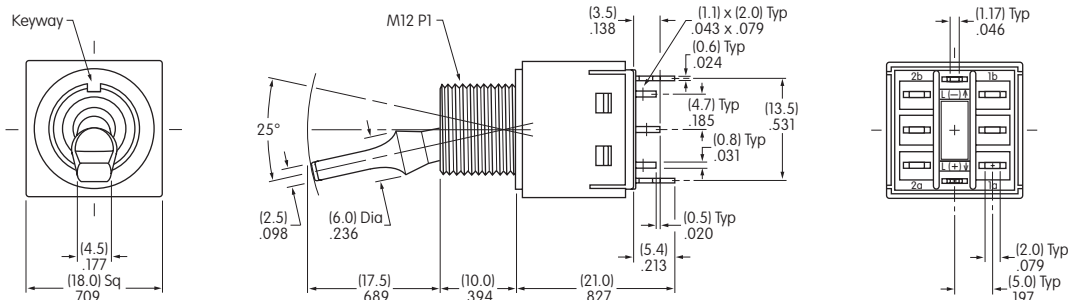
LED CODES & SPECIFICATIONS

Electrical specifications are determined at a basic temperature of 25°C. Lamp circuit is independent of switch operation.
If the source voltage is greater than rated voltage, a ballast resistor is required.
The ballast resistor calculation and more lamp detail are shown in Supplement section.

Super Bright LEDs are Electrostatic Sensitive		Colored Toggles			Clear Toggles		
		5 Bright			6 Super Bright		
LED Factory Assembled Not Available Separately		C	D	F	B	F	G
Color		Red	Amber	Green	White	Green	Blue
Maximum Forward Current	I_{FM}	30mA	30mA	50mA	30mA	30mA	30mA
Typical Forward Current	I_F	20mA	20mA	20mA	20mA	20mA	20mA
Forward Voltage	V_F	2.05V	2.05V	2.27V	3.3V	3.3V	3.3V
Maximum Reverse Voltage	V_{RM}	10V	10V	4V	7V	7V	7V
Current Reduction Rate Above 25°C	ΔI_F	0.40mA/°C	0.40mA/°C	0.50mA/°C	0.40mA/°C	0.40mA/°C	0.40mA/°C
Ambient Temperature Range		-10°C ~ +55°C			-10°C ~ +55°C		

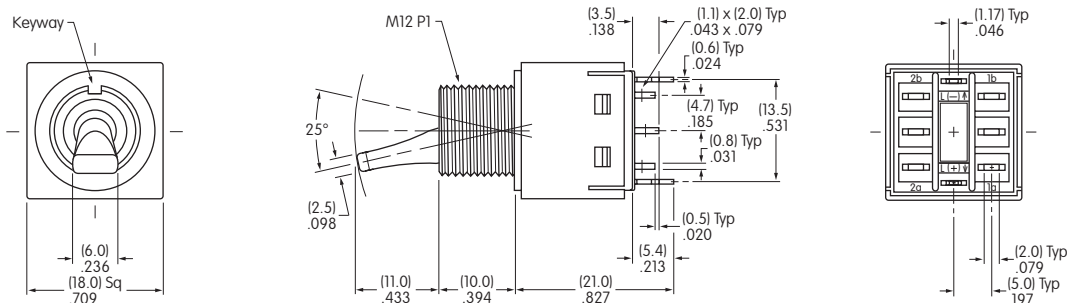
TYPICAL SWITCH DIMENSIONS

17.5mm Toggle



TL22DNAW016G

11.0mm Toggle



TL22SCAG015C

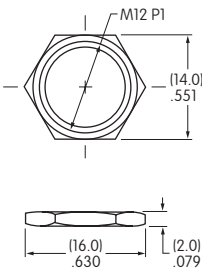
STANDARD HARDWARE

OPTIONAL HARDWARE

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

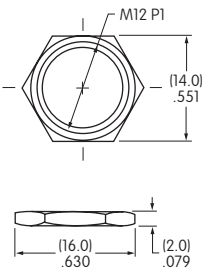
AT527MA Black Hex Nut

Use as Face Nut
Chrome/Steel



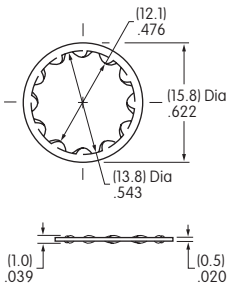
AT527M Hex Nut

Use as Backup Nut
Nickel/Steel



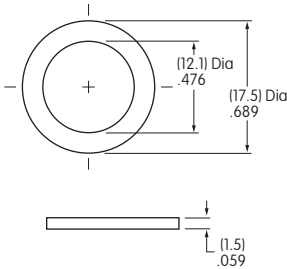
AT508 Lockwasher

Not to use with Panel Seal
Steel with Chromate/Zinc



AT401P O-ring

Use for Panel Seal
Nitrile butadiene rubber

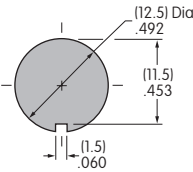
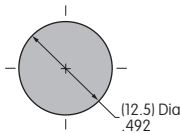


Hardware details in Accessories & Hardware section.

Panel Cutouts

Maximum Panel Thickness
with Standard Hardware:

.157" (4.0mm)



Maximum Panel Thickness
with Standard Hardware
& AT401P O-ring:

.236" (6.0mm)

A General Specifications

Electrical Capacity (Resistive Load)

Power Level: 10A @ 125V AC or 6A @ 250V AC or 10A @ 30V DC

Other Ratings

Contact Resistance: 10 milliohms maximum for solder lug & screw terminal models;
30 milliohms maximum for wire lead terminal models

Insulation Resistance: 200 megohms minimum @ 500V DC

Dielectric Strength: 1,500V AC minimum for 1 minute minimum

Mechanical Life: 50,000 operations minimum for On-None-Off, On-None-On, & On-Off-On models
30,000 operations minimum for all other models

Electrical Life: 15,000 operations minimum

Angle of Throw: 24°

Materials & Finishes

Toggle: Brass with chrome plating

Bushing & Outer Case: Glass fiber reinforced polyamide (UL94V-0)

Inner Case: Melamine

Inner Sealing Ring: Nitrile butadiene rubber for On-None-Off, On-None-On, & On-Off-On models;
silicone rubber for all other models

Outer Sealing Ring: Nitrile butadiene rubber

Movable Contactor: Copper with silver plating

Movable Contacts: Silver alloy plus copper with silver plating

Stationary Contacts: Silver alloy plus copper with silver plating

Terminals: Brass with tin plating

Wire Lead Covers: Heat resistant polyvinyl chloride (Leads are AWG 16)

Environmental Data

Operating Temp Range: -30°C through +70°C (-22°F through +158°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)

Front Panel Seal: IP67 of IEC60529, dust tight & water protected during temporary immersion for all models;
optional toggle boot AT401 for additional protection (details at end of WT section)

Behind Panel Seal: IP60 of IEC60529, dust tight but not water protected
for solder lug & screw terminal models
IP67 of IEC60529, dust tight & water protected during temporary immersion
for wire lead models

Installation

Soldering Time & Temp: Manual Soldering: See Profile A in Supplement section.

Mounting Torque: 1.47Nm (13 lb•in)

Standards & Certifications

Flammability Standards: UL94V-0 outer case

Wiring Material Standards: UL AWM 1015 Recognized at Flammability VW-1;
Temperature Range -20°C ~ +105°C; Maximum Load 600V; AWG 16.
CSA TEW 105 Certified at Temperature Range -20°C ~ +105°C;
Maximum Load 600V

Distinctive Characteristics

Sealing for wire lead models meets IP67 of IEC60529 Standards at front and back panel.

Sealing for solder lug or screw lug models meets IP67 at front panel and IP60 at back panel.

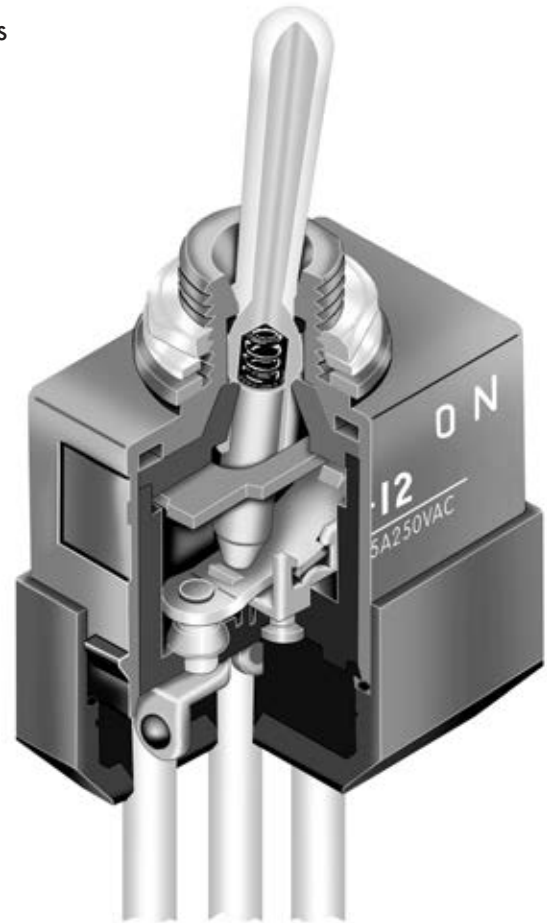
Single unit construction of bushing and case gives added protection from environmental elements.

Epoxy sealed base covered by outer case doubles protection from dust and water (not operable under water or oil).

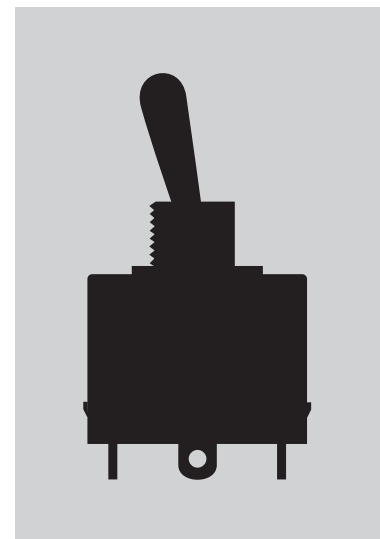
Specially designed contact mechanism that breaks light contact welds for circuits 11, 12, 21 and 22.

Interlocked movable contact mechanism provides highly reliable switching by minimizing contact bounce over center contact.

Heat resistant resin used for outer housing meets UL94V-0 flammability standard and provides high arc and tracking resistance.



Actual Size



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

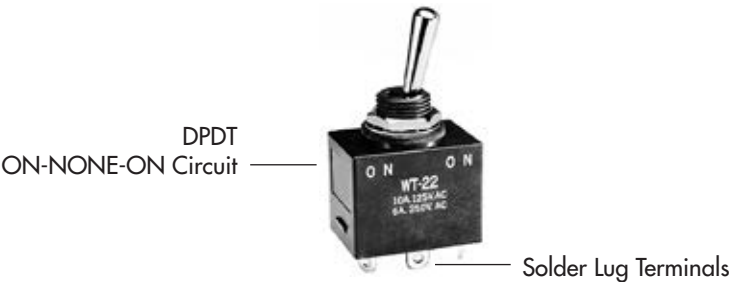
Supplement

TYPICAL SWITCH ORDERING EXAMPLE

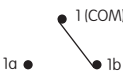
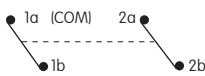
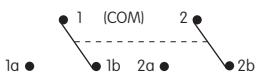
WT		2	2	S
Poles		Circuits		Terminals
1	SPST SPDT	1	ON NONE OFF	S Solder Lug
2	DPST DPDT	2	ON NONE ON	T Screw Lug
		3	ON OFF ON	L Wire Lead
		5	ON NONE (ON)	
		8	(ON) OFF (ON)	
		9	ON OFF (ON)	
		() = Momentary		

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

WT22S

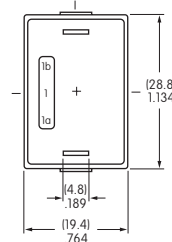
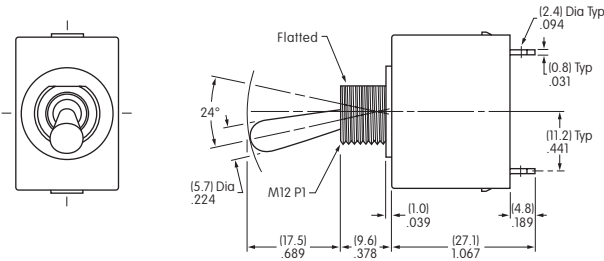


POLES & CIRCUITS

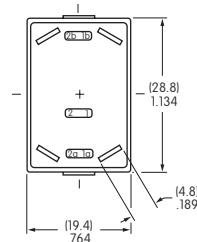
		Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
Pole	Model	Down 	Center 	Up 	Down 	Center 	Up 	Note: Terminal numbers are not actually on wire lead models.
SP	WT11	ON	NONE	OFF	1a-1b	OPEN	OPEN	SPST 
SP	WT12 WT13 WT15 WT18 WT19	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	1-1b	OPEN	1-1a	SPDT 
DP	WT21	ON	NONE	OFF	1a-1b 2a-2b	OPEN	OPEN	DPST 
DP	WT22 WT23 WT25 WT28 WT29	ON ON ON (ON) ON	NONE OFF NONE OFF OFF	ON ON (ON) (ON) (ON)	1-1b 2-2b	OPEN	1-1a 2-2a	DPDT 

TYPICAL SWITCH DIMENSIONS

Single Throw • Solder Lug



Single Pole

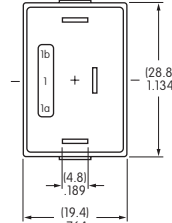
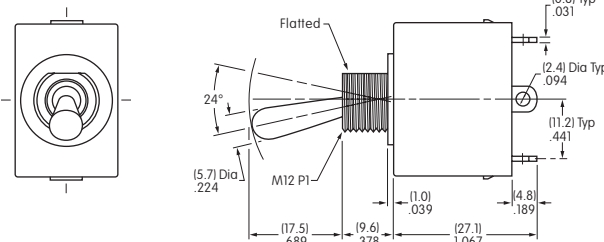


Double Pole

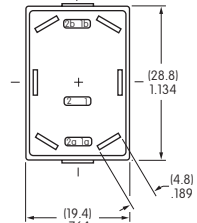


WT11S

Double Throw • Solder Lug



Single Pole

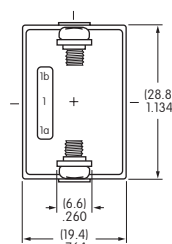
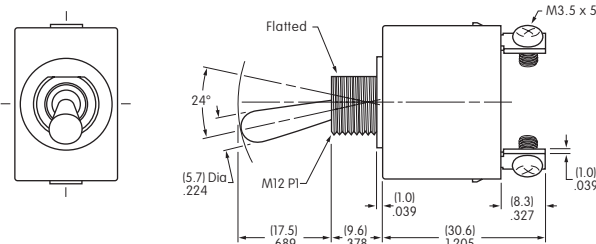


Double Pole

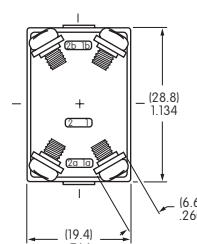


WT22S

Single Throw • Screw Lug



Single Pole



Double Pole



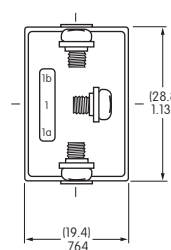
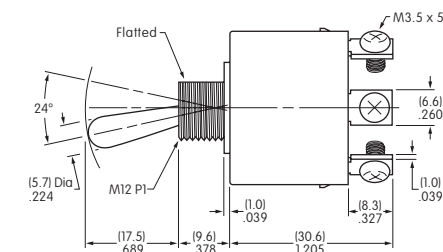
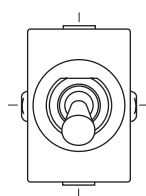
WT21T

TYPICAL SWITCH DIMENSIONS

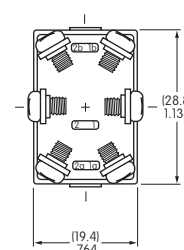
Double Throw • Screw Lug



WT22T



Single Pole

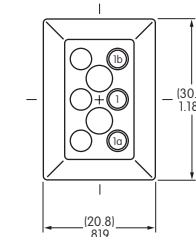
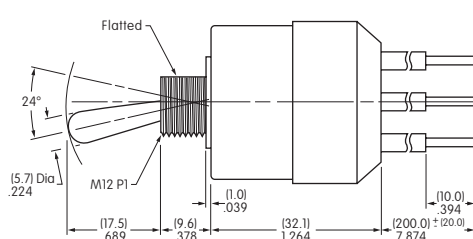
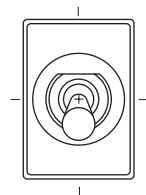


Double Pole

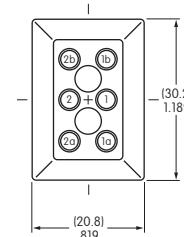
Single & Double Pole • Wire Lead



WT22L



Single Pole



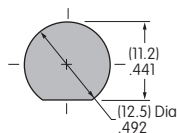
Double Pole

STANDARD WIRE COLOR SCHEME

Wire leads are covered with heat resistant vinyl in accordance to UL 1015 and CSA TEW 105 Standards for Appliance Wiring Material (AWM).

	Terminal Numbers & Wire Colors					
	1a	1	1b	2a	2	2b
WT11	Black		White			
WT12-19	White	Black	Red			
WT21	Black		White	Blue		Yellow
WT22-29	White	Black	Red	Yellow	Blue	Green

PANEL CUTOUT & THICKNESS



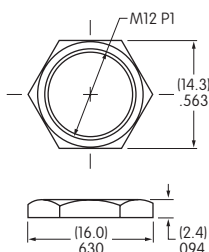
Maximum Effective Panel Thickness

With Standard Hardware: .157" (4.0mm)
 With optional Boot Assembly AT401A/H/S: .063" (1.6mm)
 With optional Boot Assembly AT4181: .083" (2.1mm)

STANDARD HARDWARE

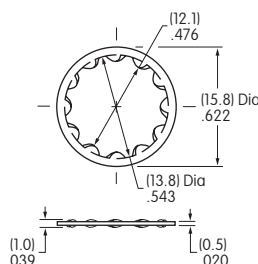
AT503M Hex Face Nut

Material: Brass with Chrome Plating
 1 supplied with each switch



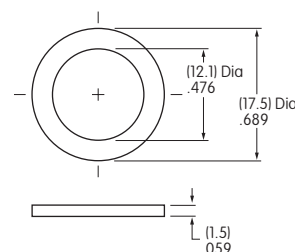
AT508 Internal Tooth Lockwasher

Material: Steel with Zinc/Chrome
 1 supplied with each switch



AT401P O-ring

Material: Nitrile butadiene rubber
 1 supplied with each switch



OPTIONAL ACCESSORIES

Boot Assemblies for High Particulate Contamination Applications

AT401A for Oil Resistance

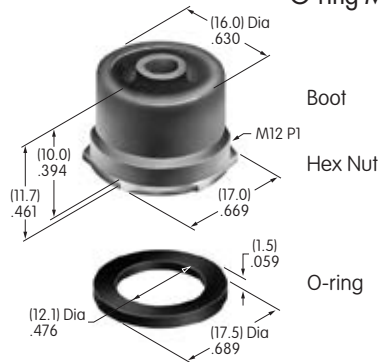
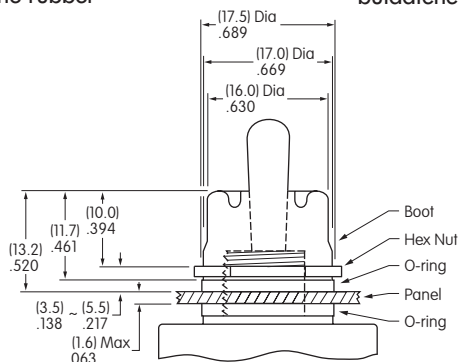
Boot Material: Black nitrile butadiene rubber
 Hex Nut Material & Finish: Nickel plated brass
 O-ring Material: Nitrile butadiene rubber

AT401H for Dust & Ozone Resistance

Boot Material: Gray ethylene propylene rubber
 Hex Nut Material & Finish: Nickel plated brass
 O-ring Material: Nitrile butadiene rubber

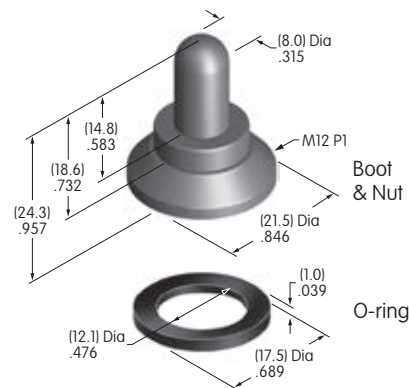
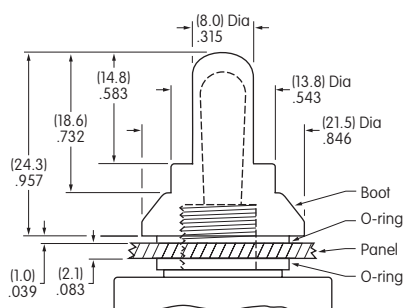
AT401S for Retention of Flexibility, Resilience & Tensile Strength Over Wide Temperature Range

Boot Material: Black silicone rubber
 Hex Nut Material & Finish: Nickel plated brass
 O-ring Material: Nitrile butadiene rubber



AT4181 Splashproof Boot Assembly

Boot Material: Black Silicon rubber
 Nut Material & Finish: Nickel plated brass
 O-ring Material: Nitrile butadiene rubber



Note: When using boot assemblies AT401A/H/S or AT4181, also use o-ring AT401P from the standard hardware supplied. Hex face nut AT503M and lockwasher AT508 are not used with these boot assemblies.