

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement



## AB Series ..... C6

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



## BB Series ..... C12

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



## DB Series ..... C18

0.4VA Logic Level  
Threaded Bushing with Straight PC  
Smooth Bushing with Straight, Right Angle, & Vertical PC



## EB Series ..... C24

3A Power Level & 0.4VA Logic Level  
Solder Lug & Straight PC  
Bushing Mount



## EB Series ..... C30

3A Power Level  
Solder Lug & Straight PC  
Snap-in Mount



## FB Series ..... C38

500mA Power Level & 0.4VA Logic Level  
PC Turret  
Bushing Mount



**GB Series** ..... C44

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



**GB2 Series** ..... C48

0.4VA Logic Level  
Straight & Right Angle PC



**G3B Series** ..... C52

0.4VA Logic Level; Process Sealed  
Gull Wing Terminals  
Upright & Right Angle Mount



**JP Series** ..... C58

10A or 16A Power Level  
Solder Lug  
Snap-in Mount



**M2B Series** ..... C64

1A Power Level & 0.4VA Logic Level  
Process Sealed  
Straight, Right Angle, & Vertical PC



**MB2000 Series** ..... C72

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

Toggles

Rockers

**C** Pushbuttons

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Supplement



## MB2000 Series ..... C80

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



## MB2000 Series ..... C87

6A Power Level & 0.4VA Logic Level  
Solder Lug, Quick Connect, Straight PC, & Wirewrap  
Large Bushing (12mm)



## MB2400 Series ..... C96

3A Power Level & 0.4VA Logic Level  
Solder Lug, Straight PC, & Wirewrap  
Bushing Mount



## MB2400 Series ..... C102

3A Power Level & 0.4VA Logic Level  
Straight, Right Angle, & Vertical PC  
PCB Mount



## MB2400 Series ..... C108

3A Power Level & 0.4VA Logic Level  
Solder Lug, Straight PC, & Wirewrap  
Snap-in Mount



## MB2500 Series ..... C116

3A Power Level & 0.4VA Logic Level  
Solder Lug & Straight PC  
Bushing Mount



**MB2500 Series .....C121**

3A Power Level & 0.4VA Logic Level  
Solder Lug & Straight PC  
PCB Mount



**MB2500 Series .....C124**

3A Power Level & 0.4VA Logic Level  
Solder Lug  
Snap-in Mount



**SB Series .....C128**

3A to 15A Power Level  
Solder Lug & Screw Lug  
Bushing Mount



**SB4011 Series ..... C38**

3A Power Level  
Solder Lug  
Bushing Mount



**SCB Series .....C131**

15A & 1/2 HP Power Level  
Quick Connect  
Bushing Mount



**WB Series .....C134**

Environmentally Sealed  
6A Power Level  
Solder Lug, Screw Lug, & Wire Lead  
Bushing Mount

Toggles

Rockers

**C** 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 for 1 minute minimum  
**Mechanical Life:** 50,000 operations minimum  
**Electrical Life:** 50,000 operations minimum  
**Nominal Operating Force:** 2.55N  
**Contact Timing:** Nonshorting (break-before-make)  
**Travel:** Pretravel .028" (0.7mm); Overtravel .016" (0.4mm); Total Travel .043" (1.1mm)

## Materials & Finishes

**Plunger:** Polyacetal  
**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 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<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

**Cap Installation Force:** 49.03N (11.2 lbf) maximum downward force on actuator

## 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 AB Series pushbuttons 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 (1/3 size of Series M switches) saves space on PC boards.

Specifically developed for logic-level applications.

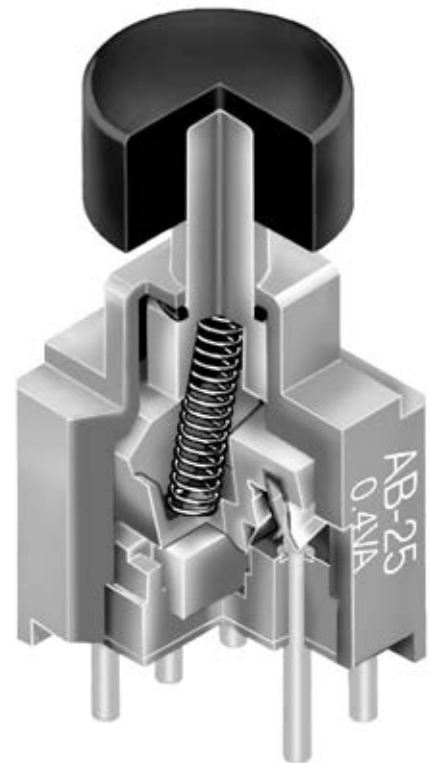
Totally sealed body construction prevents contact contamination and allows time- and money-saving automated soldering and cleaning.

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 section.)

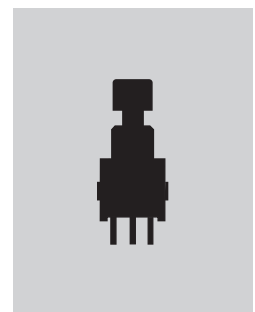
Molded-in, epoxy sealed or ultrasonically welded terminals lock out flux, solvents, and other contaminants.

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

Matching indicators available.

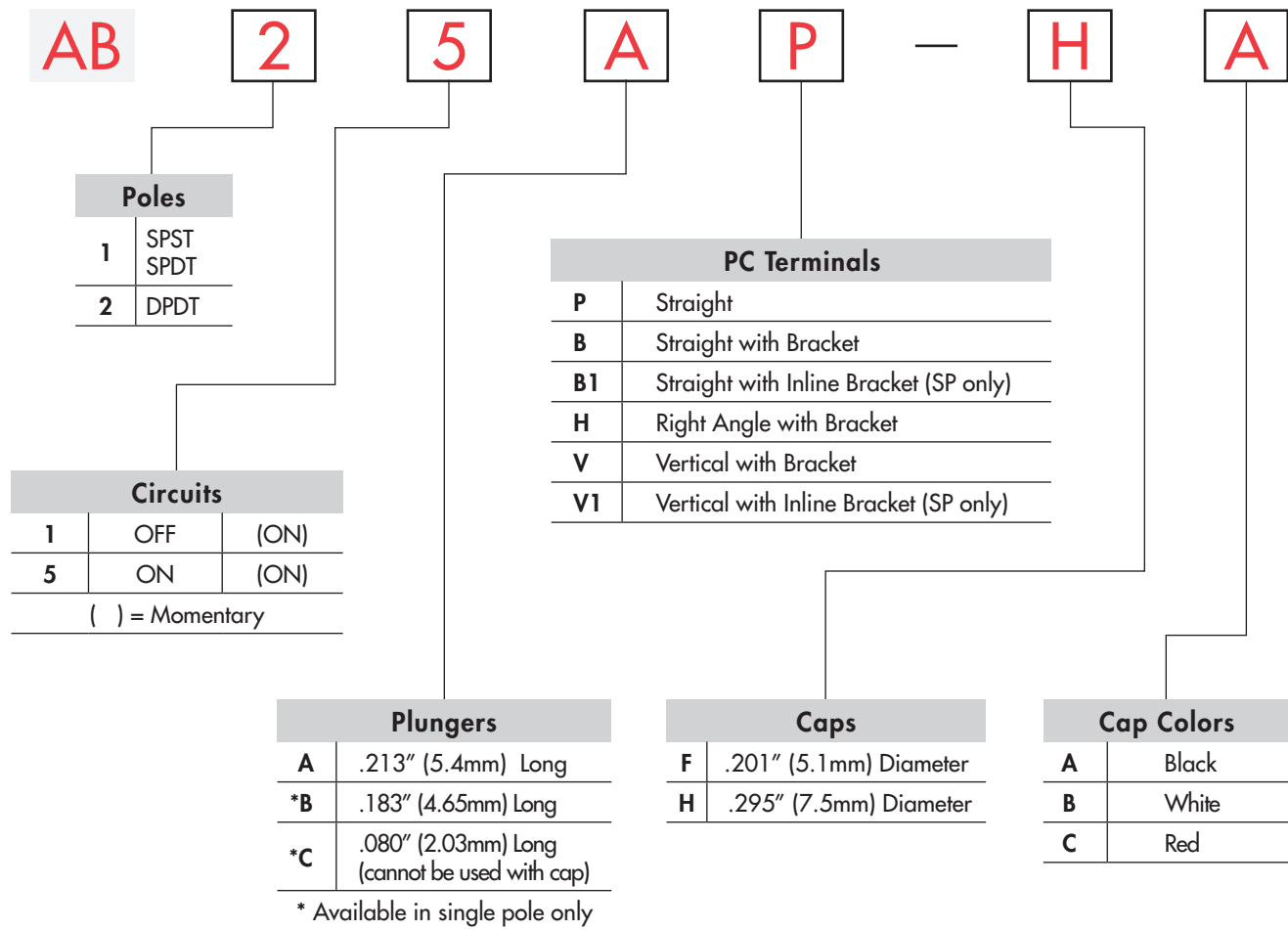


Actual Size



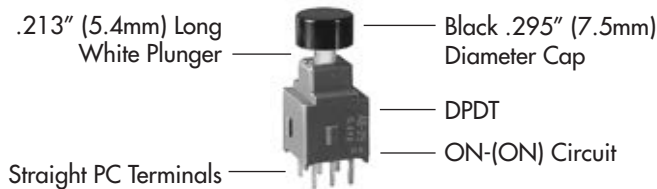
- Supplement
- Accessories
- Indicators
- Touch
- Tilt
- Tactiles
- Slides
- Rotaries
- Keylocks
- Programmable
- Illuminated PB
- Pushbuttons
- Rockers
- Toggles

### TYPICAL SWITCH ORDERING EXAMPLE



### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

#### AB25AP-HA



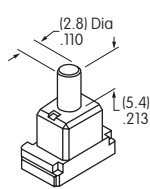
Toggles  
 Rockers  
 Pushbuttons  
 Illuminated PB  
 Programmable  
 Keylocks  
 Rotaries  
 Slides  
 Tactiles  
 Tilt  
 Touch  
 Indicators  
 Accessories  
 Supplement

## POLES & CIRCUITS

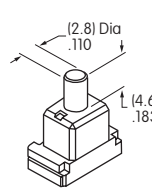
Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Schematics
		Normal	Down	Normal	Down	
SP	AB11	OFF 	(ON) 	OPEN 	3-1 	SPST Note: Terminal numbers are not actually on the switch. 
SP	AB15	ON 	(ON) 	2-3 	2-1 	SPDT 
DP	AB25	ON 	(ON) 	2-3 5-6 	2-1 5-4 	DPDT 

## PLUNGERS

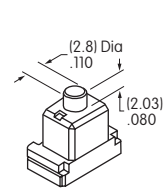
**A** .213" (5.4mm)  
Long



**B** .183" (4.6mm)  
Long  
(on SP only)



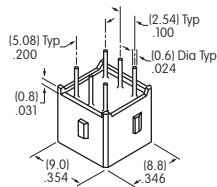
**C** .080" (2.03mm)  
Long  
(on SP only)



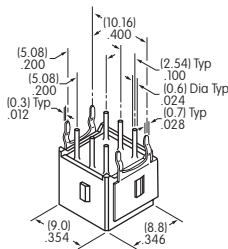
Standard Plunger Color: White Contact factory for red or black options.

## PC TERMINALS

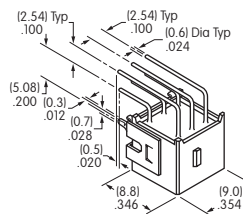
**P** Straight



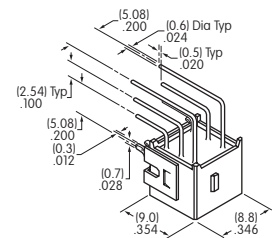
**B** Straight  
with Bracket



**H** Right Angle  
with Bracket



**V** Vertical  
with Bracket

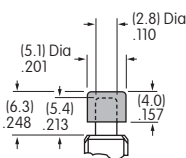


Use of a support bracket is recommended to increase PCB mounting strength and stability.  
B1 & V1 terminal dimensions appear on the pushbutton drawings which follow.

## SLIP-ON CAPS

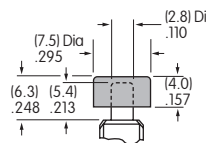
**F** AT475  
.201" (5.1mm) Diameter Cap

Material: Polyamide  
For use with  
plungers A & B only.



**H** AT496  
.295" (7.5mm) Diameter Cap

Material: Polyamide  
For use with  
plungers A & B only.



Colors Available:

**A** Black

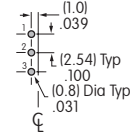
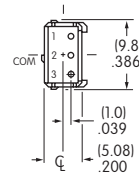
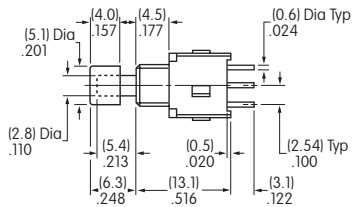
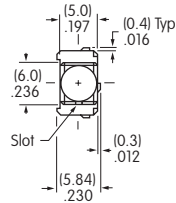
**B** White

**C** Red

## TYPICAL SWITCH DIMENSIONS

### Straight PC

### Single Pole

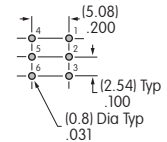
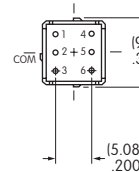
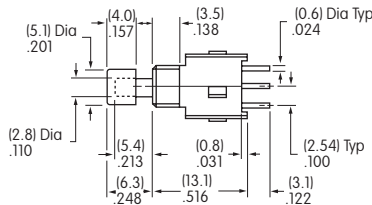
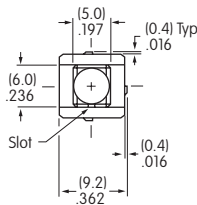


AB15AP-FA

AB11 model does not have terminal 2.

### Straight PC

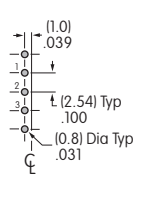
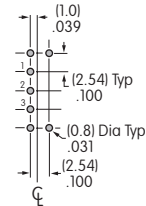
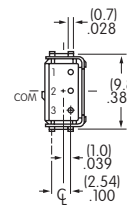
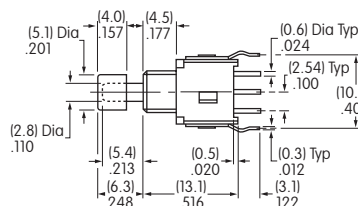
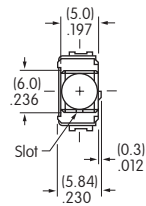
### Double Pole



AB25AP-FA

### Straight PC • Bracket

### Single Pole



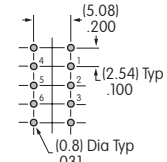
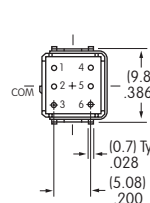
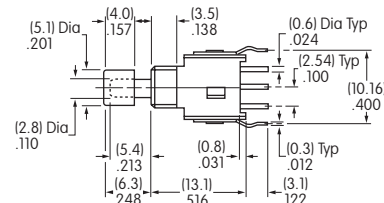
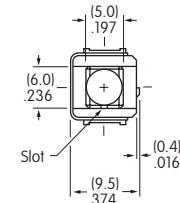
AB15AB-FA

B Terminals

B1 Terminals

### Straight PC • Bracket

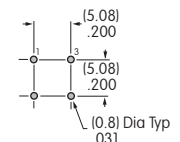
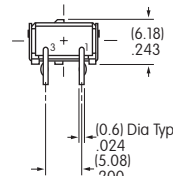
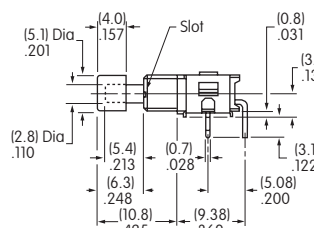
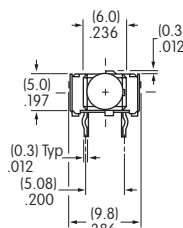
### Double Pole



AB25AB-FA

### Right Angle PC

### Single Pole (Single Throw)



AB11AH-FA

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

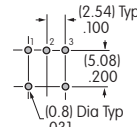
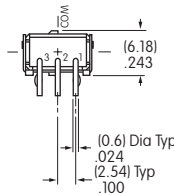
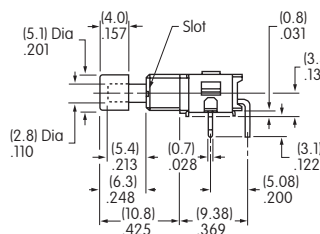
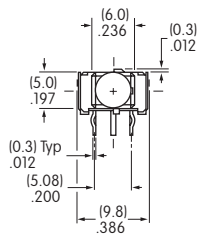
Indicators

Accessories

Supplement

## TYPICAL SWITCH DIMENSIONS

### Single Pole (Double Throw)

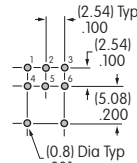
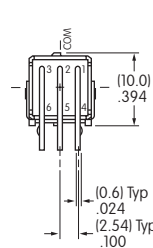
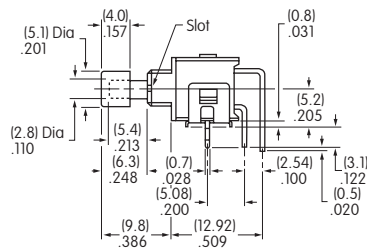
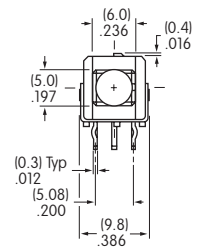


### Right Angle PC



**AB15AH-FA**

### Double Pole



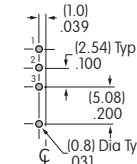
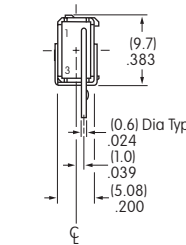
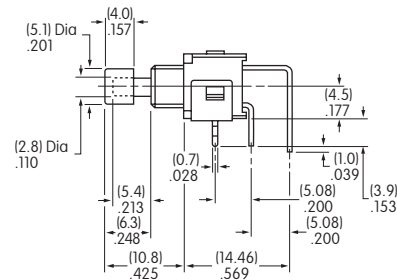
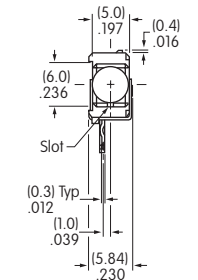
### Right Angle PC



**AB25AH-FA**

### Single Pole

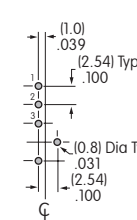
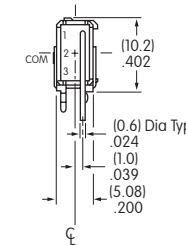
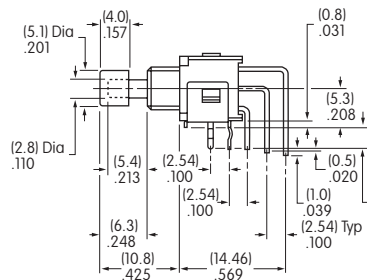
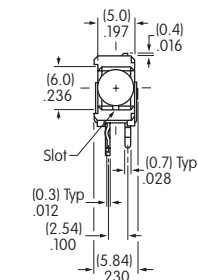
### Vertical PC • Inline Bracket



AB11 model does not have terminal 2. **AB11AV1-FA**

### Single Pole

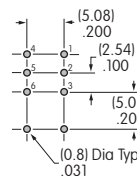
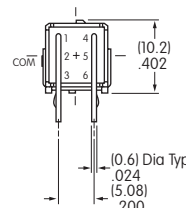
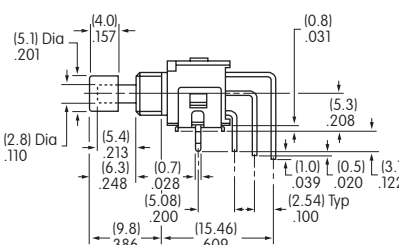
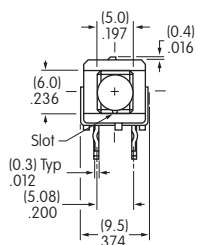
### Vertical PC



AB11 model does not have terminal 2. **AB15AV-FA**

### Double Pole

### Vertical PC



**AB25AV-FA**

# 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:** 50,000 operations minimum (momentary)  
 25,000 operations minimum (alternate action)  
**Electrical Life:** 50,000 operations minimum (momentary)  
 25,000 operations minimum (alternate action)  
**Nominal Operating Force:** 2.55N (momentary); 2.94N (alternate action)  
**Contact Timing:** Nonshorting  
**Travel:** Momentary: Pretravel .028" (0.7mm); Overtravel .016" (0.4mm); Total Travel .043" (1.1mm)  
 Alternate: Pretravel .039" (1.0mm); Overtravel .039" (1.0mm); Total Travel .079" (2.0mm)

## Materials & Finishes

**Plunger:** Polyacetal  
**Bushing:** Carbon blended polyamide  
**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 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<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

**Cap Installation Force:** 49.03N (11.2 lbf) maximum downward force on actuator;  
actuator must be in UP position to remove cap from alternate action models

## 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

**Flammability Standards:** UL94V-0 available  
The BB Series pushbuttons 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 (1/3 size of Series M switches) saves space on PC boards.

Specifically developed for logic-level applications.

Available in momentary and maintained circuits.

Industry's smallest alternate action (maintained) pushbutton with latchdown feature providing visible, audible, and tactile feedback.

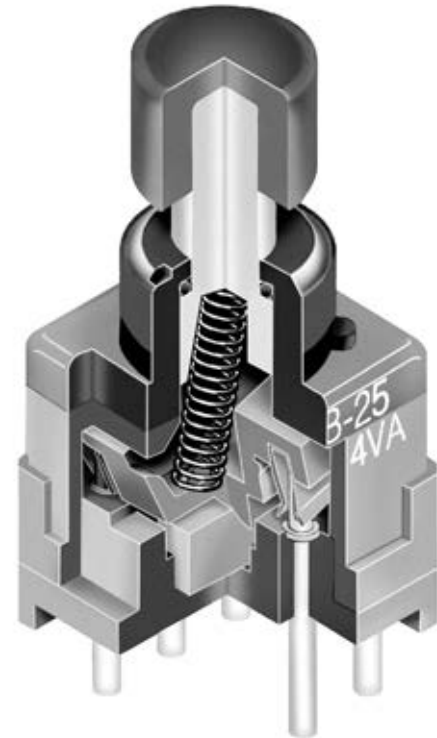
Antistatic superstructure, consisting of the carbon impregnated bushing and the support bracket, prevents static discharge to the contacts. Static electricity from an operator's touch travels from the actuator through the bushing and bracket to the PC board.

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.)

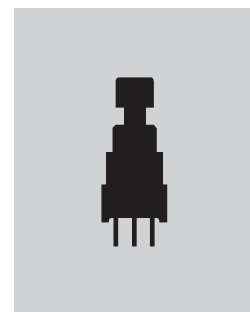
Smooth, 6mm diameter bushing simplifies panel layout.

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

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

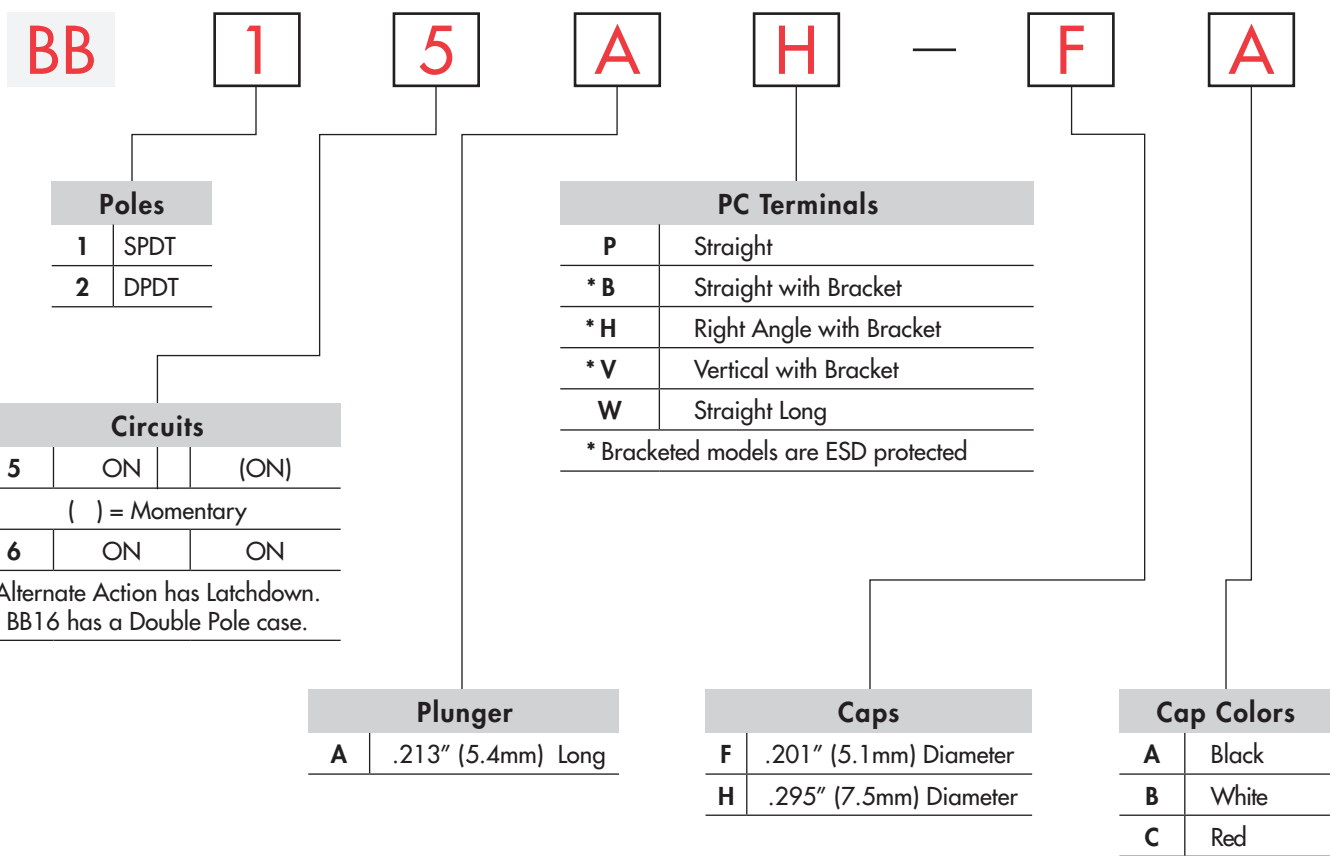


Actual Size



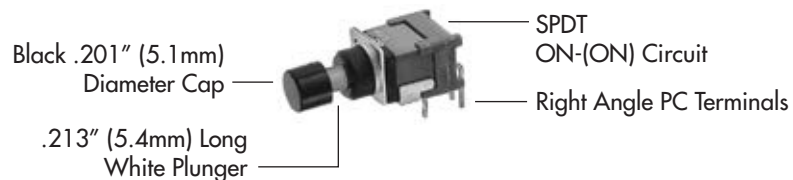
- Toggles
- Rockers
- Pushbuttons**
- Illuminated PB
- Programmable
- Keylocks
- Rotaries
- Slides
- Tactiles
- Tilt
- Touch
- Indicators
- Accessories
- Supplement

### TYPICAL SWITCH ORDERING EXAMPLE



### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

#### BB15AH-FA



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

## POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Schematics
		Normal	Down	Normal	Down	
SP	BB15 BB16	ON ON	(ON) ON	2-3	2-1	SPDT 
DP	BB25 BB26	ON ON	(ON) ON	2-3 5-6	2-1 5-4	DPDT 

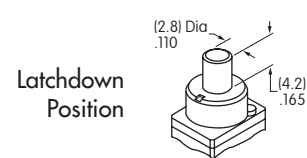
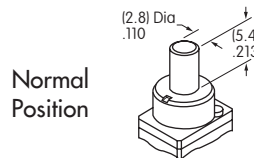
Note: Terminal numbers are not actually on the switch.

## PLUNGERS

**A** .213" (5.4mm) Long

Standard Plunger Color: White

Contact factory for other colors and lengths.

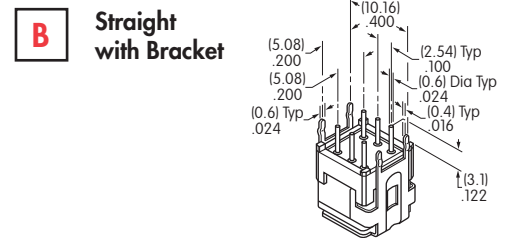
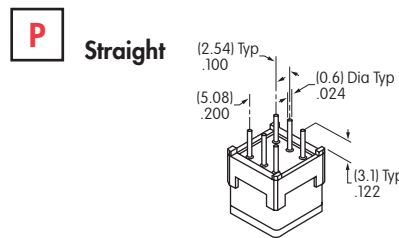


## PC TERMINALS

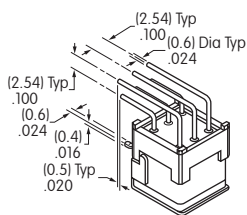
Use of a support bracket is recommended to increase PCB mounting strength and stability.

Both single pole and double pole alternate action models have double pole bases.

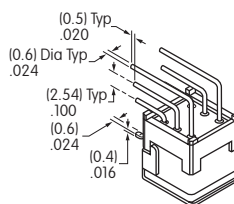
See Typical Switch Dimensions for details.



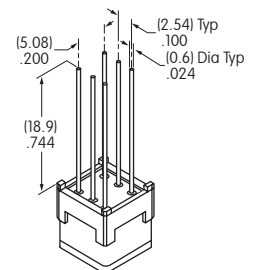
**H** Right Angle with Bracket



**V** Vertical with Bracket



**W** Straight Long

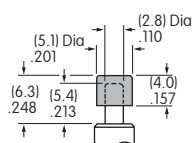


## SLIP-ON CAPS

**F** AT475  
.201" (5.1mm) Diameter Cap



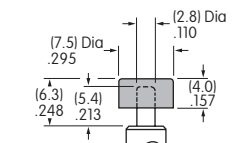
Material: Polyamide



**H** AT496  
.295" (7.5mm) Diameter Cap



Material: Polyamide



Colors Available:

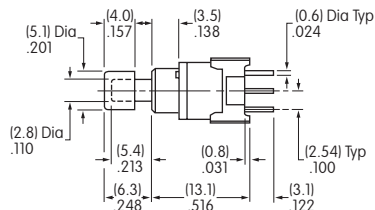
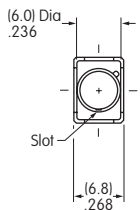
**A** Black

**B** White

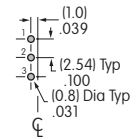
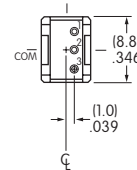
**C** Red

## TYPICAL SWITCH DIMENSIONS

### Straight PC



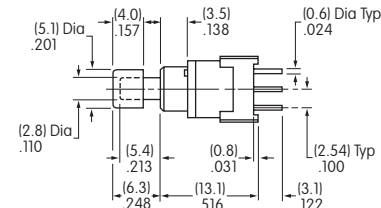
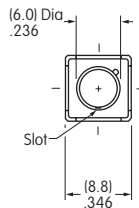
### Single Pole



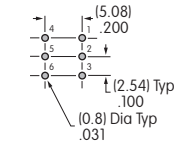
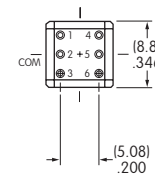
**BB15AP-FA**

Momentary

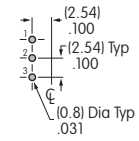
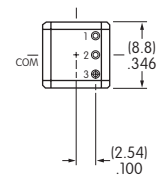
### Straight PC



### Double Pole



### BB16AP

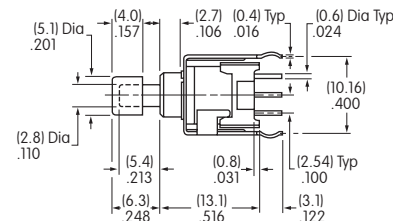
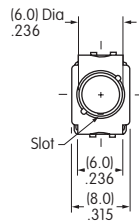


**BB25AP-FA**

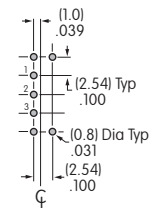
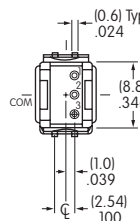
Momentary & Alternate

Alternate

### Straight PC • Bracket



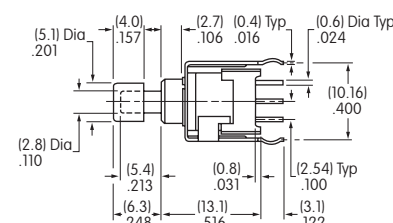
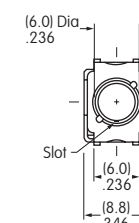
### Single Pole



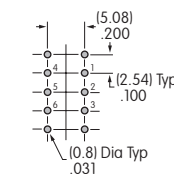
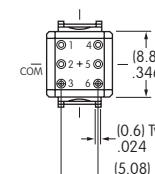
**BB15AB-FA**

Momentary

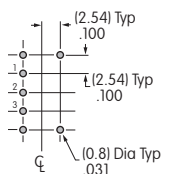
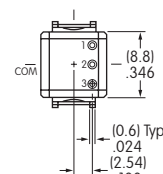
### Straight PC • Bracket



### Double Pole



### BB16AB

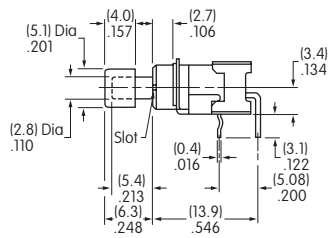
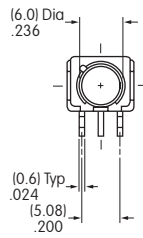


**BB25AB-FA**

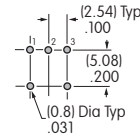
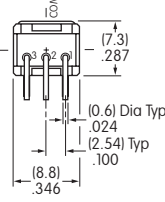
Momentary & Alternate

Alternate

## TYPICAL SWITCH DIMENSIONS



Single Pole

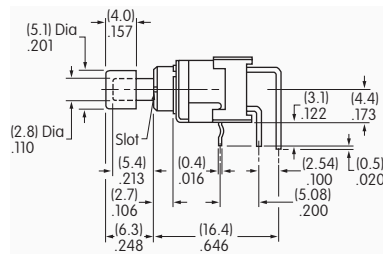
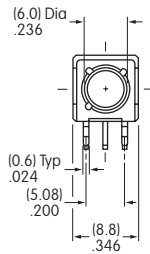


Momentary

Right Angle PC



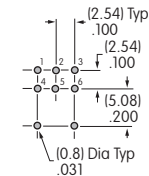
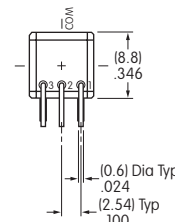
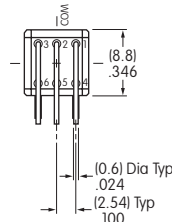
BB15AH-FA



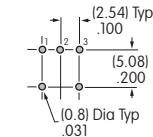
Double Pole

BB16AH

Right Angle PC

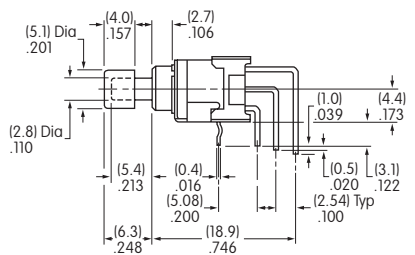
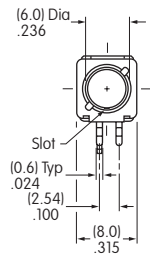


Momentary & Alternate



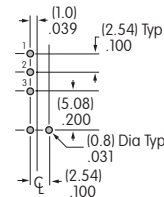
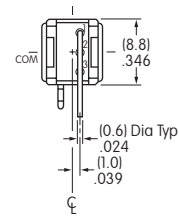
Alternate

BB25AH-FA



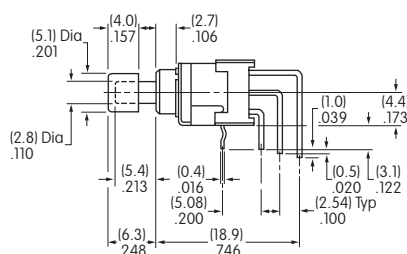
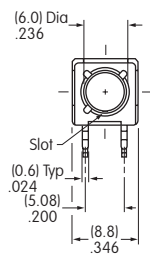
Single Pole

Vertical PC



Momentary

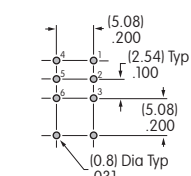
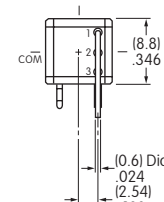
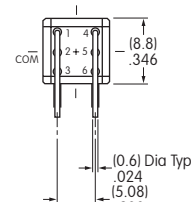
BB15AV-FA



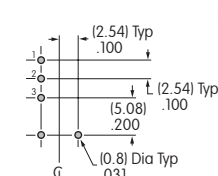
Double Pole

BB16AV

Vertical PC



Momentary & Alternate



Alternate

BB25AV-FA



# General Specifications

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

## 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:** 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:** 200,000 operations minimum  
**Electrical Life:** 100,000 operations minimum

**Nominal Operating Force:** Single Pole: 1.96N  
Double Pole: 2.94N

**Travel:** Pretravel .020" (0.5mm); Overtravel .020" (0.5mm); Total Travel .039" (1.0mm)

## Materials & Finishes

**Plunger:** Brass with nickel plating  
**Bushing:** Brass with nickel plating  
**Frame:** Stainless steel  
**Case:** Glass fiber reinforced polyamide  
**Movable Contacts:** Copper with gold plating  
**Stationary Contacts:** Phosphor bronze 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 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<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

**Mounting Torque:** 1.47Nm (13.0 lb•in) for double nut; 0.68Nm (6.0 lb•in) for single nut  
**Cap Installation Force:** 78.5N (17.65 lbf) maximum downward force on actuator

## PCB Processing

**Soldering:** Wave Soldering Recommended. See Profile A in Supplement section.  
Manual Soldering: See Profile B in Supplement section.  
**Cleaning:** These devices are not process sealed. Hand clean locally using alcohol based solution.

## Standards & Certifications

The DB Series pushbuttons have not been tested for UL recognition or CSA certification. These switches are designed for use in 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

Both PCB and panel mounting options available.

Choice of cap sizes in .315" (8.0mm) and .394" (10.0mm) diameter cap design for simple, snap-on installation.

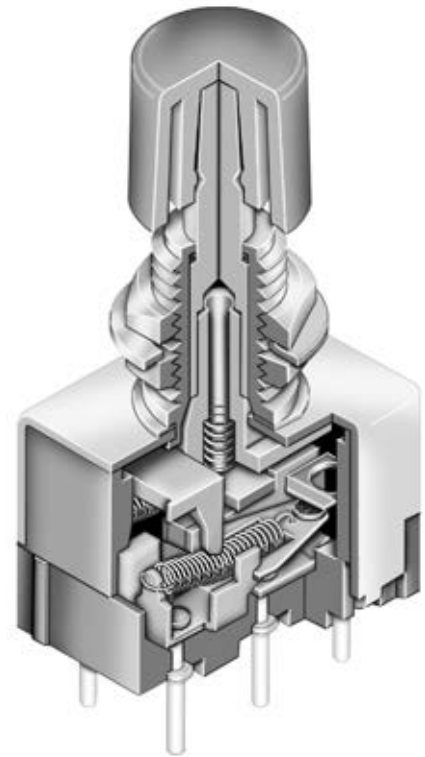
High torque bushing prevents rotation and separation from metal frame during installation.

Stainless steel frame resists corrosion.

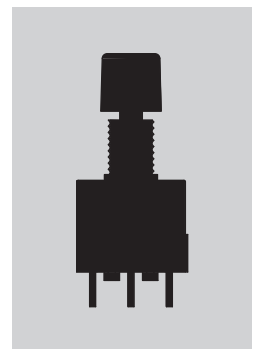
Snap action contacts give smooth actuation, short stroke, light touch, and audible feedback. This mechanism also provides long mechanical life.

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

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



Actual Size



Toggles

Rockers

**C** Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

### TYPICAL SWITCH ORDERING EXAMPLE

**DB25**

**21**

**B**

#### Poles & Circuits

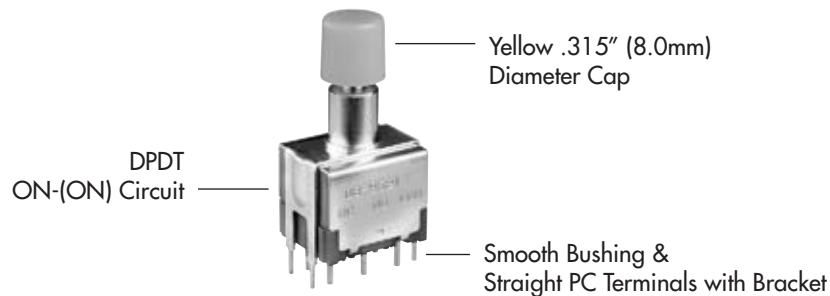
11	SPDT	ON	(ON)
21	DPDT	ON	(ON)
( ) = Momentary			

#### PC Terminals

Threaded Bushing	
P	Straight
Smooth Bushing	
B	Straight with Bracket
H	Right Angle with Bracket
V	Vertical with Bracket

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**DB2521B with AT443E Cap**



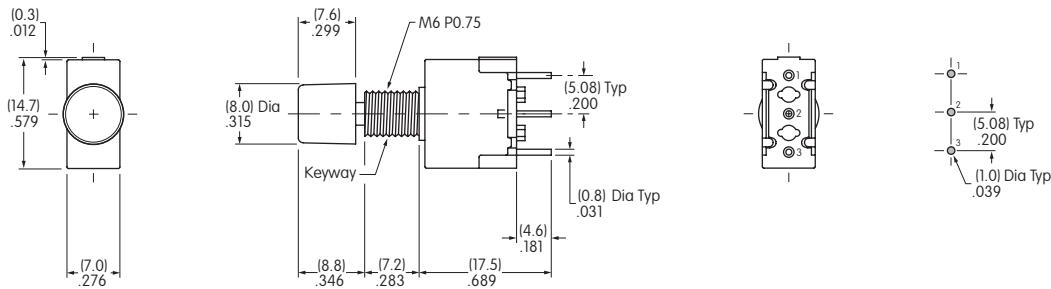
### POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal	Down	Normal	Down	
SP	DB2511	ON	(ON)	3-1	3-2	SPDT 
DP	DB2521	ON	(ON)	3-1 6-4	3-2 6-5	DPDT 

## TYPICAL SWITCH DIMENSIONS

### Single Pole

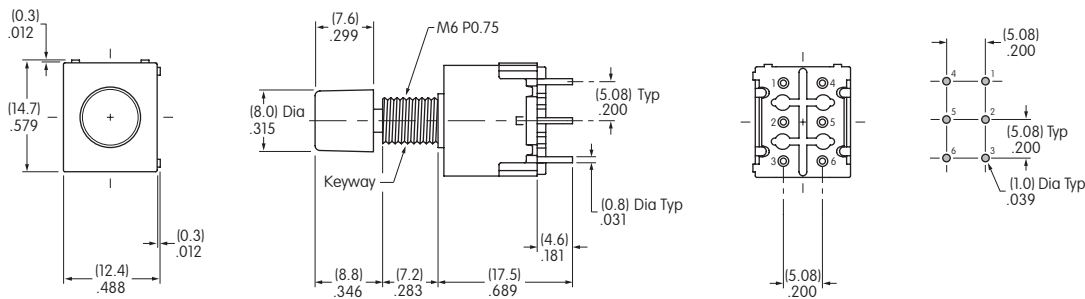
### Straight PC



DB2511P with AT443C

### Double Pole

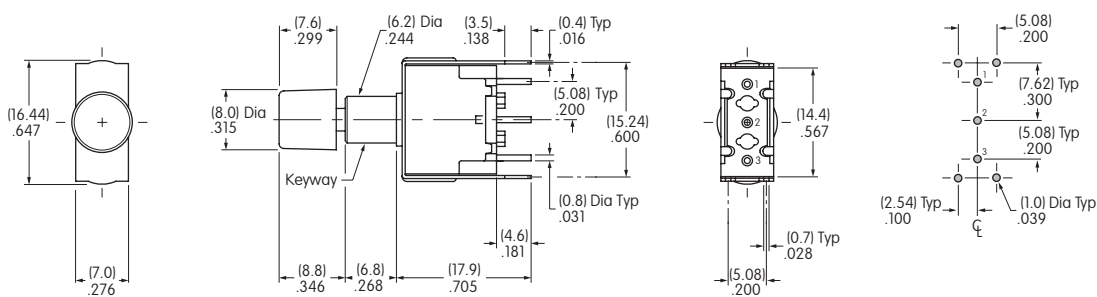
### Straight PC



DB2521P with AT442A

### Single Pole

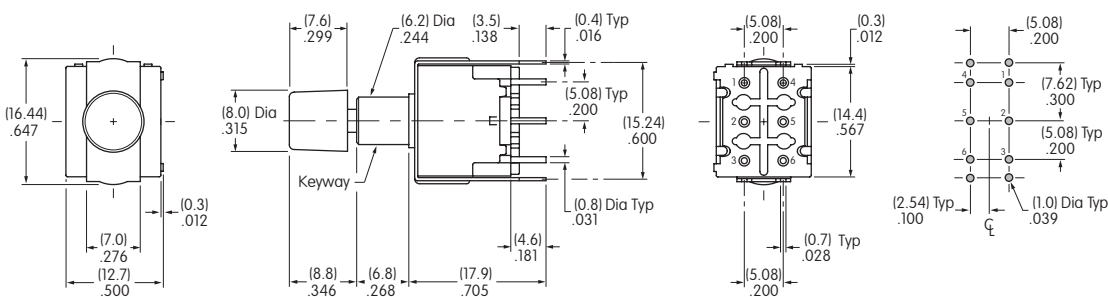
### Straight PC with Bracket



DB2511B with AT442C

### Double Pole

### Straight PC with Bracket

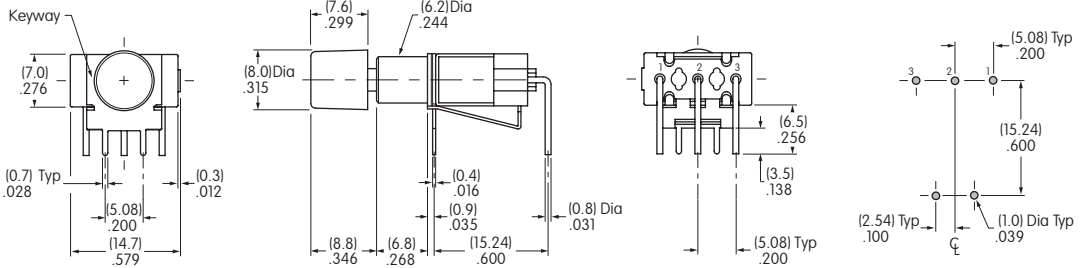
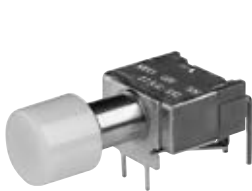


DB2521B with AT443E

## TYPICAL SWITCH DIMENSIONS

### Right Angle PC with Bracket

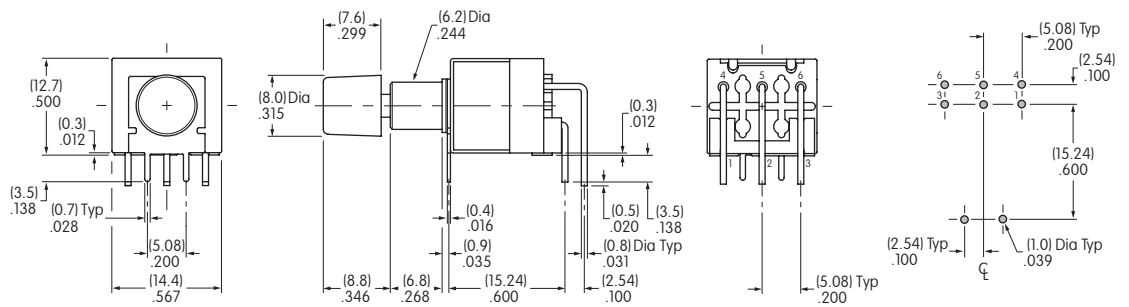
### Single Pole



DB2511H with AT442B

### Right Angle PC with Bracket

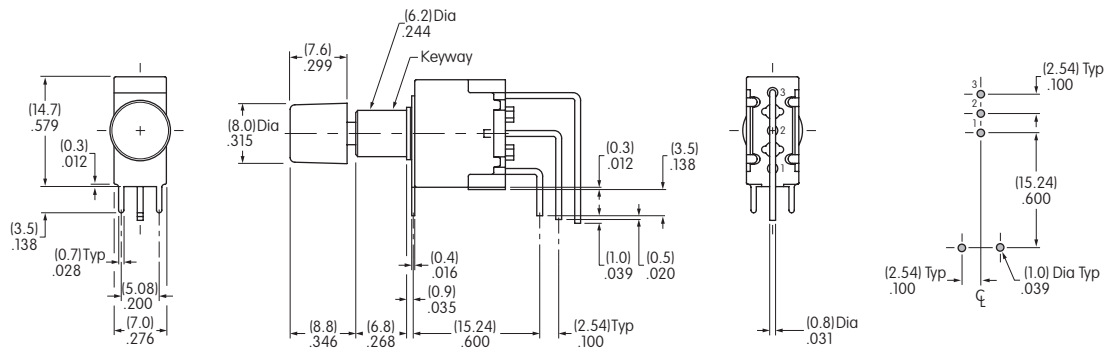
### Double Pole



DB2521H with AT442A

### Vertical PC with Bracket

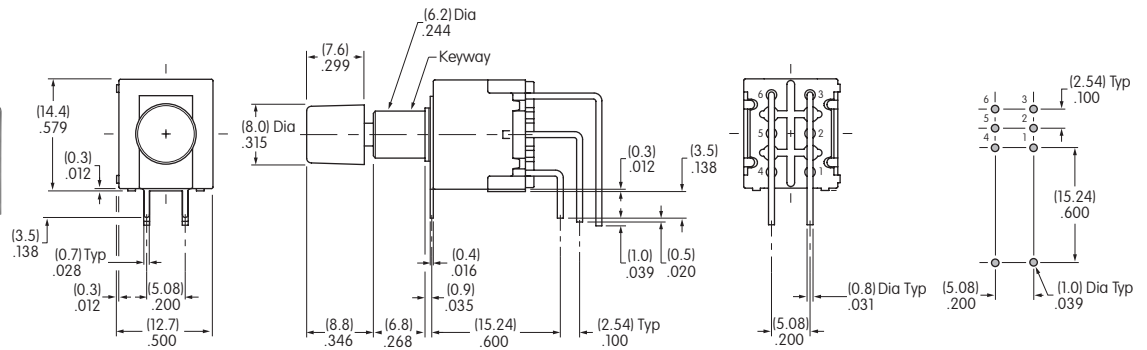
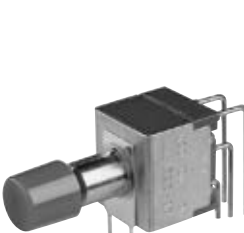
### Single Pole



DB2511V with AT443C

### Vertical PC with Bracket

### Double Pole



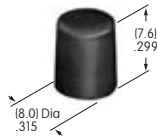
DB2521V with AT443C

OPTIONAL CAPS & COLORS

**AT443**  
 .315" (8.0mm) Diameter Snap-on Cap

Cap Colors Available:

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

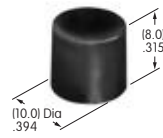


Cap Material: Polycarbonate Finish: Glossy

**AT442**  
 .394" (10.0mm) Diameter Snap-on Cap

Cap Colors Available:

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



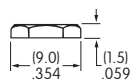
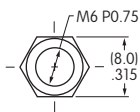
Cap Material: Polycarbonate Finish: Glossy

HARDWARE

Standard Hardware

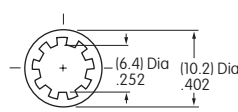
**AT513M**  
 Metric Hexagon Nut

Material:  
 Brass with  
 Nickel Plating



**AT509**  
 Lockwasher

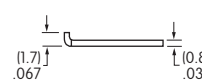
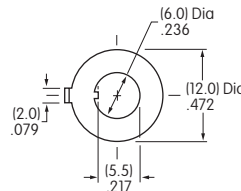
Material:  
 Steel with  
 Zinc/Chromate



Optional Hardware

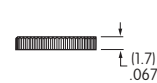
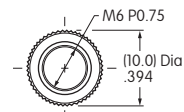
**AT507M**  
 Metric Locking Ring

Material:  
 Steel with  
 Zinc/Chromate



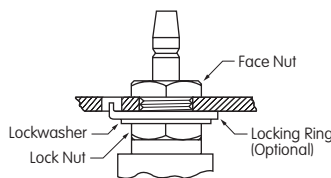
**AT501M**  
 Metric Knurled Face Nut

Material:  
 Brass with  
 Chrome Plating



INSTALLATION/ASSEMBLY

- 2 AT513M Metric Hexagon Nuts
- 1 AT509 Internal Tooth Lockwasher

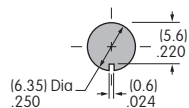


Optional Hardware:  
 AT507M Metric Locking Ring

Note: Cap must be snapped on after the switch is mounted into the panel.

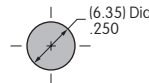
PANEL CUTOUTS & THICKNESSES

With Standard Hardware



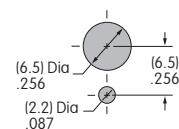
Maximum Effective Panel Thickness:  
 .118" (3.0mm)

Without Bottom Hex Nut



Maximum Effective Panel Thickness:  
 .185" (4.7mm)

With Standard Hardware & Optional Locking Ring



Maximum Effective Panel Thickness:  
 .087" (2.2mm)

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

# General Specifications

## Electrical Capacity (Resistive Load)

<b>Power Level (silver):</b>	3A @ 125V AC for silver contacts
<b>Logic Level (gold):</b>	0.4VA maximum @ 28V AC/DC maximum for gold contacts (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V) Note: Find additional explanation of operating range in Supplement section.

## Other Ratings

<b>Contact Resistance:</b>	10 milliohms maximum for silver; 20 milliohms maximum for gold
<b>Insulation Resistance:</b>	1,000 megohms minimum @ 500V DC
<b>Dielectric Strength:</b>	1,000V AC minimum between contacts for 1 minute minimum; 1,500V AC minimum between contacts and case for 1 minute minimum
<b>Mechanical Life:</b>	100,000 operations minimum
<b>Electrical Life:</b>	25,000 operations minimum for silver; 50,000 operations minimum for gold
<b>Nominal Operating Force:</b>	Single Pole: 1.75N for Momentary and 2.49N for Alternate Action Double Pole: 2.30N for Momentary and 3.05N for Alternate Action
<b>Travel:</b>	Momentary: Pretravel .047" (1.2mm); Overtravel .016" (0.4mm); Total Travel .063" (1.6mm) Alternate: Pretravel .071" (1.8mm); Overtravel .016" (0.4mm); Total Travel .087" (2.2mm)

## Materials & Finishes

<b>Plunger:</b>	Brass with nickel plating
<b>Bushing:</b>	Brass with nickel plating
<b>Frame:</b>	Stainless steel
<b>Case:</b>	Melamine phenolic resin (UL94V-0)
<b>Movable Contacts:</b>	Copper with silver or gold plating
<b>Stationary Contacts:</b>	Silver & copper with silver or gold plating
<b>Terminals:</b>	Copper with silver or gold plating

## Environmental Data

<b>Operating Temp Range:</b>	-10°C through +70°C (+14°F through +158°F)
<b>Humidity:</b>	90 ~ 95% humidity for 96 hours @ 40°C (104°F)
<b>Vibration:</b>	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
<b>Shock:</b>	50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

<b>Mounting Torque:</b>	1.47Nm (13.0 lb•in) for double nut; 0.68Nm (6.0 lb•in) for single nut
<b>Cap Installation Force:</b>	78.5N (17.65 lbf) maximum downward force on actuator
<b>Soldering Time &amp; Temp:</b>	Wave Solder (Straight PC): See Profile B in Supplement section. Manual Soldering: See Profile B in Supplement section.
<b>Cleaning:</b>	These devices are not process sealed. Hand clean locally using alcohol based solution.

## Standards & Certifications

<b>Flammability Standards:</b>	UL94V-0 case
<b>UL:</b>	<b>File No. E44145 - Recognized only when ordered with marking on switch.</b> Add "/U" or "/CUL" before first dash in part number to order UL recognized switch. All single and double pole models recognized at 3A @ 125V AC.
<b>CSA:</b>	<b>File No. 023535_0_000 - Certified only when ordered with marking on switch.</b> Add "/C" before first dash in part number to order CSA certified switch. Single pole solder lug and PC models certified at 3A @ 125V AC; double pole PC models certified at 3A @ 125V AC.

# Distinctive Characteristics

Power and logic level capabilities available to suit varying applications.

Bushing and snap-in mount versions available; snap-in models offer many style and color choices to enhance front panel appearance.

Light touch actuation.

High torque bushing prevents rotation and separation from metal frame during installation.

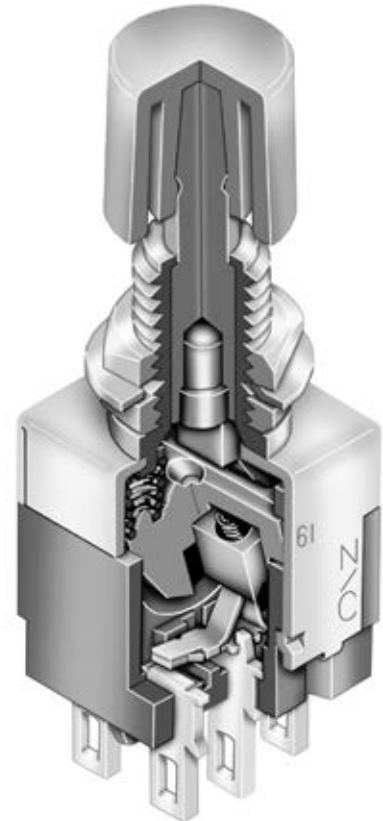
Stainless steel frame resists corrosion.

Case of heat resistant resin meets UL 94V-0 flammability rating.

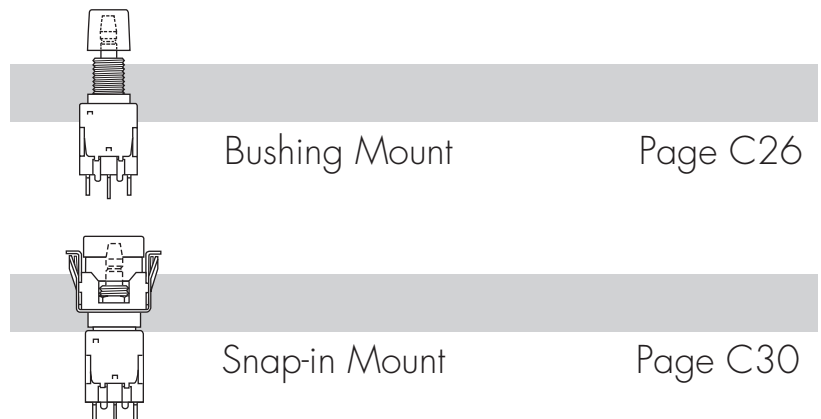
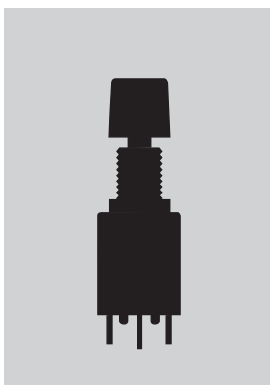
Higher insulating barriers protect against crossover in double pole devices.

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

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



Actual Size



- Toggle
- Rockers
- Pushbuttons**
- Illuminated PB
- Programmable
- Keylocks
- Rotaries
- Slides
- Tactiles
- Tilt
- Touch
- Indicators
- Accessories
- Supplement

### TYPICAL SWITCH ORDERING EXAMPLE

**EB20**

**65**

**B**

**F**

#### Poles & Circuits

<b>11</b>	SPDT	ON	(ON)
<b>65</b>	SPDT	ON	ON
<b>61</b>	DPDT	ON	(ON)
<b>85</b>	DPDT	ON	ON

( ) = Momentary

#### Caps

<b>B</b>	.315" (8.0mm) Dia.
<b>C</b>	.394" (10.0mm) Dia.

#### Contacts, Ratings, & Terminals

<b>No Code</b>	Silver Contacts; Solder Lug Terminals 3A @ 125V AC
<b>G</b>	Gold Contacts; Solder Lug Terminals 0.4VA max @ 28V AC/DC max
<b>P</b>	Silver Contacts; Straight PC Terminals; 3A @ 125V AC
<b>PG</b>	Gold Contacts; Straight PC Terminals 0.4VA max @ 28V AC/DC max

#### Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>E</b>	Yellow
<b>F</b>	Green
<b>G</b>	Blue
<b>H</b>	Gray

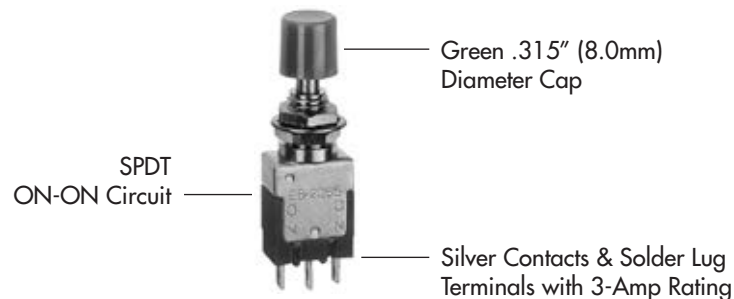
#### IMPORTANT:








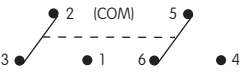
Switches are supplied without UL, cULus & CSA marking unless specified.  
**UL, cULus & CSA recognized only when ordered with marking on the switch.**  
 Specific models, ratings, & ordering instructions are noted on the General Specifications page.

#### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**EB2065-BF**



## POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal  Keyway	Down 	Normal  Keyway	Down 	
SP	EB2011 EB2065	ON ON	(ON) ON	2-3	2-1	SPDT 
DP	EB2061 EB2085	ON ON	(ON) ON	2-3 5-6	2-1 5-4	DPDT 

Note: Terminal numbers are not actually on the switch.

## CONTACT MATERIALS, RATINGS, & TERMINALS



**Solder Lug  
Silver Contacts**

**Power Level**

**3A @ 125V AC**

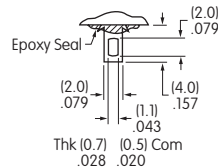


**Solder Lug  
Gold Contacts**

**Logic Level**

**0.4VA max @ 28V AC/DC max**

Complete explanation of operating range in Supplement section.



**Straight PC  
Silver Contacts**

**Power Level**

**3A @ 125V AC**

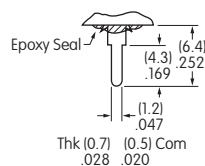


**Straight PC  
Gold Contacts**

**Logic Level**

**0.4VA max @ 28V AC/DC max**

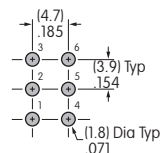
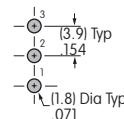
Complete explanation of operating range in Supplement section.



### PCB Footprints

Single Pole

Double Pole



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

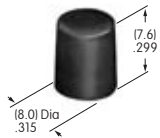
## CAPS & COLORS

**B** AT443  
.315" (8.0mm) Diameter Snap-on Cap

**C** AT442  
.394" (10.0mm) Diameter Snap-on Cap

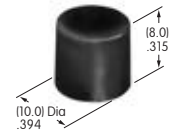
Cap Colors Available:

- |                 |                |
|-----------------|----------------|
| <b>A</b> Black  | <b>F</b> Green |
| <b>B</b> White  | <b>G</b> Blue  |
| <b>C</b> Red    | <b>H</b> Gray  |
| <b>E</b> Yellow |                |



Cap Colors Available:

- |                 |                |
|-----------------|----------------|
| <b>A</b> Black  | <b>F</b> Green |
| <b>B</b> White  | <b>G</b> Blue  |
| <b>C</b> Red    | <b>H</b> Gray  |
| <b>E</b> Yellow |                |

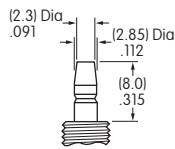


Cap Material: Polycarbonate Finish: Glossy

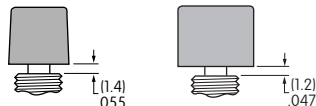
Cap Material: Polycarbonate Finish: Glossy

### Plunger Extension

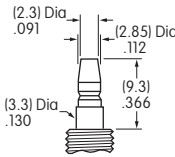
Due to a difference in plunger lengths on the momentary and alternate action models, cap distance from top of bushing varies.



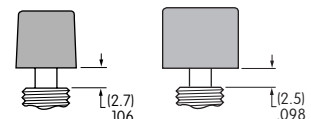
Momentary Plunger Length



Momentary Cap Location



Alternate Plunger Length



Alternate Cap Location

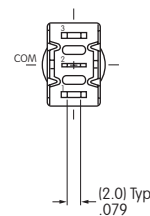
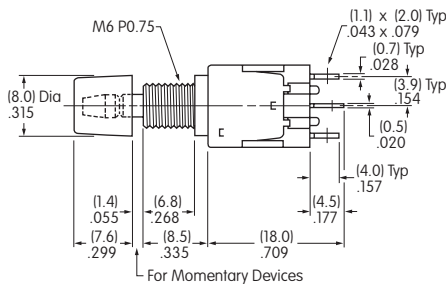
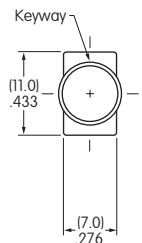
## TYPICAL SWITCH DIMENSIONS

### Solder Lug

### Single Pole



EB2011-BA

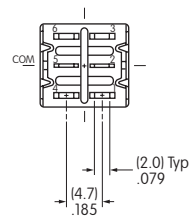
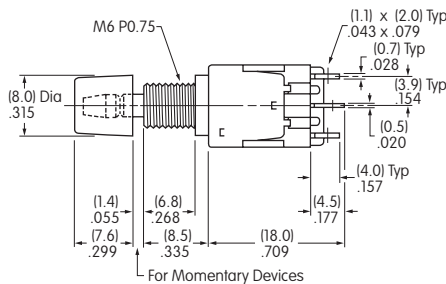
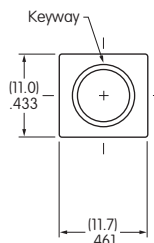


### Solder Lug

### Double Pole



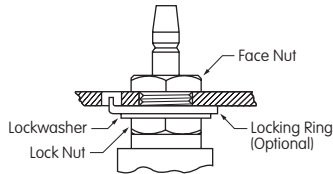
EB2061-BA



## HARDWARE

### Installation/Assembly

- 2 AT513M Metric Hexagon Nuts
- 1 AT509 Internal Tooth Lockwasher



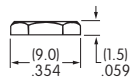
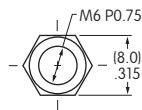
Optional Hardware:  
AT507M Metric Locking Ring

Note: Cap must be snapped on after the switch is mounted into the panel.

### Standard Hardware

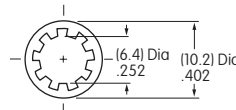
#### AT513M Metric Hexagon Nut

Material:  
Brass with  
Nickel Plating



#### AT509 Lockwasher

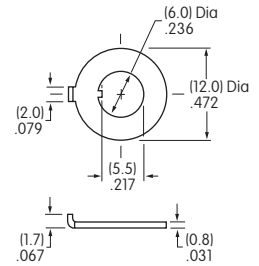
Material:  
Steel with  
Zinc/Chromate



### Optional Hardware

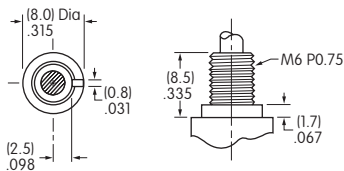
#### AT507M Metric Locking Ring

Material:  
Steel with  
Zinc/Chromate

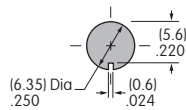


## PANEL CUTOUTS & THICKNESSES

### Metric Bushing

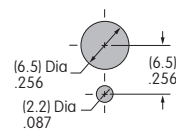


### With Standard Hardware



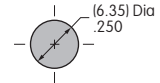
Maximum Effective  
Panel Thickness:  
.118" (3.0mm)

### With Standard Hardware & Optional Locking Ring



Maximum Effective  
Panel Thickness:  
.055" (1.4mm)

### Without Bottom Hex Nut



Maximum Effective  
Panel Thickness:  
.185" (4.7mm)

See Accessories & Hardware section for optional Conical Nuts:  
AT512M used with cap AT443 and AT512CM used with cap AT442.

EB20

11

B

J23

#### Poles & Circuits

11	SPDT	ON	(ON)
65	SPDT	ON	ON
61	DPDT	ON	(ON)
85	DPDT	ON	ON
( ) = Momentary			

#### Contacts, Ratings, & Terminals

<b>No Code</b>	Silver Contacts; Solder Lug Terminals 3A @ 125V AC
<b>G</b>	Gold Contacts; Solder Lug Terminals 0.4VA max @ 28V AC/DC max
<b>P</b>	Silver Contacts; Straight PC Terminals; 3A @ 125V AC
<b>PG</b>	Gold Contacts; Straight PC Terminals 0.4VA max @ 28V AC/DC max

#### Cap Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>E</b>	Yellow
<b>F</b>	Green
<b>G</b>	Blue
<b>H</b>	Gray

#### Cap Extensions & Bezel Types

Low Rise		High Rise		Description
Momentary	Alternate	Momentary	Alternate	
J20	J30	J40	J50	Without Bezel
J21	J31	J41	J51	Bezel without LED
J22	J32	J42	J52	Bezel with 1 Round LED
J23	J33	J43	J53	Bezel with 2 Round LEDs
J24	J34	J44	J54	Bezel with 2 Rectangular LEDs

#### IMPORTANT:

Switches are supplied without UL, cULus & CSA marking unless specified.

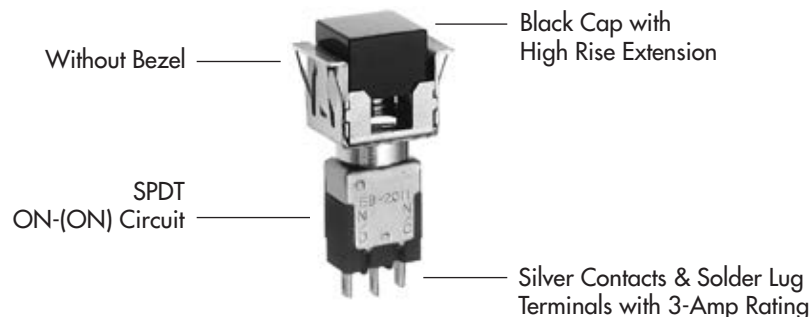
**UL, cULus & CSA recognized only when ordered with marking on the switch.**

Specific models, ratings, & ordering instructions are noted on the General Specifications page.

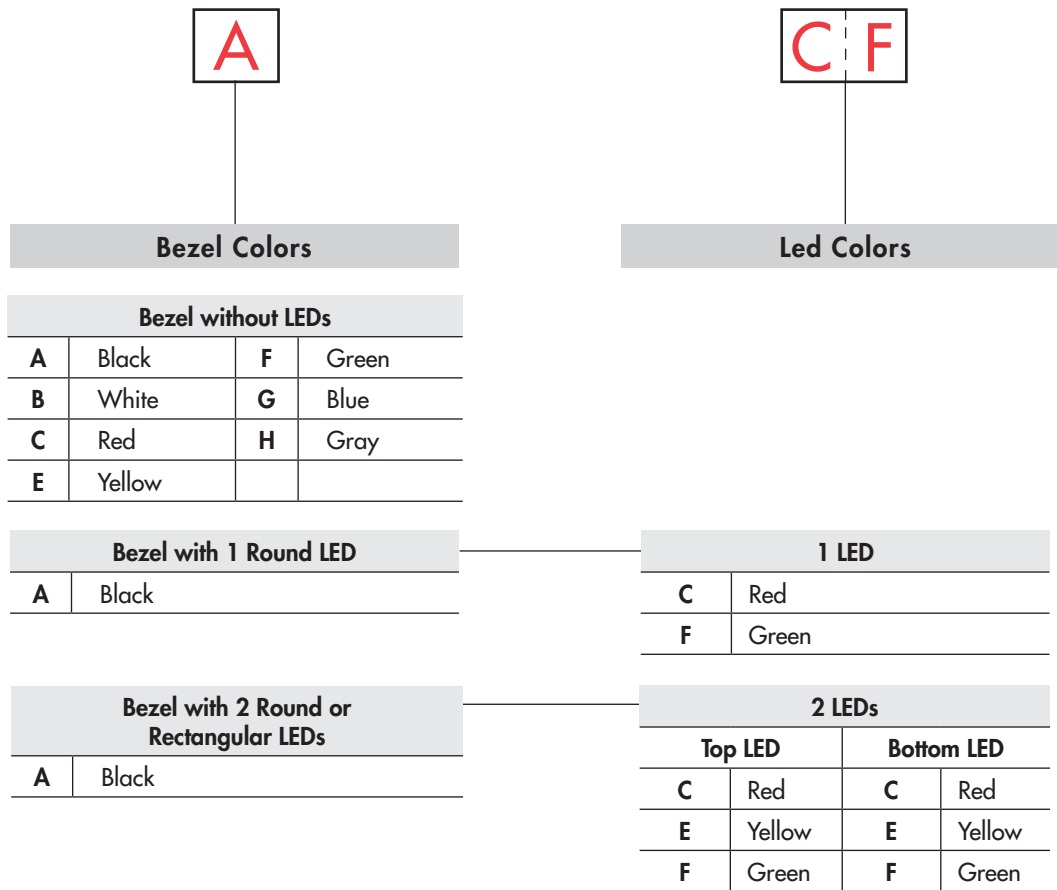


#### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE WITHOUT BEZEL

**EB2011-A-J40**

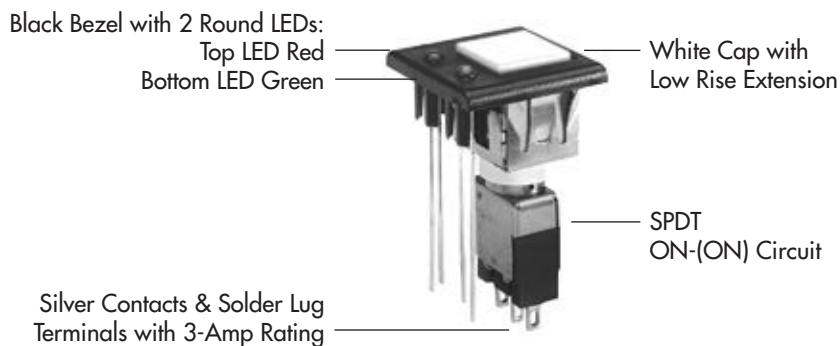


ORDERING EXAMPLES



DESCRIPTION FOR TYPICAL ORDERING EXAMPLE WITH BEZEL

**EB2011-B-J23ACF**



Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

## POLES & CIRCUITS

		Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
Pole	Model	Normal	Down	Normal	Down	
						Note: Terminal numbers are not actually on the switch.
SP	EB2011 EB2065	ON ON	(ON) ON	2-3	2-1	SPDT 
DP	EB2061 EB2085	ON ON	(ON) ON	2-3 5-6	2-1 5-4	DPDT 

## CONTACT MATERIALS, RATINGS, & TERMINALS



Solder Lug  
Silver Contacts

Power Level

3A @ 125V AC

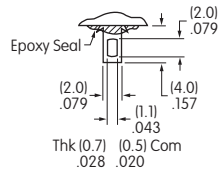


Solder Lug  
Gold Contacts

Logic Level

0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.



Straight PC  
Silver Contacts

Power Level

3A @ 125V AC



Straight PC  
Gold Contacts

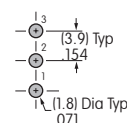
Logic Level

0.4VA maximum @ 28V AC/DC maximum

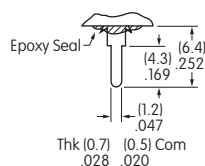
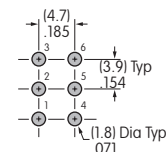
Complete explanation of operating range in Supplement section.

### PCB Footprints

Single Pole



Double Pole



## CAP COLORS

Factory Assembled on the Switch:  
 Square snap-on cap AT465, snap-in mounter  
 AT529, and optional bezels which follow.

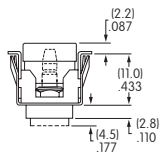
- |                |                |               |                 |
|----------------|----------------|---------------|-----------------|
| <b>A</b> Black | <b>B</b> White | <b>C</b> Red  | <b>E</b> Yellow |
| <b>F</b> Green | <b>G</b> Blue  | <b>H</b> Gray |                 |

## CAP EXTENSIONS & BEZEL TYPES

Cap Extension without Bezel

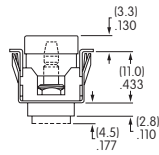
**J20**

Low Rise Momentary



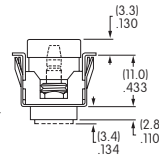
**J30**

Low Rise Alternate



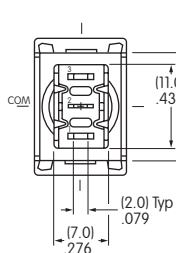
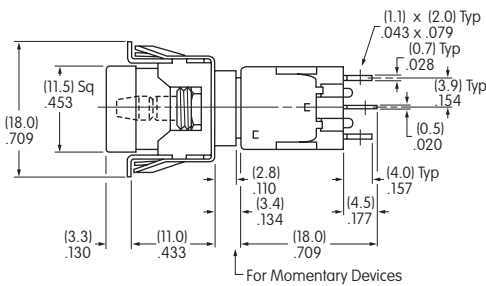
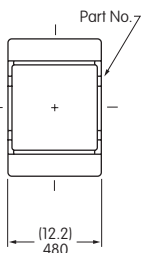
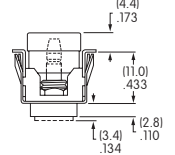
**J40**

High Rise Momentary



**J50**

High Rise Alternate



Maximum Panel Thickness  
 .039" ~ .157" (1.0mm ~ 4.0mm)  
 Cutout applies to SP & DP



High Rise

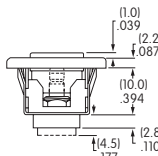
Single Pole

**EB2011-A-J40**

Cap Extension with Bezel

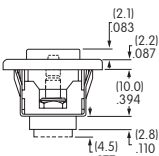
**J21**

Low Rise Momentary



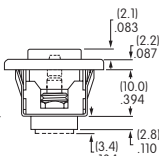
**J31**

Low Rise Alternate



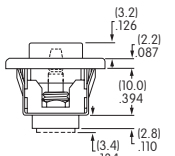
**J41**

High Rise Momentary



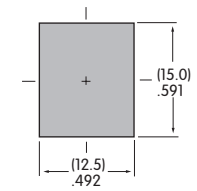
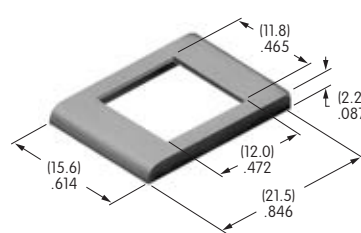
**J51**

High Rise Alternate

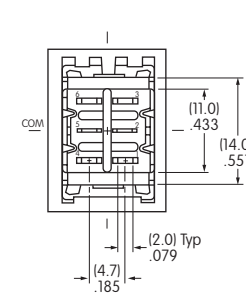
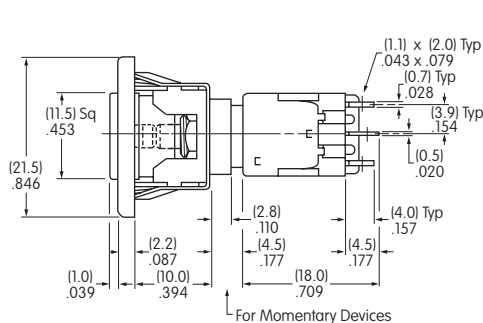
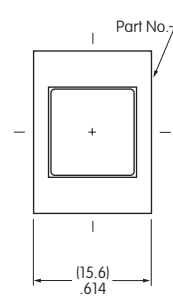


AT207 Bezel without LED

- |                 |                |                            |
|-----------------|----------------|----------------------------|
| <b>E</b> Yellow | <b>F</b> Green | Material:<br>Polycarbonate |
| <b>A</b> Black  | <b>G</b> Blue  |                            |
| <b>B</b> White  | <b>H</b> Gray  |                            |
| <b>C</b> Red    |                |                            |
- Finish: Glossy



Maximum Panel Thickness  
 .039" ~ .126" (1.0mm ~ 3.2mm)  
 Cutout applies to SP & DP



Low Rise

Double Pole

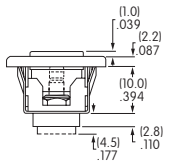
**EB2061-B-J21A**

## CAP EXTENSIONS & BEZEL TYPES

**Cap Extension with Bezel**

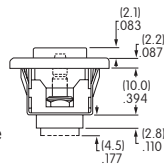
**J22**

Low Rise Momentary



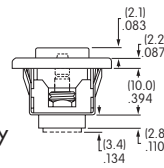
**J32**

Low Rise Alternate



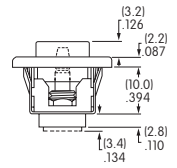
**J42**

High Rise Momentary



**J52**

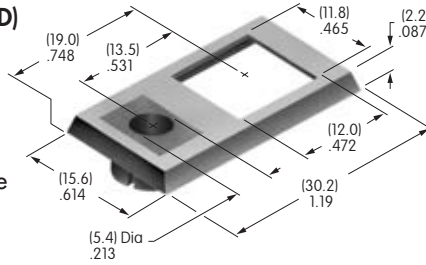
High Rise Alternate



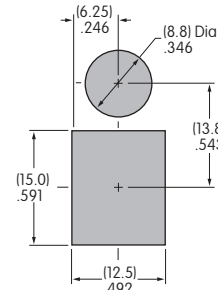
**AT208 Bezel with 1 Round LED (AT070 LED)**

**A** Black

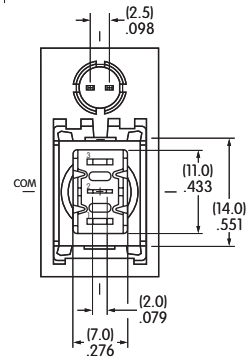
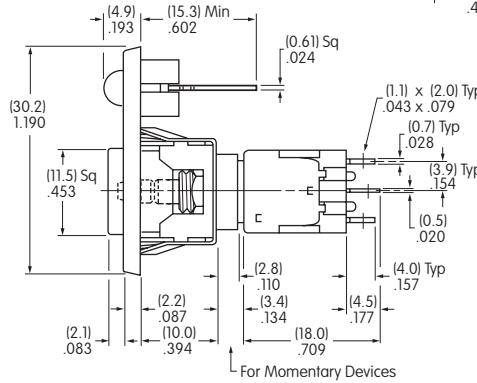
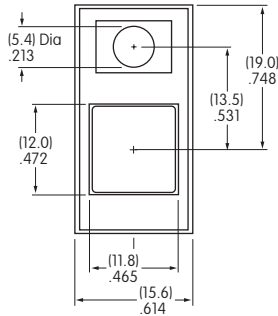
Material: Polycarbonate  
Finish: Glossy



Maximum Panel Thickness  
.039" ~ .126"  
(1.0mm ~ 3.2mm)  
Cutout applies to SP & DP



LED colors and specifications on next to last page of this EB section.



**EB2011-B-J42AC**

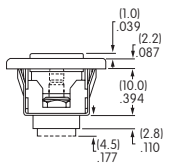
High Rise

Single Pole

**Cap Extension with Bezel**

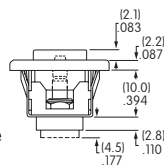
**J23**

Low Rise Momentary



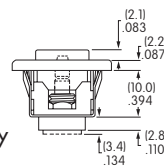
**J33**

Low Rise Alternate



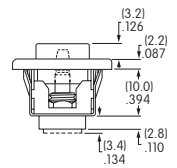
**J43**

High Rise Momentary



**J53**

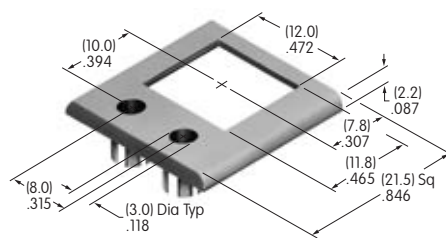
High Rise Alternate



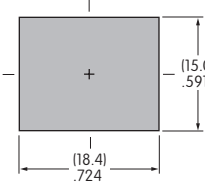
**AT212 Bezel with 2 Round LEDs (AT617 LEDs)**

**A** Black

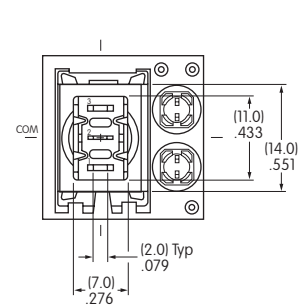
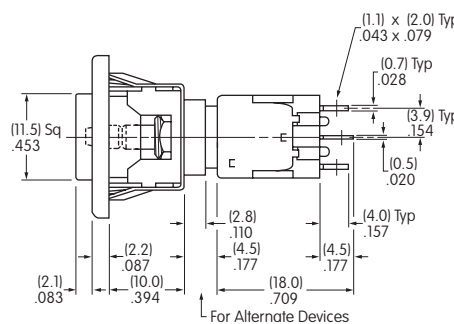
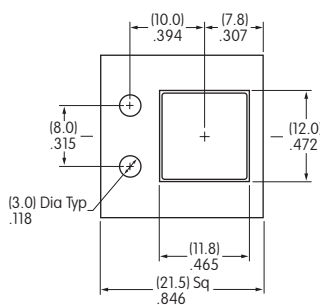
Material: Polycarbonate  
Finish: Glossy



Maximum Panel Thickness  
.039" ~ .126" (1.0mm ~ 3.2mm)  
Cutout applies to SP & DP



LED colors and specifications on next to last page of this EB section.



**EB2065-B-J33ACF**

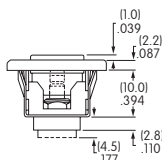
Low Rise

Single Pole

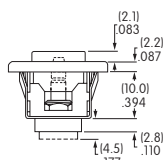
## CAP EXTENSIONS & BEZEL TYPES

Cap Extension with Bezel

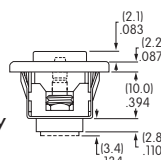
**J24**  
Low Rise Momentary



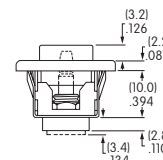
**J34**  
Low Rise Alternate



**J44**  
High Rise Momentary



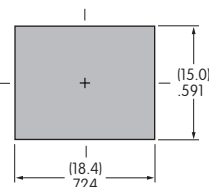
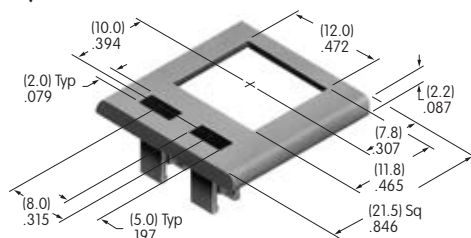
**J54**  
High Rise Alternate



AT213 Bezel with 2 Rectangular LEDs (AT618 LEDs)

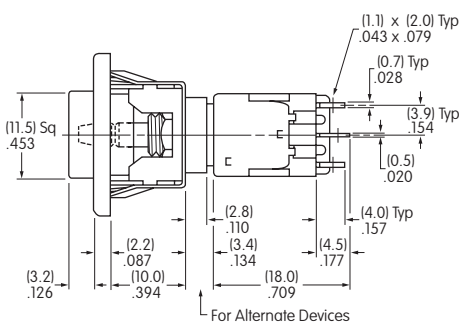
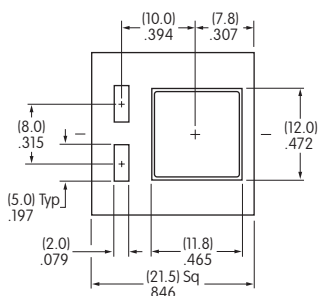
**A** Black

Material: Polycarbonate  
Finish: Glossy

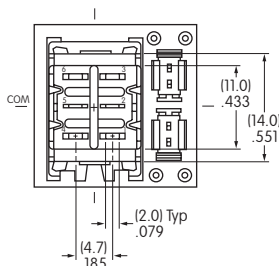


Maximum Panel Thickness  
.039" ~ .126" (1.0mm ~ 3.2mm)  
Cutout applies to SP & DP

LED colors and specifications on next page of this EB section.



High Rise



Double Pole



EB2085-B-J54ACF

Toggles

Rockers

**C** Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

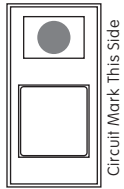
Accessories

Supplement

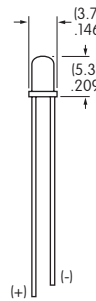
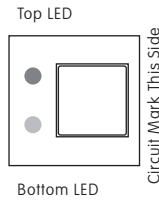
## LED COLORS & SPECIFICATIONS

### Bezel Orientation on Switch

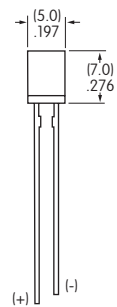
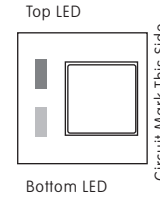
**AT070 LED**  
For Bezel AT208  
with 1 LED



**AT617 LED**  
For Bezel AT212  
with 2 Round LEDs



**AT618 LED**  
For Bezel AT213  
with 2 Rectangular LEDs



Note: Lead lengths may differ from manufacturing lot to lot. The longer lead is the anode (+).

		AT070		AT617			AT618		
		<b>C</b>	<b>F</b>	<b>C</b>	<b>E</b>	<b>F</b>	<b>C</b>	<b>E</b>	<b>F</b>
	Color	Red	Green	Red	Yellow	Green	Red	Yellow	Green
Maximum Forward Current	$I_{FM}$	25mA	30mA	30mA	30mA	30mA	25mA	30mA	25mA
Typical Forward Current	$I_F$	20mA	20mA	20mA	20mA	20mA	20mA	20mA	20mA
Forward Voltage	$V_F$	2.8V	2.1V	2.1V	2.1V	2.2V	2.25V	2.1V	2.2V
Maximum Reverse Voltage	$V_{RM}$	4V	5V	5V	5V	5V	5V	5V	5V
Current Reduction Rate Above 25°C	$\Delta I_F$	0.33 mA/°C	0.40 mA/°C	0.40 mA/°C	0.40 mA/°C	0.40 mA/°C	0.33 mA/°C	0.40 mA/°C	0.33 mA/°C
Ambient Temperature Range (when used with a bezel)		-10° ~ +70°C		-15° ~ +70°C			-25° ~ +50°C		

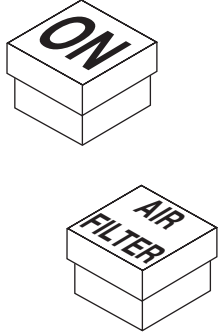
The electrical specifications shown are determined at a basic temperature of 25°C.  
LED circuit is independent of switch operation. LED is colored in OFF state.

If the source voltage is greater than the rated voltage of the LED, a ballast resistor must be connected in series with the lamp.  
The ballast resistor calculation and more lamp detail are shown in the Supplement section.

LEGENDS

NKK Switches can provide custom legends for caps. Contact factory for more information.

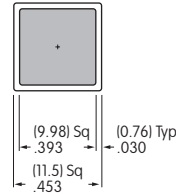
Suggested Printable Area for Cap



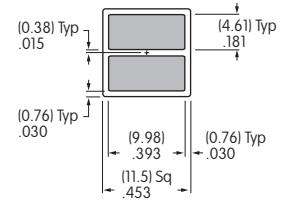
Recommended Print Method:

Screen Print or Pad Print

Epoxy based ink is recommended.



AT465



AT465

Shaded areas are printable areas.

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

# General Specifications

## FB Series

## SB Series

### Electrical Capacity (Resistive Load)

**Power Level:** 500mA @ 125V AC for silver  
**Logic Level:** 0.4VA max. @ 28V AC/DC max. for gold  
 (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)  
 Note: Find additional explanation in Supplement section.

3A @ 125V AC or 2A @ 250V AC or  
 2A @ 30V DC for silver  
 0.4VA max. @ 28V AC/DC max. for gold  
 (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)  
 Note: Find explanation of operating range in Supplement section.

### Other Ratings

**Contact Resistance:** 30 milliohms maximum for silver;  
 30 milliohms maximum for gold  
**Insulation Resistance:** 100 megohms minimum @ 500V DC  
**Dielectric Strength:** 1,000V AC minimum between contacts &  
 between contacts & case for 1 minute minimum  
**Mechanical Life:** 50,000 operations minimum  
**Electrical Life:** 50,000 operations minimum  
**Nominal Operating Force:** 2.16N  
**Travel:** Pretravel .043" (1.1mm)  
 Overtravel .022" (0.57mm)  
 Total Travel .065" (1.67mm)

10 milliohms maximum for silver;  
 20 milliohms maximum for gold  
 200 megohms minimum @ 500V DC  
 1,000V AC minimum between contacts  
 & between contacts & case for 1 minute minimum  
 30,000 operations minimum  
 10,000 operations minimum  
 4.90N  
 Normally Open Total Travel .088" (2.24mm)  
 Normally Closed Total Travel .088" (2.24mm)

### Materials & Finishes

**Plunger:** Polyacetal  
**Bushing:** Brass with nickel plating  
**Case:** Phenolic resin  
**Movable Contactor:** Copper with silver or gold plating  
**Stationary Contacts:** Phosphor bronze with silver or gold plating  
**Terminals:** Phosphor bronze with silver or gold plating

Black: Phenolic resin; Red: Urea formaldehyde resin  
 Brass with nickel plating  
 Phenolic resin  
 Copper with silver or gold plating  
 Copper with silver or gold plating  
 Copper with silver or gold plating

### Environmental & Installation Data

**Operating Temp Range:** -10°C through +70°C (+14°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/s<sup>2</sup>) acceleration (tested in 6 right  
 angled directions, with 5 shocks in each  
 direction)  
**Soldering Time &  
 Temperature:** Manual Soldering:  
 See Profile A in Supplement section.

-10°C through +70°C (+14°F through +158°F)  
 90 ~ 95% humidity for 96 hours @ 40°C (104°F)  
 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  
 50G (490m/s<sup>2</sup>) acceleration (tested in 6 right  
 angled directions, with 5 shocks in each  
 direction)  
 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" before dash in part number to order UL recognized switch.  
 Models rated 0.5A @ 125V AC Single pole;  
 Momentary action circuit with solder lug terminations.

**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.  
 Models rated 3A @ 125V AC & 2A @ 250V AC.  
 Single pole: Momentary action circuit with solder lug terminations. Black plunger only.

**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.  
 SB series rated 3A @ 125V AC & 2A @ 250V AC.  
 Single pole: Momentary action circuit with solder lug terminations. Black plunger only.

# Distinctive Characteristics

Optional caps in different colors to vary appearance as needed.

Low operating force for ease of actuation.

Rear panel bushing mount with compact behind panel dimension.

Internal antijamming feature to protect the contacts from damage due to excessive force on the plunger.

Self-cleaning contacts make FB models highly reliable.

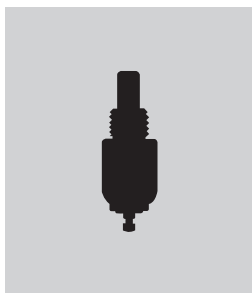
Low cost device of rugged one-piece bushing and housing construction.

Reliability of construction with an internal guide to maintain contact alignment.

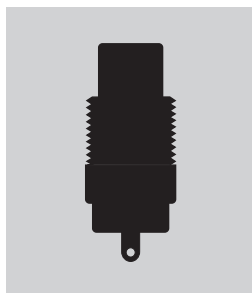
FB15ANEP and SB4011NO models have epoxy sealed terminals.



Actual Size FB



Actual Size SB



FB Bushing Mount

Page C40

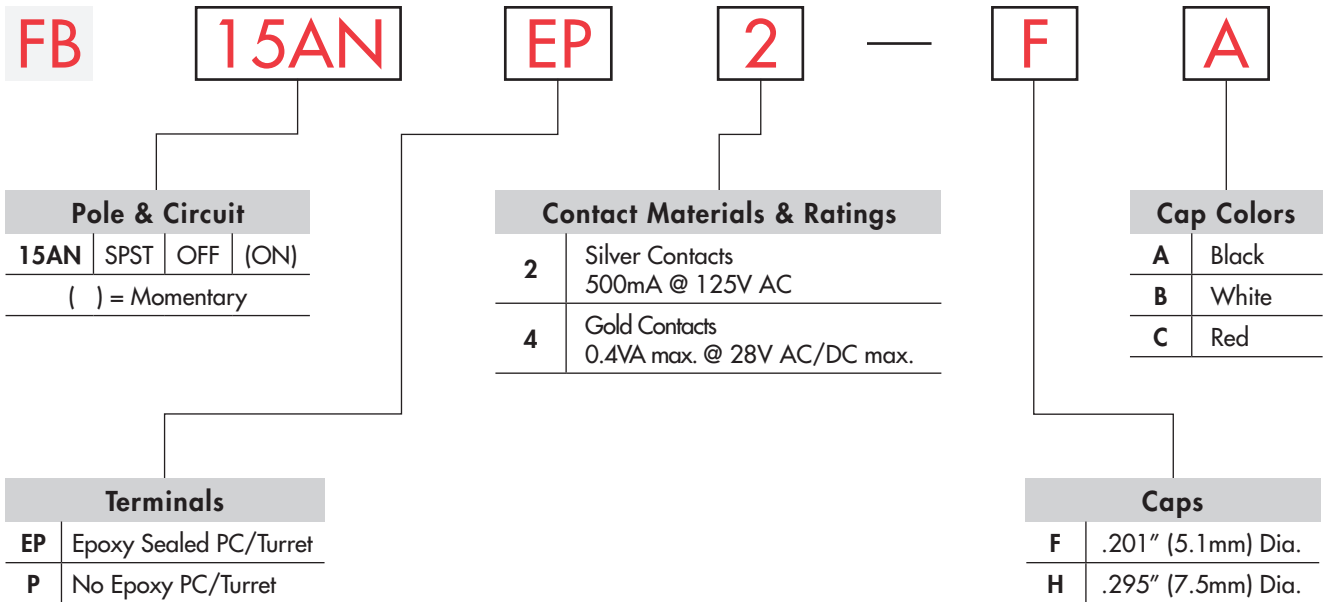


SB Bushing Mount

Page C42

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

### TYPICAL SWITCH ORDERING EXAMPLE



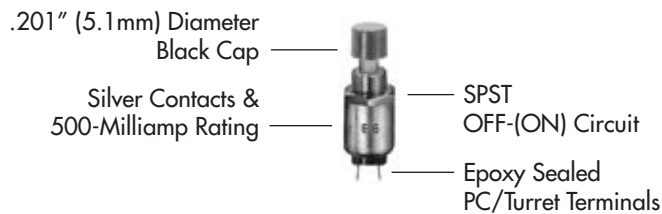
#### IMPORTANT:



Switches are supplied without UL & cULus marking unless specified.  
**UL & cULus 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

#### FB15ANEP2-FA



#### POLE & CIRCUIT

		Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
Pole	Model	Normal	Down	Normal	Down	
SP	FB15AN	OFF	(ON)	OPEN	1-2	SPST

Note: Terminal numbers are not actually on the switch.

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

## TERMINALS

**EP** Epoxy Sealed  
PC/Turret Terminals

**P** No Epoxy  
PC/Turret Terminals

## CONTACT MATERIALS & RATINGS

**2** Silver Contacts

Power Level

500mA @ 125V AC

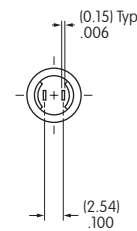
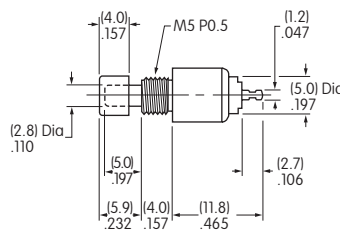
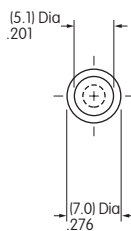
**4** Gold Contacts

Logic Level

0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.

## TYPICAL SWITCH DIMENSIONS



PC/Turret



Plunger is white polyacetal.

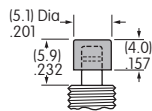
**FB15ANEP2-FA**

## SLIP-ON CAPS & COLORS

**F** AT475  
.201" (5.1mm) Diameter

Material: Polyamide

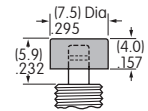
Finish: Glossy



**H** AT496  
.295" (7.5mm) Diameter

Material: Polyamide

Finish: Glossy



Colors Available:

**A** Black

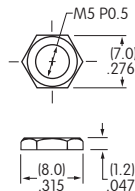
**B** White

**C** Red

## STANDARD HARDWARE & PANEL CUTOUT

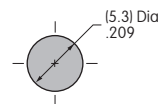
**AT536 Hex Nut**

Material:  
Brass with nickel plating



**Panel Thickness:**

.110" (2.8mm) maximum



### TYPICAL SWITCH ORDERING EXAMPLE

**SB40**

**11NO**

**M**



Pole & Circuits			
Normally Open			
* 11NO	SPST	OFF	(ON)
Normally Closed			
11NC	SPST	ON	(OFF)
( ) = Momentary			
* SB4011NO models have epoxy sealed terminals			

Plunger Colors	
No Code	Black
C	Red

Contact Materials & Ratings	
No Code	Silver Contacts 3A @ 125V AC or 2A @ 250V AC
G	Gold Contacts 0.4VA max. @ 28V AC/DC max.

Bushings	
M	Metric Threaded M12 P1
H	Inch Threaded 15/32-32 NS

Slip-On Cap & Colors	
No Code	Without Cap
2A	Black
2B	White
2C	Red
2E	Yellow
2F	Green
2G	Blue

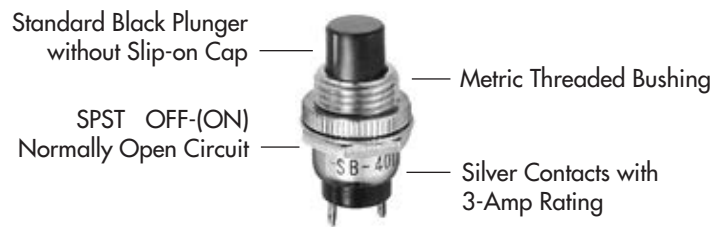
#### IMPORTANT:



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

**SB4011NOM**

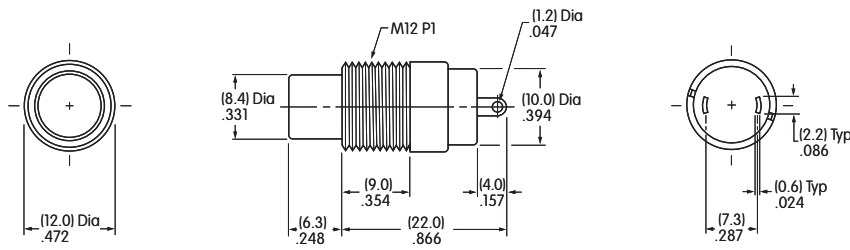


#### POLE & CIRCUITS

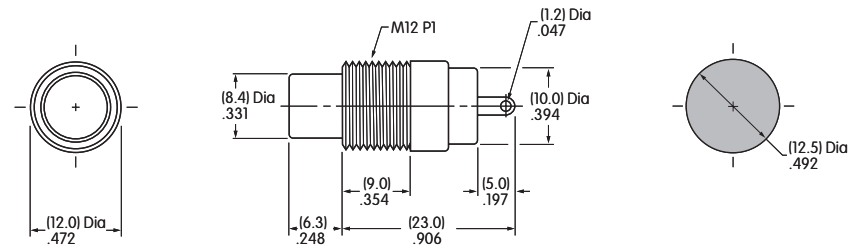
		Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
Pole	Model	Normal	Down	Normal	Down	
SP	SB4011NO	OFF	(ON)	OPEN	1-2	Note: Terminal numbers are not actually on the switch. SPST NO  NC
	SB4011NC	ON	(OFF)	1-2	OPEN	

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

## TYPICAL SWITCH DIMENSIONS



**SB4011NOM**



**SB4011NCM**

### Metric Bushing

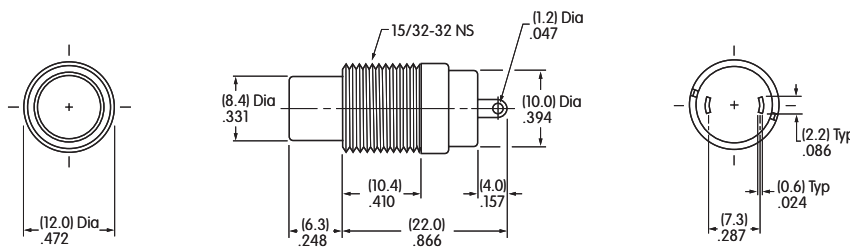


**SB4011NOM**

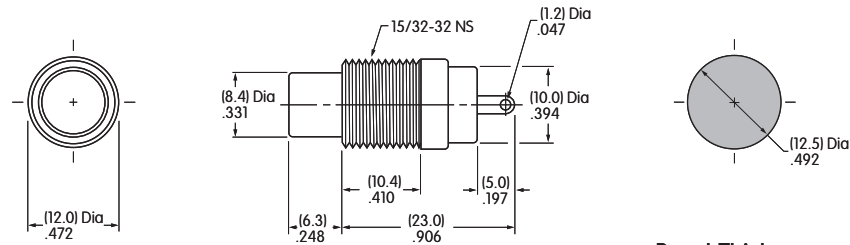
Hardware provided:  
 1 AT504 Knurled Face Nut  
 1 AT508 Lockwasher  
 1 AT527M Hex Mounting Nut

Panel Thickness:  
 .157" (4.0mm)

Details in Hardware & Accessories section.



**SB4011NOH**



**SB4011NCH**

### Inch Bushing



**SB4011NCH**

Hardware provided:  
 2 AT503H Hex Mounting Nuts  
 1 AT508 Lockwasher

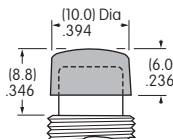
Panel Thickness:  
 .157" (4.0mm)

Details in Hardware & Accessories section.

## SLIP-ON CAP & COLORS

**AT422**  
 .394" (10.0mm) Diameter Cap

Material: Polyethylene  
 Finish: Matte



- |                 |                  |                 |
|-----------------|------------------|-----------------|
| <b>2A</b> Black | <b>2C</b> Red    | <b>2F</b> Green |
| <b>2B</b> White | <b>2E</b> Yellow | <b>2G</b> Blue  |

Toggle  
 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:** 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:** 1.70N  
**Travel:** Pretravel .035" (0.9mm); Overtravel .008" (0.2mm); Total Travel .043" (1.1mm)

## Materials & Finishes

**Actuator:** Polyacetal  
**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  
**Mounting Bracket:** Phosphor bronze with tin plating  
**Terminals:** Phosphor bronze 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/s<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

**Cap Installation Force:** 39.1N (8.8 lbf) maximum downward force on actuator

## 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 GB Series pushbuttons 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

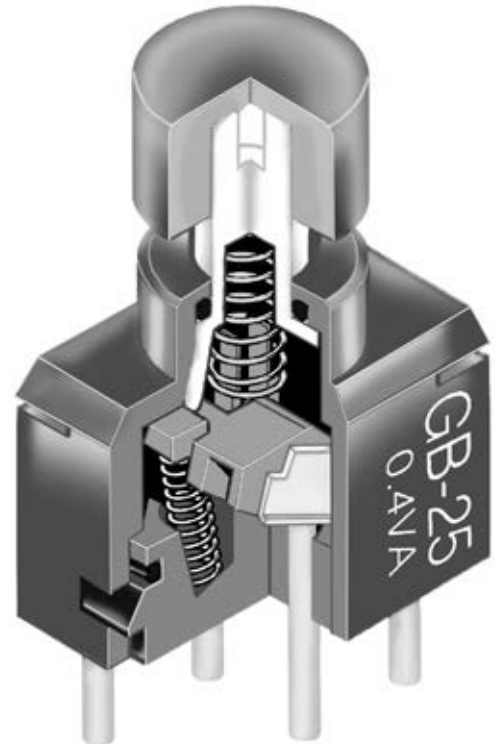
Ultra-miniature size allows high density mounting, and extremely light weight of 0.25 gram makes these switches ideal for handheld equipment.

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

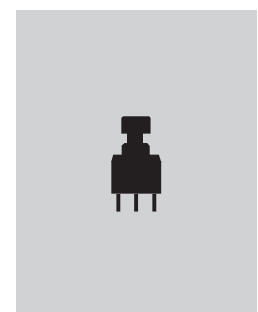
Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother, positive detent actuation, increased contact stability and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement section.)

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

Matching indicators available.

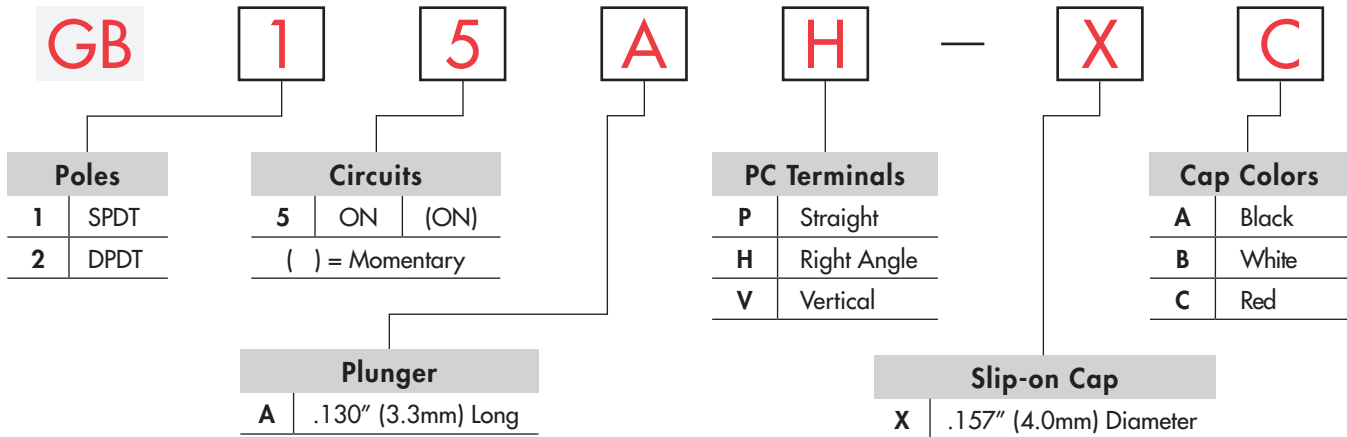


Actual Size



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

### TYPICAL SWITCH ORDERING EXAMPLE



### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

#### GB15AH-XC

.130" (3.3mm) Long Plunger with  
.157" (4.0mm) Diameter Red Cap



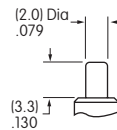
SPDT  
ON-(ON) Circuit  
Right Angle PC Terminals

### POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Schematics
		Normal	Down	Normal	Down	
SP	GB15	ON	(ON)	5-6	5-4	SPDT Note: Terminal numbers are not actually on the switch. 
DP	GB25	ON	(ON)	5-6 2-3	5-4 2-1	DPDT 

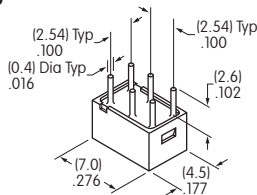
### PLUNGER

**A** .130" (3.3mm) Long Plunger

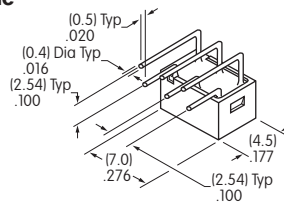


### PC TERMINALS

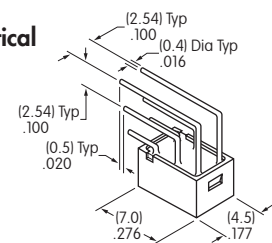
**P** Straight



**H** Right Angle



**V** Vertical



## SLIP-ON CAP & COLORS

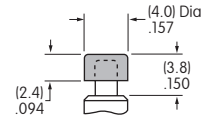
**X** **AT4063**  
**.157" (4.0mm) Diameter Slip-on Cap**

Material: Polyamide

Finish: Glossy



Actual Size



Cap Colors Available:



Black



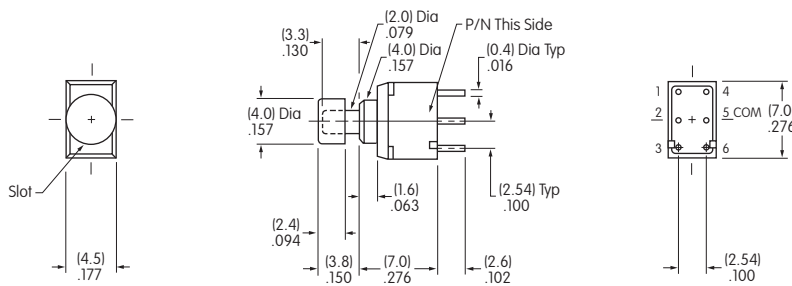
White



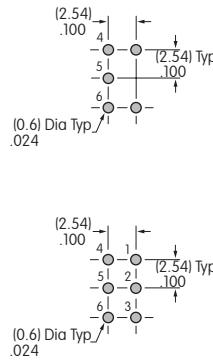
Red

## TYPICAL SWITCH DIMENSIONS

### Single & Double Pole



On single pole switches terminals 1 & 3 are support pins.

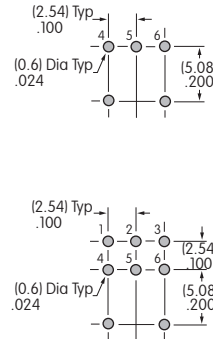
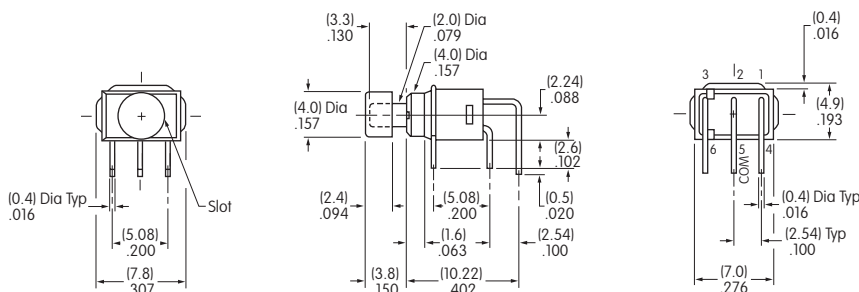


### Straight PC



**GB25AP-XC**

### Single & Double Pole

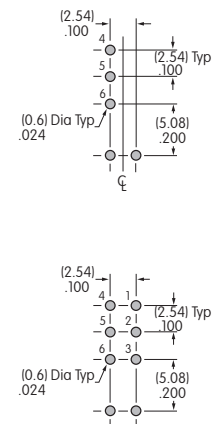
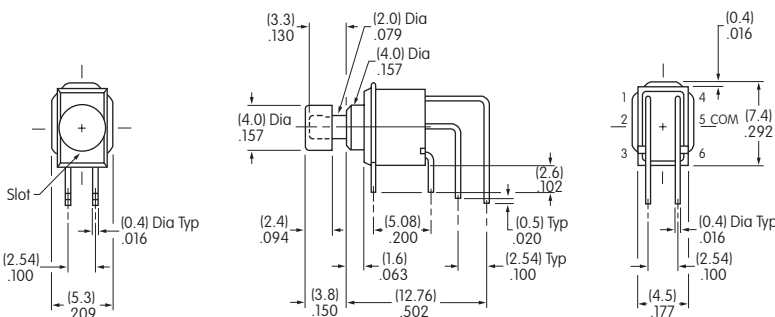


### Right Angle PC



**GB25AH-XC**

### Single & Double Pole



### Vertical PC



**GB25AV-XC**

# 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:** 50,000 operations minimum  
**Electrical Life:** 50,000 operations minimum  
**Nominal Operating Force:** 1.0N  
**Travel:** Pretravel .020" (0.5mm); Overtravel .023 (0.6mm); Total Travel .043" (1.1mm)

## Materials & Finishes

**Actuator:** Glass fiber reinforced polyamide (UL94V-0)  
**Case:** Glass fiber reinforced polyamide (UL94V-0)  
**Movable Contacts:** Phosphor bronze with gold plating  
**Stationary Contacts:** Brass with gold plating  
**Base:** Glass fiber reinforced polyamide (UL94V-0)  
**Mounting Bracket:** Phosphor bronze with tin plating  
**Terminals:** Brass with gold plating

## Environmental Data

**Operating Temperature Range:** -25°C through +70°C (-13°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/s<sup>2</sup>) 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:** These devices are not process sealed. Hand clean locally using alcohol based solution.

## Standards & Certifications

**Flammability Standards:** UL94V-0 actuator, case, & base  
The GB2 Series pushbuttons 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

Unique, off-center actuator allows high density setup and easy actuation while avoiding accidental operation in compact environments.

Side-by-side, block mounting can be achieved by use of bracket AT546 on straight PC mounting types.

Off-Momentary On Circuit.

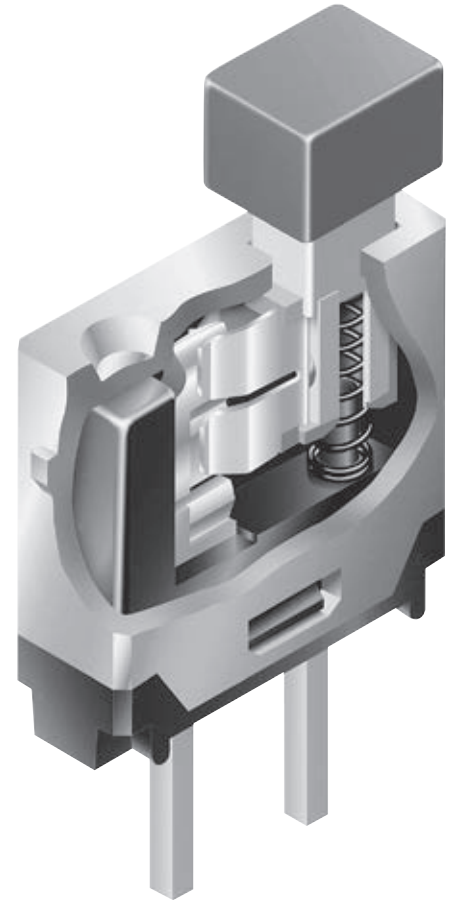
Black, white, and red snap-on caps available.

Extremely thin size allows high density PCB mounting and makes these switches ideal for handheld equipment.

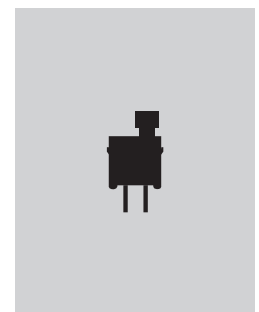
Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother, positive detent actuation, increased contact stability and unparalleled logic-level reliability. (Additional STC details in Terms & Acronyms; see Supplement section.)

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

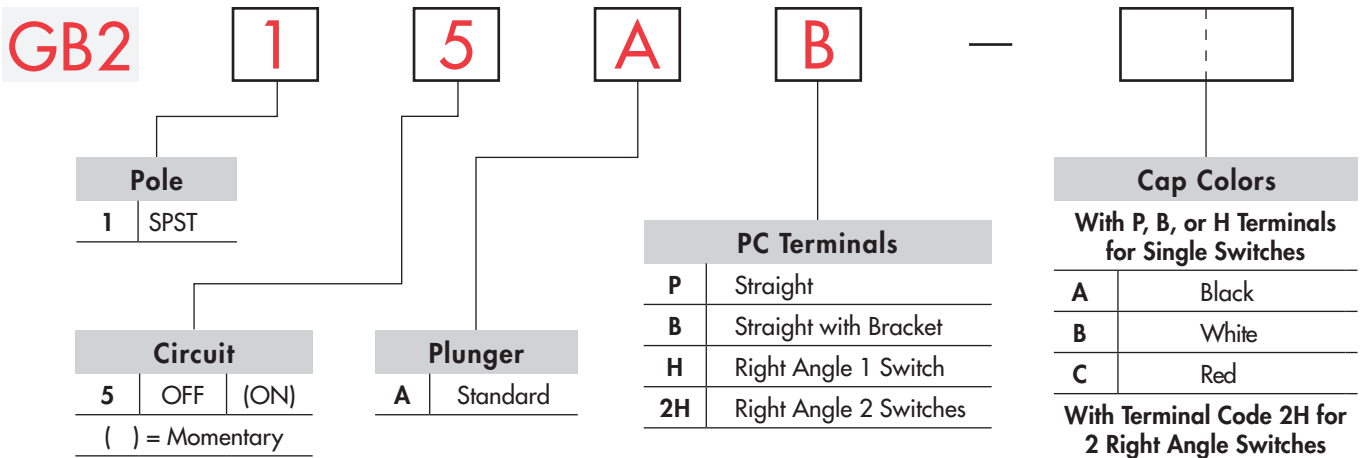
.100" x .100" (2.54mm x 2.54mm) terminal spacing conforms to standard PC board grid spacing for straight and angle mounting.



Actual Size

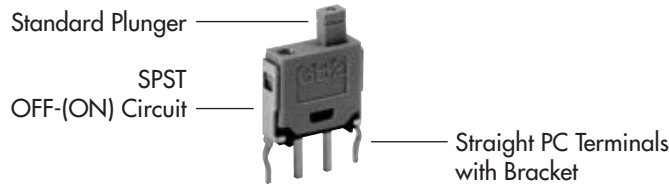


## TYPICAL SWITCH ORDERING EXAMPLE



### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**GB215AB**



## POLE & CIRCUIT

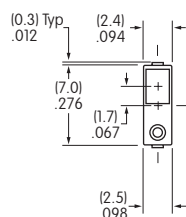
Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Schematics
		Normal	Down	Normal	Down	
SP	GB215	OFF	(ON)	OPEN	1-2 1-2 3-4	Note: Terminal numbers are not actually on the switch.  SPST SPST with 2 switches

## TYPICAL SWITCH DIMENSIONS

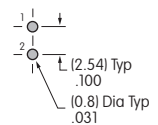
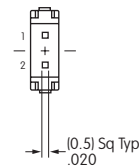
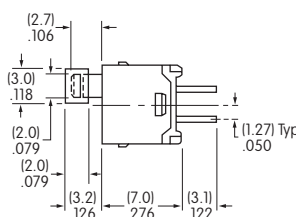
### Straight PC



**GB215AP**



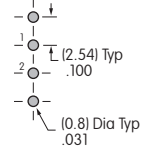
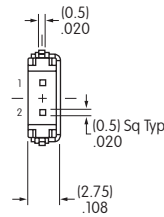
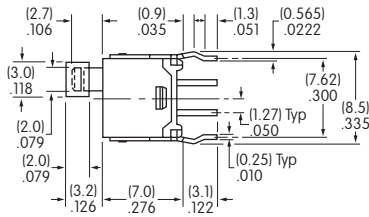
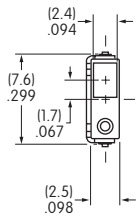
### Single Pole



TYPICAL SWITCH DIMENSIONS

Single Pole

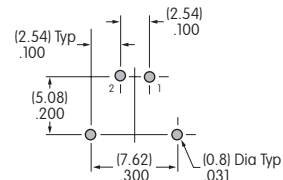
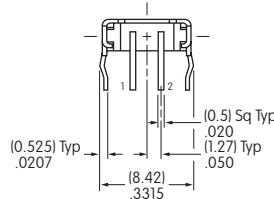
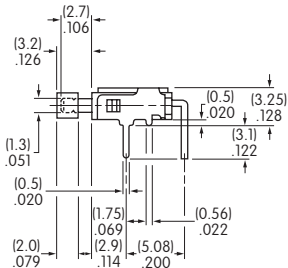
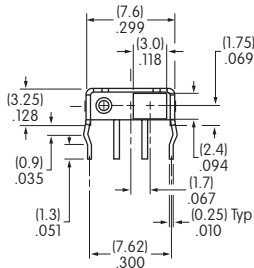
Straight PC with Bracket



GB215AB

Single Pole with 1 Switch

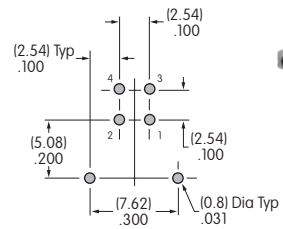
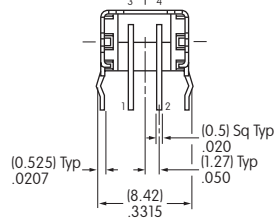
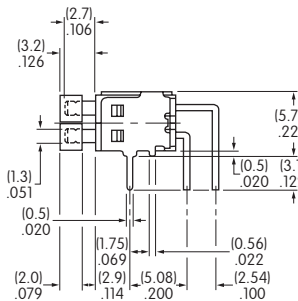
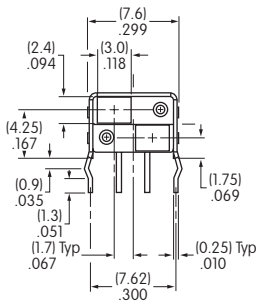
Right Angle PC



GB215AH

Single Pole with 2 Switches

Right Angle PC



GB215A2H

SNAP-ON CAP & MOUNTING BRACKET

**A** AT4137 Rectangular Snap-on Cap Black

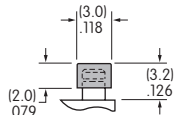
**B** AT4137 Rectangular Snap-on Cap White

**C** AT4137 Rectangular Snap-on Cap Red

Material: PBT  
Finish: Glossy

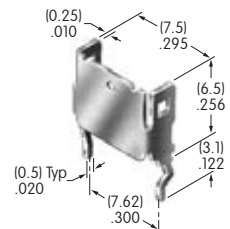


Actual Size



AT546  
Mounting Bracket  
for Block Mounting

Material:  
Phosphor Bronze  
with Tin Plating



# General Specifications

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

## 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:** 50,000 operations minimum  
**Electrical Life:** 50,000 operations minimum  
**Nominal Operating Force:** 2.0N  
**Travel:** Pretravel: .024" (0.6mm); Overtravel: .019" (0.5mm); Total Travel: .043" (1.1mm)

## 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/s<sup>2</sup>) 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 G3B Series pushbuttons 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.

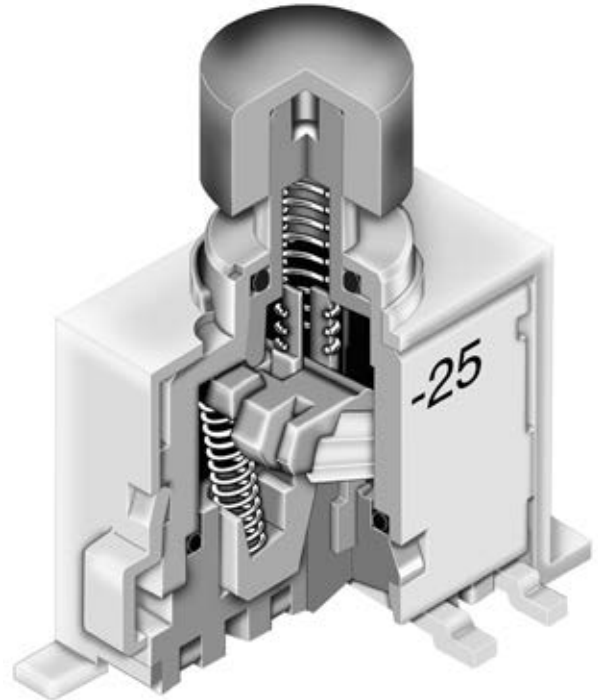
Heat resistant resin used for housing, base, and plunger allows vapor phase and infrared convection reflow soldering.

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 area maximum distance apart of .0059" (0.15mm). (Additional coplanarity details in Terms and Acronyms in the Supplement section.)



Actual Size



### TYPICAL SWITCH ORDERING EXAMPLE

**G3B** **1** **5** **A** **B** — — —

Poles	
1	SPDT
2	DPDT

Plunger	
A	.130" (3.3mm) Long

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

Colors	
A	Black
B	White
C	Red

Circuits		
5	ON	(ON)
( ) = Momentary		

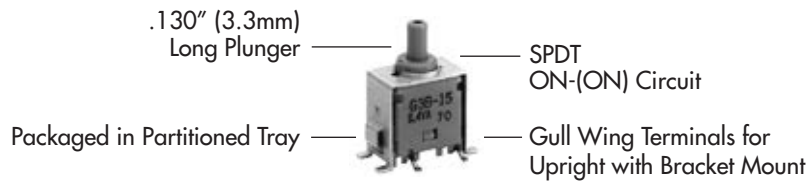
Packaging	
No Code	Partitioned Tray for Upright & Right Angle - Any Quantity
R	Tape-Reel for Right Angle Only 500 Pieces/Reel
S	Stick-Tube for Upright Mount 50 Pieces/Stick

Optional Caps	
X	Slip-on Cap .157" (4.0mm) Diameter (For installation after processing only)
Y	Process Compatible Cap .157" (4.0mm) Diameter (Combines with R or S packaging only)

Packaging details at end of G3B Series

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

#### G3B15AB



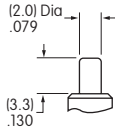
### POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Schematics
		Normal	Down	Normal	Down	
SP	G3B15	ON	(ON)	5-6	5-4	SPDT
DP	G3B25	ON	(ON)	5-6 2-3	5-4 2-1	DPDT

Note: Terminal numbers are not actually on the switch.

## PLUNGER & OPTIONAL CAPS

**A** .130" (3.3mm)  
Long Plunger



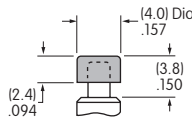
**X** AT4063 Slip-on Cap  
.157" (4.0mm) Diameter

Available with bulk packaging only. Cap must be installed after processing.

Material: Polyamide  
Finish: Glossy



Actual Size



**Y** Process Compatible Cap  
.157" (4.0mm) Diameter

Factory assembled. Available with tape-reel or stick-tube packaging only.

**Caution:** Pulling force specification for this cap is not warranted after reflow processing.

Material: Polyamide  
Finish: Glossy

Cap Colors Available:



Black



White

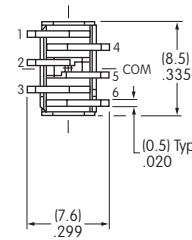
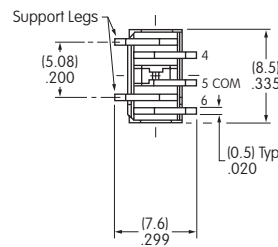
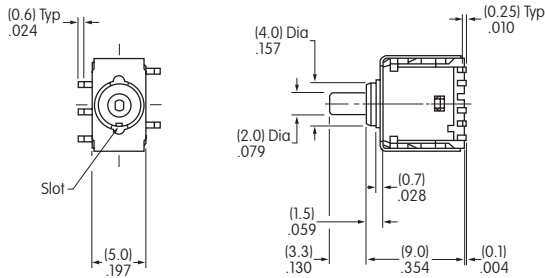


Red

## TYPICAL SWITCH DIMENSIONS

### Single & Double Pole

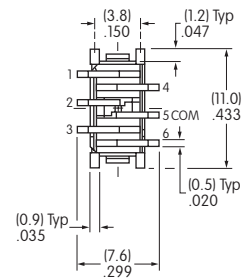
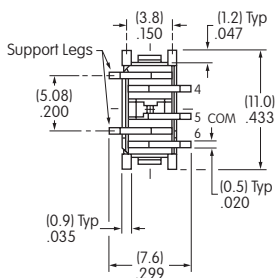
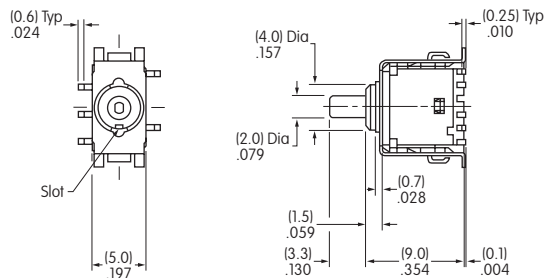
### Upright Mounting



G3B25AP

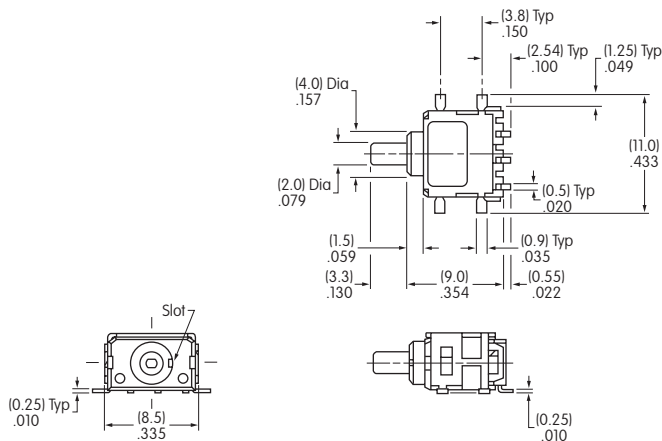
### Single & Double Pole

### Upright Mounting with Bracket



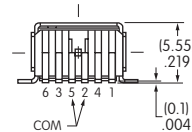
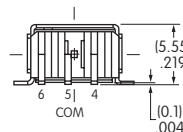
G3B15AB

### Right Angle Mounting



### Single Pole

### Double Pole



G3B15AH

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

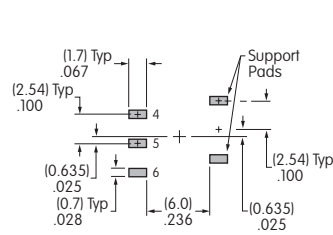
Accessories

Supplement

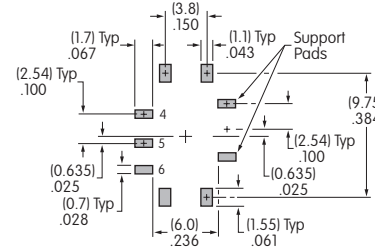
### Pad Layouts for Surface Mount Terminals

#### Single Pole Double Throw

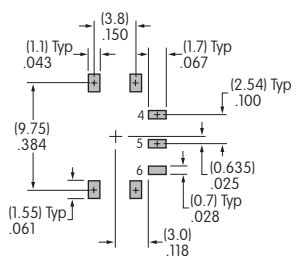
#### Upright Mounting



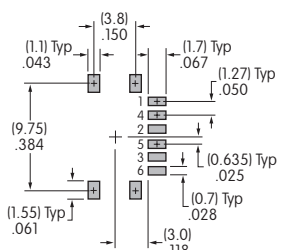
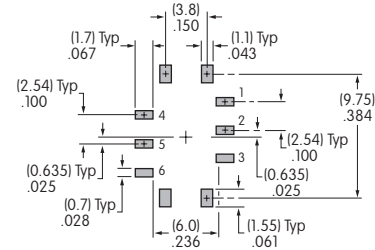
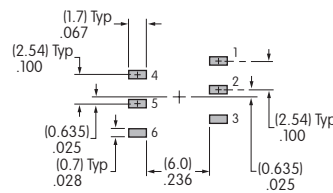
#### Upright Mounting with Bracket



#### Right Angle Mounting



#### Double Pole Double Throw



## PACKAGING

**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.



**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."



PACKAGING (CONTINUED)

**S** Stick-Tube for Upright Mount

50 pieces per stick

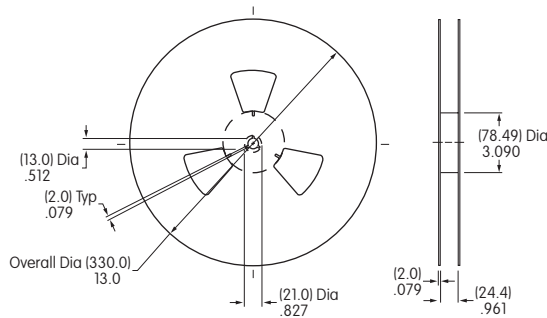
Switches must be ordered in 50-piece increments when stick-tube packaging is selected.



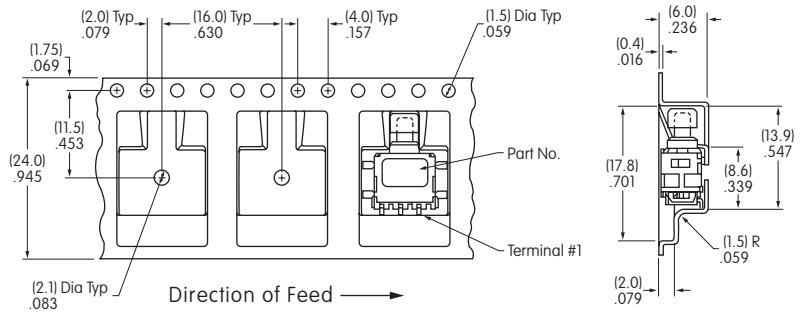
Tape-Reel Packaging for Right Angle Mount

Each tape-reel of 550 pockets contains 500 switches.

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



Reel Dimensions



Tape Dimensions

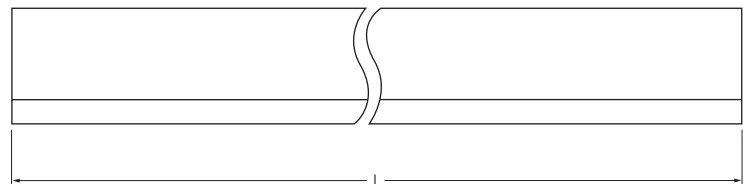
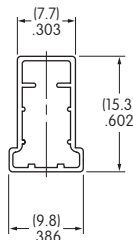
Stick-Tube Packaging for Upright Mount

Each stick-tube contains 50 switches.

L = Length

G3B Upright (code P)  
18.31" (465mm)

G3B Upright with Bracket (code B)  
21.26" (540mm)



Stick-Tube Dimensions

# General Specifications

## Electrical Capacity (Resistive Load)

**Power Level:** 10A @ 125/250V AC for JPM models & 16A @ 125/250V AC for JPL models

## Other Ratings

**Contact Resistance:** 20 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:** 25,000 operations minimum

**Electrical Life:** 25,000 operations minimum

**Nominal Operating Force:** JPM Single Pole 3.53N & Double Pole 6.47N

JPL Single Pole 4.51N & Double Pole 9.02 N

**Contact Timing:** Nonshorting (break before make)

**Latchdown:** Normal position - flush with barrier; latchdown position - .079" (2.0mm) below normal

**Travel:** Pretravel .059" (1.5mm); Overtravel .071" (1.8mm); Total Travel .130" (3.3mm)

## Materials & Finishes

**Housing/Frame & Barrier:** Polyamide (UL94V-0)

**Interior Seal:** Polyphenylene sulfide (UL94V-0)

**Case/Base:** Melamine (UL94V-0)

**Movable Contacts:** Silver alloy

**Stationary Contacts:** Silver alloy plus copper

**Terminals:** Brass with silver plating

## Environmental Data

**Operating Temp Range:** -10°C through +70°C (+14°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/s<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

**Process Seal:** Dust resistant inner seal

## Installation

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

## Standards & Certifications

**Flammability Standards:** UL94V-0 for housing/frame, barrier, interior seal, & case/base

**TV Ratings for UL:** JPM (TV-5) Overload Test @ 125V AC for 50 operations:

Steady State Current (rms) 7.5A; Minimum Inrush Current (peak) 111A

JPM (TV-5) Endurance Test @ 125V AC for 25,000 operations:

Steady State Current (rms) 5A; Minimum Inrush Current (peak) 78A

JPL (TV-8) Overload Test @ 125V AC for 50 operations:

Steady State Current (rms) 12A; Minimum Inrush Current (peak) 163A

JPL (TV-8) Endurance Test @ 125V AC for 25,000 operations:

Steady State Current (rms) 8A; Minimum Inrush Current (peak) 117A

**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 JPM models certified at 10A @ 125V AC, TV5 & JPL models at 16A @ 125V AC, TV8.

**VDE:** **License No. 40028887 - Approved only when ordered with marking on switch.**

Add "/V" before dash in part number to order VDE approved switch.

All JPM models approved at steady state 5A, inrush 80A, resistive 10A, & motor load 6A all at 250V AC.

**License No. 40039784**

All JPL models approved at steady state 8A, inrush 128A, resistive 16A, & motor load 8A all at 250V AC.

# Distinctive Characteristics

Industry's first molded pushbutton with TV rating. Designed to handle large inrush current. JPM models certified for TV-5 rating and JPL models for TV-8 rating.

Prominent external insulating barriers increase insulation resistance and dielectric strength.

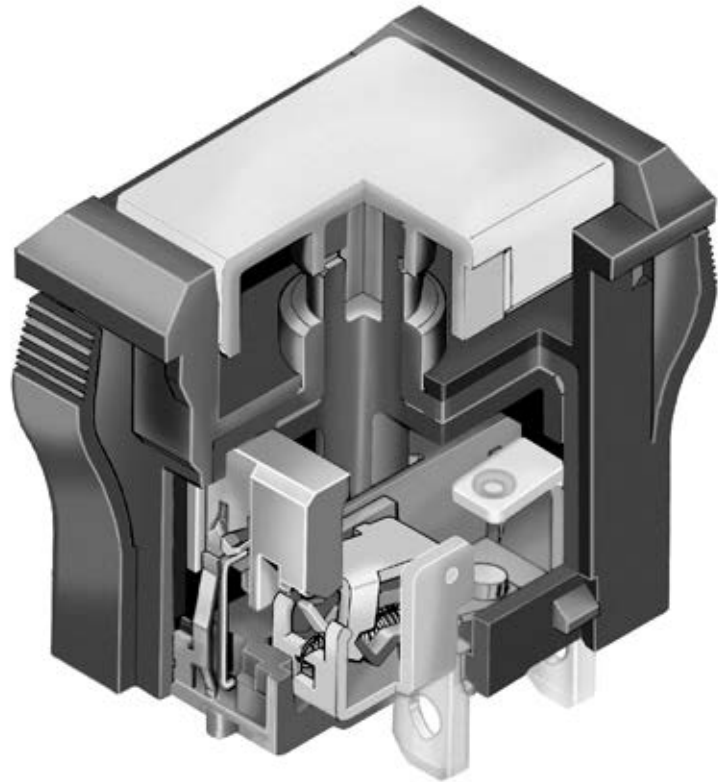
Constructed for dust resistance with interior seal of polyphenylene sulfide (PPS) between actuator and contact area.

Specially designed to break light contact welds.

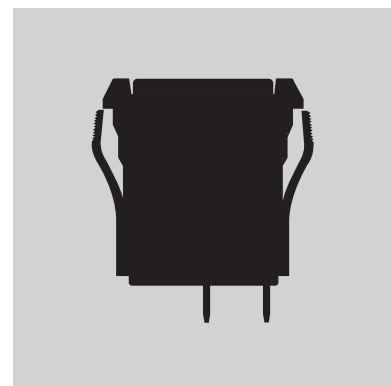
Snap-action contact mechanism.

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

Outer case of heat resistant resin meets UL's 94V-0 flammability standard.

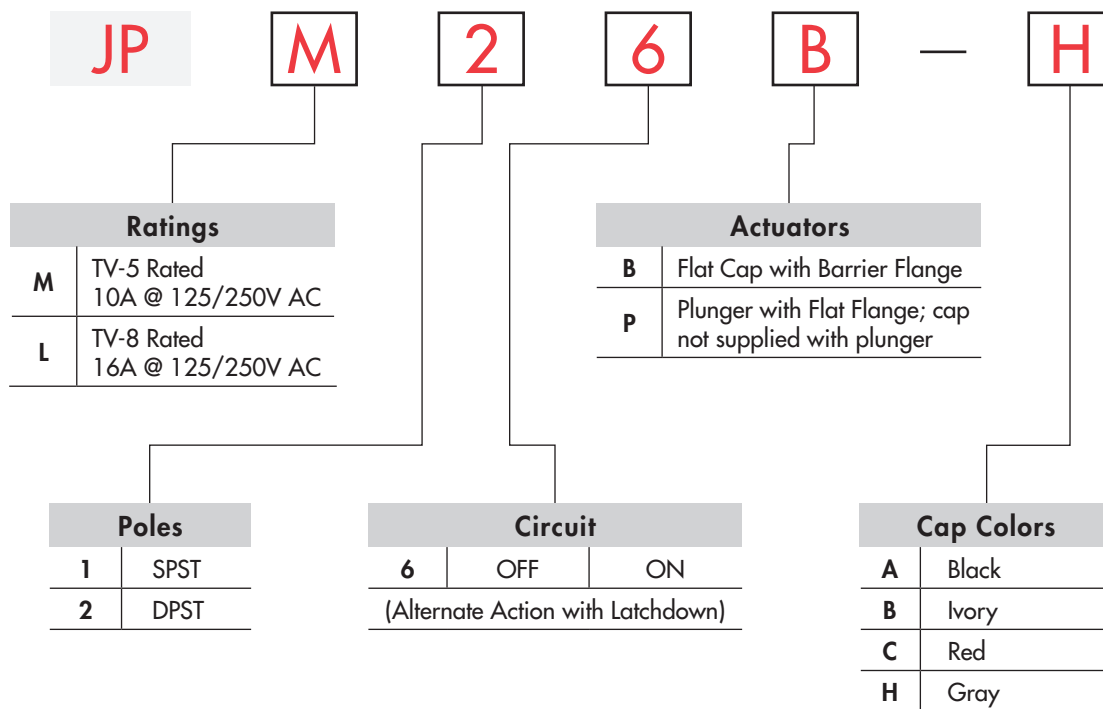


Actual Size JPM



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

### TYPICAL SWITCH ORDERING EXAMPLE



#### IMPORTANT:



Switches are supplied without UL & VDE markings unless specified.  
**UL recognized only when ordered with marking on the switch.**  
**VDE approved 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

#### JPM26B-H

Gray Flat Cap with Barrier Flange



TV-5 Rated  
10A @ 125/250V AC

DPST  
OFF-ON Circuit

## RATINGS



TV-5 Rated

Power Level

10A @ 125/250V AC



TV-8 Rated

Power Level

16A @ 125/250V AC

Note: See General Specifications page to find complete explanation of TV ratings.

## POLES & CIRCUIT

		Plunger Position		Connected Terminals		Throw & Schematics
Pole	Model	Normal	Down	Normal	Down	
						Note: Terminal numbers are actually on the switch.
SP	JPM16 JPL16	OFF	ON	OPEN	1-1a	SPST
DP	JPM26 JPL26	OFF	ON	OPEN	1-1a 2-2a	DPST

## ACTUATORS



**Flat Cap with Barrier Flange**

The barrier is an integral part of the switch. This housing is black, molded polyamide matte finish material.

Cap details below.



**Plunger with Flat Flange**

The flange is an integral part of the switch. This housing is black, molded polyamide matte finish material.

No cap supplied.



## CAP COLORS

**AT3021 Flat Cap for Actuator Type B with Barrier Flange**

Cap Material: Polyphenylene Oxide

Finish: Matte

Cap Colors Available:



Black



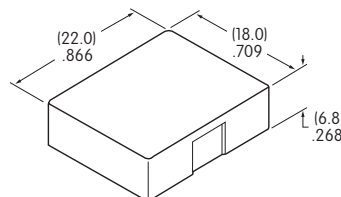
Ivory



Red



Gray



The cap is flush with the barrier in normal position and .079" (2.0mm) below that in latched position.

The latched feature on this alternate action device provides visible, audible, and tactile feedback. This design gives smooth, responsive operation.

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

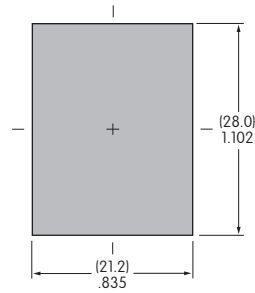
Accessories

Supplement

### PANEL CUTOUT & TERMINALS

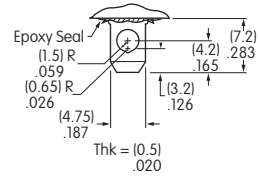
Panel Thickness Range applies to both JPM & JPL models.

.039" ~ .157"  
(1.0mm ~ 4.0mm)



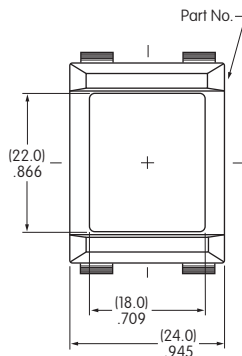
#### JPM & JPL Solder Lug/ .187" (4.75mm) Quick Connect Terminals

This switch assembly, when used with connectors, is not VDE approved.



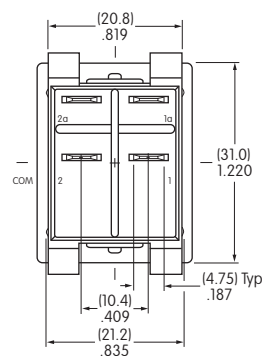
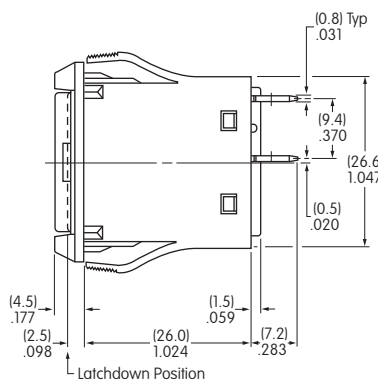
### TYPICAL SWITCH DIMENSIONS

#### Flat Cap with Barrier Flange



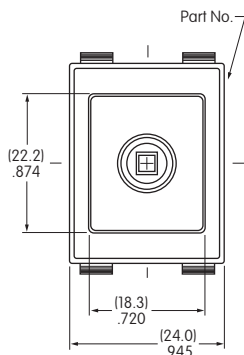
**JPM26B-H**

#### JPM & JPL Single & Double Pole



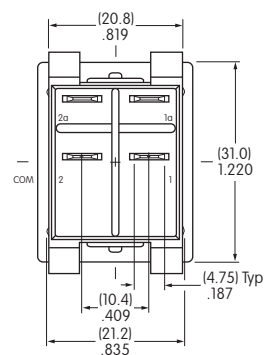
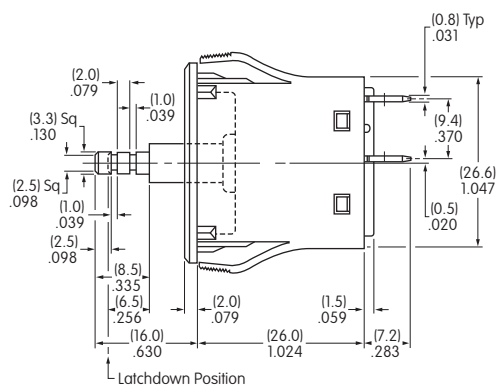
Single pole model does not have terminals 2 & 2a.

#### Plunger with Flat Flange



**JPL16P**

#### JPM & JPL Single & Double Pole



Single pole model does not have terminals 2 & 2a.

# General Specifications

## Electrical Capacity (Resistive Load)

<b>Power Level (silver):</b>	1A @ 125V AC or 1A @ 30V DC
<b>Logic Level (gold):</b>	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
<b>Logic/Power Level: (gold over silver)</b>	Combines silver & gold ratings

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

## Other Ratings

<b>Contact Resistance:</b>	20 milliohms maximum for silver; 30 milliohms maximum for gold
<b>Insulation Resistance:</b>	1,000 megohms minimum @ 500V DC
<b>Dielectric Strength:</b>	1,000V AC minimum between contacts for 1 minute minimum; 1,500V AC minimum between contacts & case for 1 minute minimum
<b>Mechanical Life:</b>	200,000 operations minimum
<b>Electrical Life:</b>	25,000 operations minimum for silver; 100,000 operations minimum for gold
<b>Nominal Operating Force:</b>	Single pole 2.94N & double pole 4.90N
<b>Contact Timing:</b>	Nonshorting (break-before-make)
<b>Travel:</b>	Pretravel .023" (0.6mm); Overtravel .016" (0.4mm); Total Travel .039" (1.0mm)

## Materials & Finishes

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

## Environmental Data

<b>Operating Temp Range:</b>	-30°C through +85°C (-22°F through +185°F)
<b>Humidity:</b>	90 ~ 95% humidity for 96 hours @ 40°C (104°F)
<b>Vibration:</b>	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
<b>Shock:</b>	50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

<b>Cap Installation Force:</b>	49.0N (11.0 lbf) for plunger A & 79.4N (17.9 lbf) for plunger B
--------------------------------	---

## PCB Processing

<b>Soldering:</b>	Wave Soldering Recommended: See Profile B in Supplement section. Manual Soldering: See Profile B in Supplement section.
<b>Cleaning:</b>	Automated cleaning. See Cleaning specifications in Supplement section.

## Standards & Certifications

<b>Flammability Standards:</b>	UL94V-0 rated bushing/housing & base
<b>UL:</b>	<b>File No. E44145 - Recognized only when ordered with marking on switch.</b> Add "/U" or "/CUL" before dash in part number to order UL recognized switch. All models recognized at 1A @ 125V AC, 1A @ 30V DC, or 0.4A @ 28V DC.
<b>CSA:</b>	<b>File No. 023535_0_000 - Certified only when ordered with marking on switch.</b> Add "/C" before dash in part number to order CSA certified switch. All models certified at 1A @ 125V AC, 1A @ 30V DC, or 0.4A @ 28V DC.

# Distinctive Characteristics

Snap-acting contact mechanism gives short travel, sensitive actuation, light touch, smooth feel, audible feedback, and a longer electrical life.

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

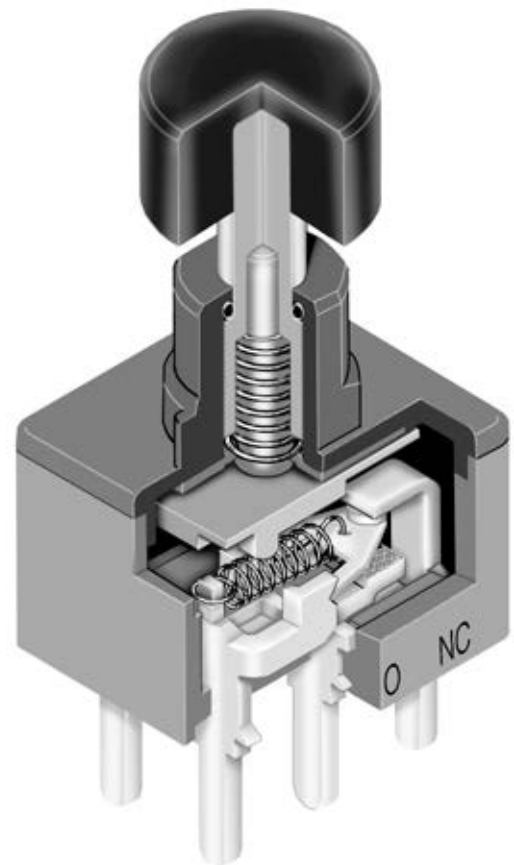
O-ring surrounding actuator at top of bushing interior prevents liquids from reaching switch mechanism.

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

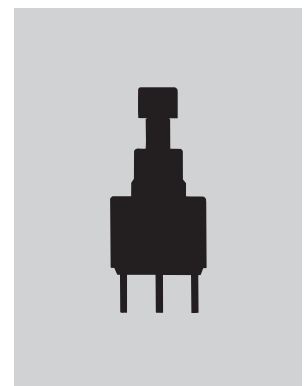
Terminals are epoxy sealed to prevent entry of flux, solvents, and other contaminants.

Bracketed models have crimped bracket 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



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

### TYPICAL SWITCH ORDERING EXAMPLE

**M2B**

**15**

**A**

**A5**

**G**

**30**

—

**F**

**C**

#### Poles & Circuits

15	SPDT	ON	(ON)
25	DPDT	ON	(ON)
( ) = Momentary			

#### Plungers

<b>A</b>	.282" (7.16mm) Long for cap codes F & H
<b>B</b>	.307" (7.8mm) Long for cap codes B & C

#### Bushing

<b>A5</b>	.250" (6.35mm) Double Flatted
-----------	----------------------------------

#### Contact Materials & Ratings

<b>W</b>	Silver; Rated 1A @ 125V AC & 1A @ 30V DC
<b>G</b>	Gold; Rated 0.4VA maximum @ 28V AC/DC maximum
<b>A</b>	Gold over Silver; Rated 1A @ 125V AC & 0.4VA max @ 28V AC/DC max

#### PC Terminals

<b>03</b>	Straight
<b>13</b>	Straight with .460" (11.7mm) Bracket
<b>30</b>	.150" (3.81mm) Right Angle
<b>40</b>	.150" (3.81mm) Vertical

#### Snap-on Caps

For Plunger A	
<b>F</b>	.201" (5.1mm) Diameter
<b>H</b>	.295" (7.5mm) Diameter
For Plunger B	
<b>B</b>	.315" (8.0mm) Diameter
<b>C</b>	.394" (10.0mm) Diameter

#### Cap Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
* <b>E</b>	Yellow
* <b>F</b>	Green
* <b>G</b>	Blue
* <b>H</b>	Gray
* For cap codes B & C only	

#### 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

**M2B15AA5G30-FC**



## POLES & CIRCUITS

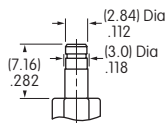
Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Schematics
		Normal	Down	Normal	Down	
						Note: Terminal numbers are not actually on the switch.
SP	M2B15	ON	(ON)	1-3	1-2	SPDT
DP	M2B25	ON	(ON)	1-3 4-6	1-2 4-5	DPDT

## PLUNGERS

**A** .282" (7.16mm) Long

For cap codes F & H

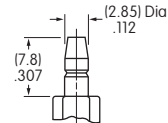
Material:  
Chrome over brass



**B** .307" (7.8mm) Long

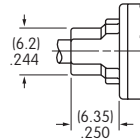
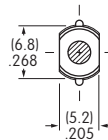
For cap codes B & C

Material:  
Chrome over brass



## BUSHING

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



## CONTACT MATERIALS & RATINGS

**W** Silver over Silver      Power Level      1A @ 125V AC & 1A @ 30V DC

**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      1A @ 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.

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

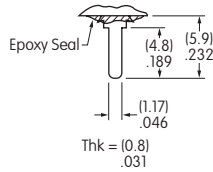
Indicators

Accessories

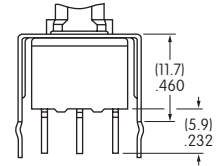
Supplement

## PC TERMINALS

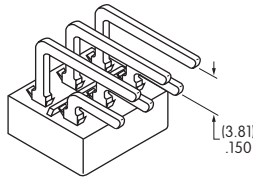
**03** Straight



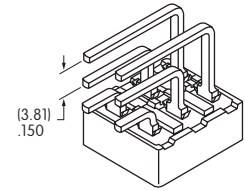
**13** Straight with .460" (11.7mm) Bracket



**30** .150" (3.81mm) Right Angle



**40** .150" (3.81mm) Vertical

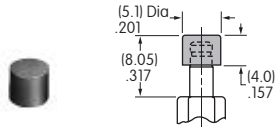


## SNAP-ON CAPS

### For Plunger Type A

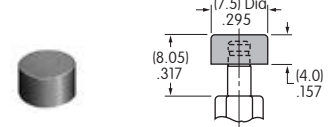
**F** AT475  
.201" (5.1mm) Diameter

Material: Polyamide  
Colors Available:  
A, B, C



**H** AT496  
.295" (7.5mm) Diameter

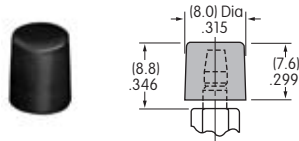
Material: Polyamide  
Colors Available:  
A, B, C



### For Plunger Type B

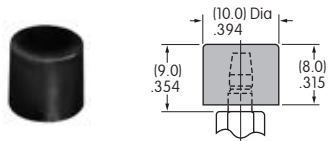
**B** AT443  
.315" (8.0mm) Diameter

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



**C** AT442  
.394" (10.0mm) Diameter

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

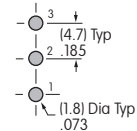
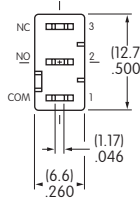
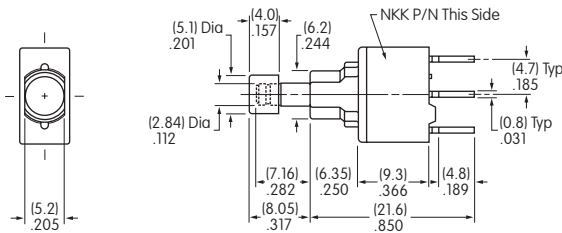


Cap Colors Codes:

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

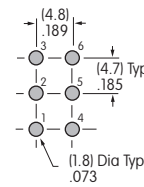
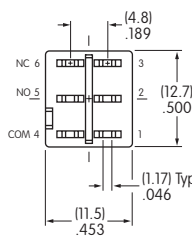
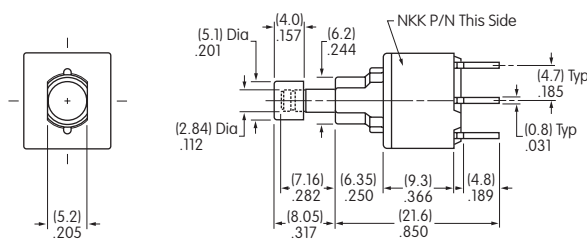
TYPICAL SWITCH DIMENSIONS

Single Pole



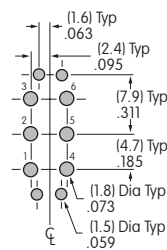
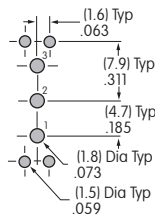
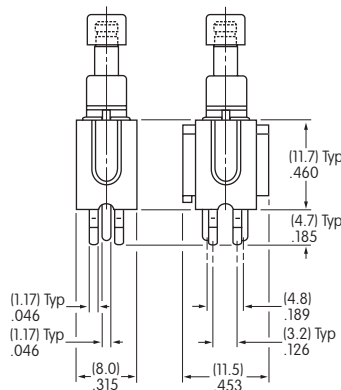
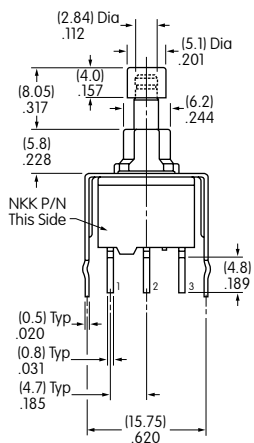
M2B15AA5G03-FC

Double Pole



M2B25AA5G03-FC

Single & Double Pole

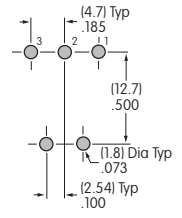
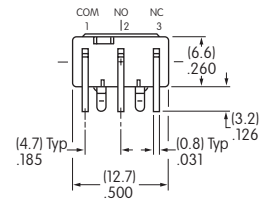
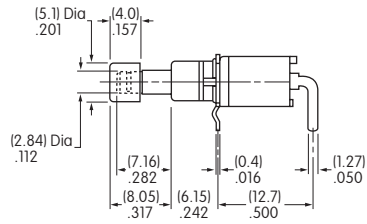
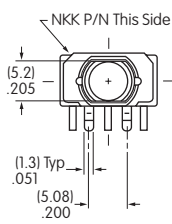


M2B15AA5G13-FC

## TYPICAL SWITCH DIMENSIONS

### Right Angle PC

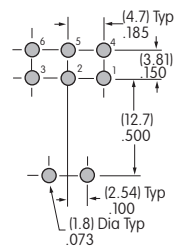
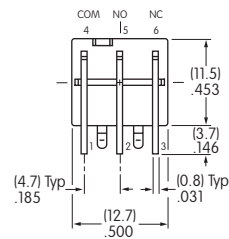
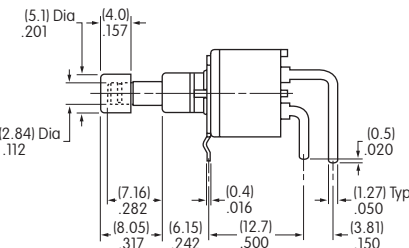
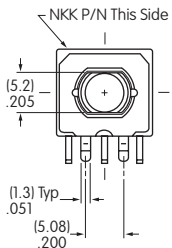
### Single Pole



**M2B15AA5G30-FC**

### Right Angle PC

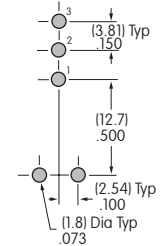
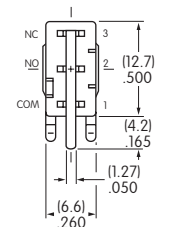
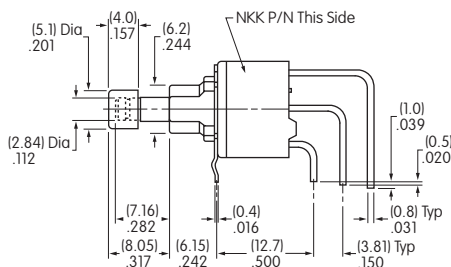
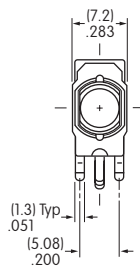
### Double Pole



**M2B25AA5G30-FC**

### Vertical PC

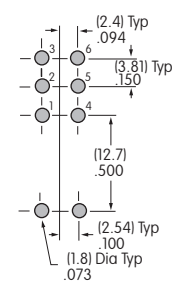
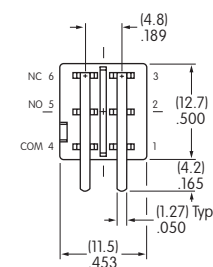
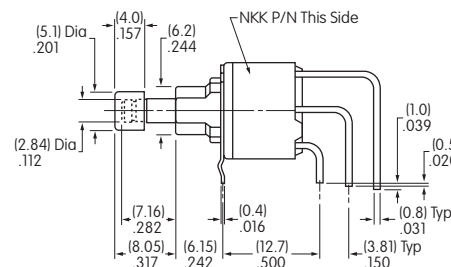
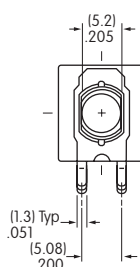
### Single Pole



**M2B15AA5G40-FC**

### Vertical PC

### Double Pole



**M2B25AA5G40-FC**

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

# General Specifications

## Electrical Capacity (Resistive Load)

<b>Power Level (silver):</b>	6A @ 125V AC & 3A @ 250V AC or 3A @ 30V DC
<b>Logic Level (gold):</b>	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
<b>Logic/Power Level: (gold over silver)</b>	Combines silver & gold ratings

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

## Other Ratings

<b>Contact Resistance:</b>	10 milliohms maximum for silver; 20 milliohms maximum for gold		
<b>Insulation Resistance:</b>	1,000 megohms minimum @ 500V DC		
<b>Dielectric Strength:</b>	1,000V AC minimum between contacts for 1 minute minimum; 1,500V AC minimum between contacts & case for 1 minute minimum		
<b>Mechanical Life:</b>	50,000 operations minimum for splashproof models; 100,000 for all other models		
<b>Electrical Life:</b>	25,000 operations minimum for silver; 50,000 operations minimum for gold 50,000 operations minimum for silver at 3A @ 125V AC		
<b>Nominal Operating Force:</b>	Momentary Action: 1-pole 9.32N; 2-pole 16.18N; 4-pole 25.54N; Alternate Action: 1-pole 4.41N; 2-pole 7.06N; 4-pole 11.77N		
<b>Contact Timing:</b>	Slow make, slow break		
<b>Plunger Travel:</b>	Screw-on Cap (Mom.)	Screw-on Cap (Alt.)	Snap-on Cap (Mom. & Alt.)
<b>Pretravel:</b>	.028" (0.71mm)	.110" (2.80mm)	.125" (3.19mm)
<b>Overtravel:</b>	.043" (1.09mm)	.043" (1.09mm)	.050" (1.26mm)
<b>Total Travel</b>	.071" (1.80mm)	.153" (3.90mm)	.175" (4.45mm)

## Materials & Finishes

<b>Plunger:</b>	Brass w/nickel plating; polyacetal w/B1 bushing	<b>Bushing:</b>	Brass with nickel plating
<b>Frame:</b>	Stainless steel	<b>Case:</b>	Diallyl phthalate resin (UL94V-0)
<b>Movable Contactor:</b>	Phosphor bronze with silver or gold plating		
<b>Movable Contacts:</b>	Silver alloy (code W); copper with gold plating (code G); or silver alloy with gold plating (code A)		
<b>Stationary Contacts:</b>	Silver with silver plating (code W); copper or brass with gold plating (code G); or silver with gold plating (code A)		
<b>Terminals:</b>	Copper or brass with silver plating; copper or brass with gold plating		

## Environmental Data

<b>Operating Temp Range:</b>	-30°C through +85°C (-22°F through +185°F)
<b>Humidity:</b>	90 ~ 95% humidity for 96 hours @ 40°C (104°F)
<b>Vibration:</b>	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
<b>Shock:</b>	50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)
<b>Sealing:</b>	B3 & D3 bushing options equivalent to IP67

## Installation

<b>Mounting Torque:</b>	1.5Nm (13.0 lb•in) for double nut; 0.7Nm (6.0 lb•in) for single nut
<b>Cap Installation Force:</b>	80.0N (18.0 lbf) maximum downward force on actuator
<b>Soldering Time &amp; Temp:</b>	Wave Soldering (PC version): See Profile A in Supplement section. Manual Soldering: See Profile A in Supplement section.
<b>Process Seal:</b>	These devices are not process sealed. Hand clean locally using alcohol based solution.

## Standards & Certifications

<b>Flammability Standards:</b>	UL94V-0 case
<b>UL:</b>	<b>File No. E44145 - Recognized only when ordered with marking on switch.</b> Add "/U" or "/CUL" before dash in part number to order UL recognized switch. All models recognized at 6A @ 125V AC or 3A @ 250V AC or 0.4VA max. @ 28V DC max.
<b>CSA:</b>	<b>File No. 023535_0_000 - Certified only when ordered with marking on switch.</b> 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 max. @ 28V max.

# Distinctive Characteristics

Guide interlocked with actuator block prevents window locking and maintains correct plunger alignment to assure contact stability.

Employs an over-center actuator mechanism, which diminishes sparking and increases operating life in AC circuits.

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

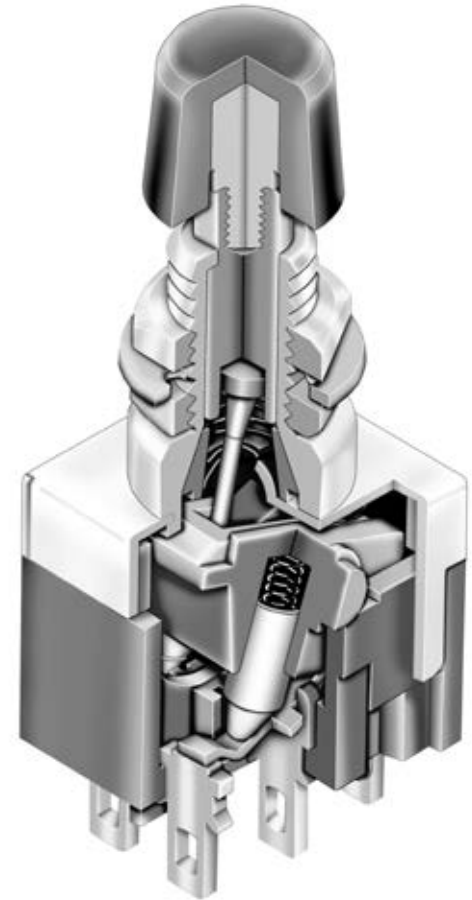
Splashproof option (D3 and B3 bushing codes) features an o-ring within the bushing and one under the face nut to protect from splashed, sprayed, or spilled liquids. Splashproof models meet IP67 of IEC 60529 Standards at front panel (dust tight and water protected from effects of temporary immersion).

High insulating barriers, formed in the molded diallyl phthalate case, increase isolation of circuits in multipole devices.

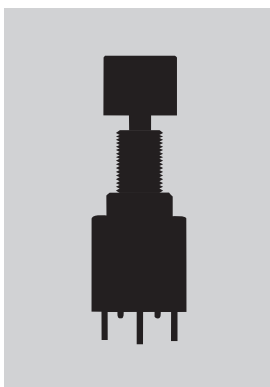
Prominent external insulating barriers increase insulation resistance and dielectric strength.




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

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



Actual Size



	Bushing Mount	Page C74
	Bracket PC Mount	Page C80
	Large Bushing	Page C87

- Toggle
- Rockers
- Pushbuttons**
- Illuminated PB
- Programmable
- Keylocks
- Rotaries
- Slides
- Tactiles
- Tilt
- Touch
- Indicators
- Accessories
- Supplement

## TYPICAL SWITCH ORDERING EXAMPLE

**MB 2011 S S1 W 01 — C A**

Poles & Circuits			
2011	SPDT	ON	(ON)
2065	SPDT	ON	ON
2061	DPDT	ON	(ON)
2085	DPDT	ON	ON
2181	4PDT	ON	(ON)
2185	4PDT	ON	ON

( ) = Momentary

Contact Materials & Ratings	
<b>W</b>	Silver Rated 6A @ 125V AC & 3A @ 250V AC
<b>G</b>	Gold Rated 0.4VA max @ 28V AC/DC max
<b>A</b>	Gold over Silver Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max

Caps	
<b>B</b>	.315" (8.0mm) Diameter
<b>C</b>	.394" (10.0mm) Diameter

Cap Colors	
<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>E</b>	Yellow
<b>F</b>	Green
<b>G</b>	Blue
<b>H</b>	Gray

Plunger Types	
<b>S</b>	Plunger for Screw-on Caps
<b>L</b>	Plunger for Snap-on Caps

Bushings	
<b>S1</b>	.335" (8.5mm) Threaded with Keyway
<b>S2</b>	.335" (8.5mm) Smooth with Keyway
<b>S4</b>	.335" (8.5mm) Metric Threaded with Keyway
<b>D1</b>	.335" (8.5mm) Threaded with D-Flat
<b>D3</b>	.335" (8.5mm) Threaded Splashproof without Keyway

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

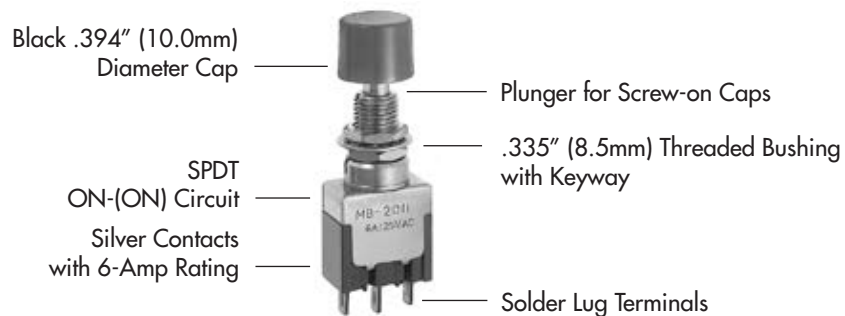
### IMPORTANT:






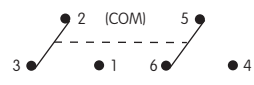
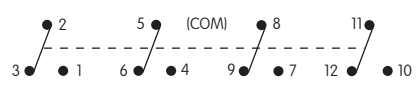
Switches are supplied without UL, cULus & CSA marking unless specified. **UL, cULus & CSA recognized only when ordered with marking on the switch.** Specific models, ratings, & ordering instructions are noted on the General Specifications page.



### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**MB2011SS1W01-CA**



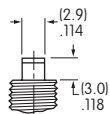
POLES & CIRCUITS						
Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal  Keyway	Down 	Normal  Keyway	Down 	
SP	MB2011	ON	(ON)	2-3	2-1	SPDT 
	MB2065	ON	ON			
DP	MB2061	ON	(ON)	2-3 5-6	2-1 5-4	DPDT 
	MB2085	ON	ON			
4P	MB2181	ON	(ON)	2-3 5-6	2-1 5-4	4PDT 
	MB2185	ON	ON	8-9 11-12	8-7 11-10	

## PLUNGER TYPES

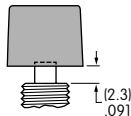
On alternate action models, after transferring circuit, the plunger returns to its original position and does not latch down.



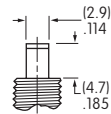
### Plunger for Screw-on Caps



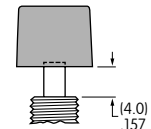
Momentary Plunger Length



Momentary Cap Location



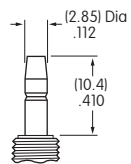
Alternate Plunger Length



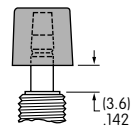
Alternate Cap Location



### Plunger for Snap-on Caps



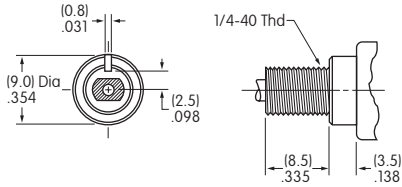
Momentary & Alternate Plunger Length



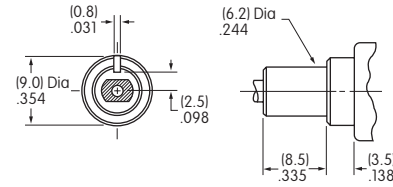
Momentary & Alternate Cap Location

## BUSHINGS

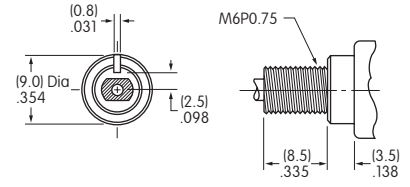
**S1** .335" (8.5mm)  
Threaded with Keyway



**S2** .335" (8.5mm)  
Smooth with Keyway



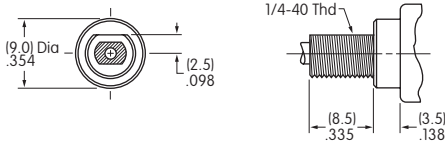
**S4** .335" (8.5mm) Metric  
Threaded with Keyway



Maximum Panel Thickness with  
Standard Hardware: .154" (3.9mm)

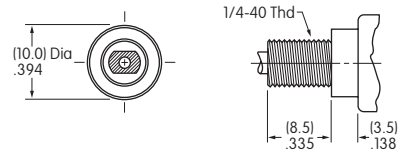
Maximum Panel Thickness with  
Standard Hardware: .154" (3.9mm)

**D1** .335" (8.5mm)  
Threaded with D Flat



Maximum Panel Thickness with  
Standard Hardware: .154" (3.9mm)

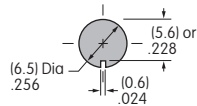
**D3** .335" (8.5mm)  
Threaded Splashproof without Keyway



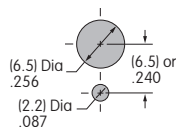
Maximum Panel Thickness with  
Standard Hardware: .240" (6.1mm)

## Panel Cutouts

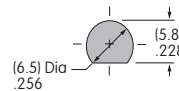
For S1, S2, or S4 Bushing  
with  
Keyway



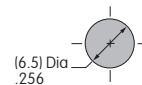
For S1 or S4 Bushing  
with  
Optional Locking Ring



For D1 Bushing  
with  
D Flat



For D3 Bushing  
without  
Keyway



Standard hardware for bushings S1, S4, & D1 includes 2 hex nuts & 1 lockwasher; D3 bushing has 1 hex nut & 1 o-ring.  
Standard & optional hardware are illustrated following the Typical Switch Dimension drawings.

## CONTACT MATERIALS & RATINGS

**W** Silver over Silver      Power Level      6A @ 125V AC & 3A @ 250V AC

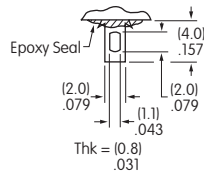
**G** Gold over Brass or Copper      Logic Level      0.4VA maximum @ 28V AC/DC maximum  
Note: Complete explanation of operating range in Supplement section.

**A** Gold over Silver      Power Level  
or Logic Level      6A @ 125V AC & 3A @ 250V AC  
or 0.4VA maximum @ 28V AC/DC maximum

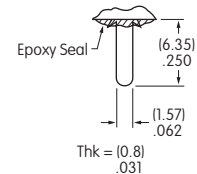
Note: This dual rated option is suitable when two or more identical switches are used in logic and in power circuits within the same application. See Supplement section for complete explanation of dual rating and operating range.

## TERMINALS

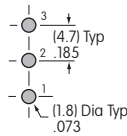
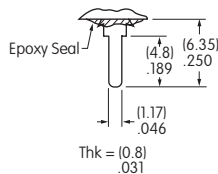
**01** Solder Lug



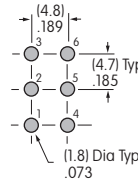
**02** .062" (1.57mm) Wide Quick Connect



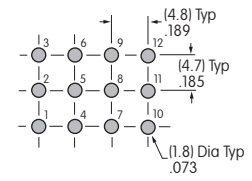
**03** .250" (6.35mm) Straight PC



Single Pole



Double Pole



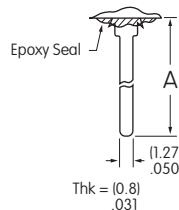
Four Pole

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

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

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

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



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

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

## CAPS & CAP COLORS

**B** AT413  
.315" (8.0mm) Diameter  
Screw-on Cap

AT443  
.315" (8.0mm) Diameter  
Snap-on Cap

**C** AT407  
.394" (10.0mm) Diameter  
Screw-on Cap

AT442  
.394" (10.0mm) Diameter  
Snap-on Cap

For use with Plunger Code S

For use with Plunger Code L

For use with Plunger Code S

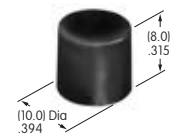
For use with Plunger Code L

Cap Material: PBT  
Finish: Glossy

Cap Material: Polycarbonate  
Finish: Glossy

Cap Material: PBT  
Finish: Glossy

Cap Material: Polycarbonate  
Finish: Glossy



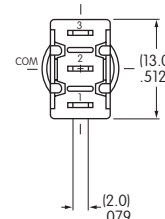
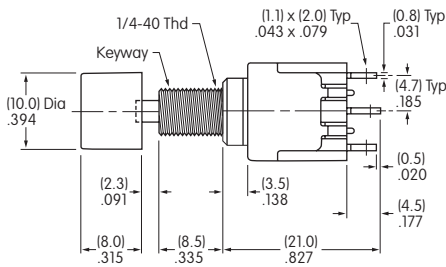
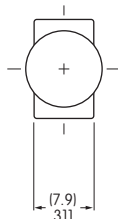
Cap Colors Available:

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

## TYPICAL SWITCH DIMENSIONS

### Solder Lug

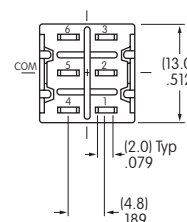
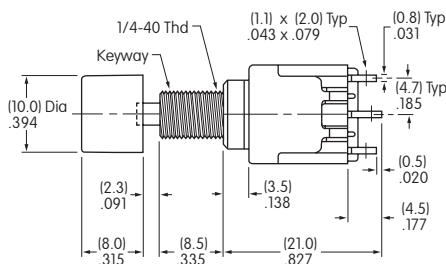
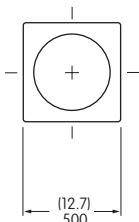
### Single Pole



MB2011SS1W01-CA

### Solder Lug

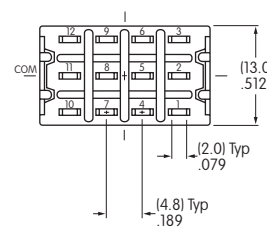
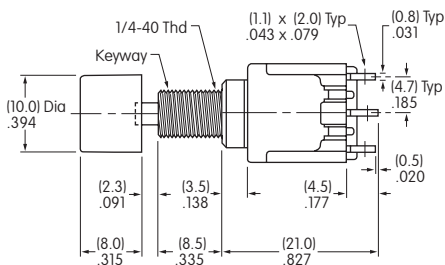
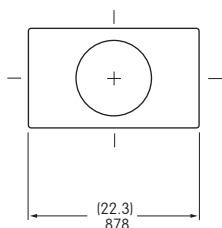
### Double Pole



MB2061SS1W01-CA

### Solder Lug

### Four Pole



MB2181SS1W01-CA

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

## HARDWARE

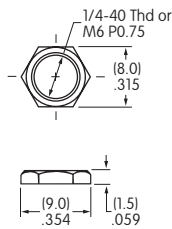
### Standard Hardware

### Optional Hardware

#### AT513H for Inch AT513M for Metric Hexagon Nut

2 included with each switch  
(1 with splashproof models)

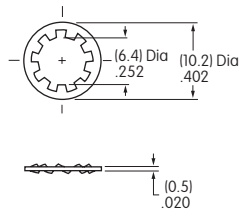
Material:  
Brass with Nickel plating



#### AT509 Lockwasher

1 included with each switch  
(not with splashproof models)

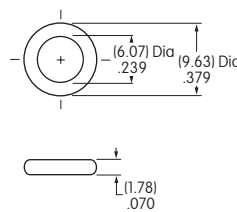
Material:  
Steel with Zinc/Chromate



#### AT516 O-ring for Splashproof Bushing

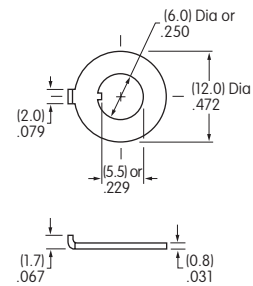
1 included with  
each splashproof model

Material:  
Nitrile butadiene rubber



#### AT507H for Inch AT507M for Metric Locking Ring

Material:  
Steel with Zinc/Chromate

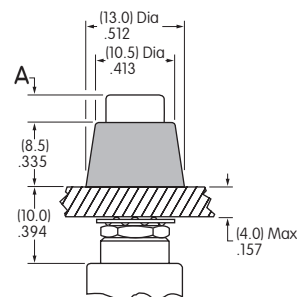


### Optional Mounting Collars/Conical Nuts

### Optional Splashproof Boots for S Plunger

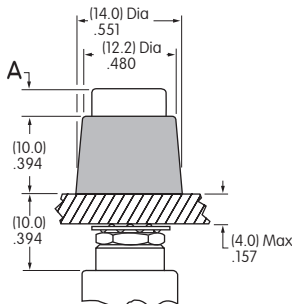
#### AT512H for Inch AT512M for Metric Conical Nut

Used with .315" (8.0mm)  
Diameter Cap (cap code B)  
Material:  
Brass with chrome plating



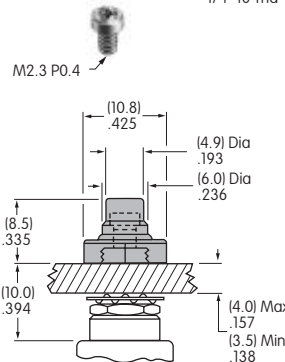
#### AT512CH for Inch AT512CM for Metric Conical nut

Used with .394" (10.0mm)  
Diameter Cap (cap code C)  
Material:  
Brass with chrome plating



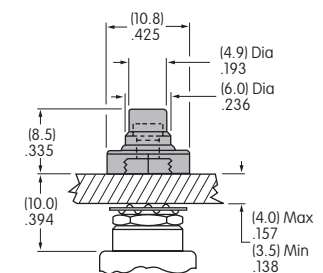
#### AT4041H for Inch AT4041M for Metric Boot for Momentary

Material:  
Silicone rubber



#### AT4042H for Inch AT4042M for Metric Boot for Alternate

Material:  
Silicone rubber



### Dimension A = Cap Height

.091" (2.3mm) for Momentary with Plunger Code S  
.157" (4.0mm) for Alternate with Plunger Code S  
.142" (3.6mm) for Momentary & Alternate with Plunger Code L

Optional Conical Nuts fit with all 8.5mm bushing options except the D3 & S2 bushings.

### Operating Life 100,000

Boots for momentary devices  
are accompanied by a threaded  
adaptor which extends the length  
of the plunger.

### Operating Life 30,000

### TYPICAL SWITCH ORDERING EXAMPLE

**MB**

**2011**

**S**

**S2**

**G**

**13**

**C**

**A**

#### Poles & Circuits

<b>2011</b>	SPDT	ON	(ON)
<b>2065</b>	SPDT	ON	ON
<b>2061</b>	DPDT	ON	(ON)
<b>2085</b>	DPDT	ON	ON
<b>2181</b>	4PDT	ON	(ON)
<b>2185</b>	4PDT	ON	ON

( ) = Momentary

4-pole not for use with right angle terminals

#### Contact Materials & Ratings

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

#### Caps

<b>B</b>	.315" (8.0mm) Diameter
<b>C</b>	.394" (10.0mm) Diameter

#### Cap Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>E</b>	Yellow
<b>F</b>	Green
<b>G</b>	Blue
<b>H</b>	Gray

#### Plunger Type

<b>S</b>	Plunger for Screw-on Caps
----------	---------------------------

#### Bushings

<b>S2</b>	.335" (8.5mm) Smooth with Keyway
<b>S1</b>	.335" (8.5mm) Threaded with Keyway
<b>A2</b>	.200" (5.08mm) Smooth with Keyway Only Available in Part Numbers MB2011SA2G31 & MB2011SA2W31

#### Terminals

<b>13</b>	.250" (6.35mm) Straight PC with Bracket
<b>40</b>	.150" (3.81mm) Vertical PC
<b>45</b>	.100" (2.54mm) Vertical PC
<b>30</b>	Right Angle PC with .646" (16.4mm) Support to Terminals Available in 1- & 2-pole only
<b>31</b>	Right Angle PC with .500" (12.7mm) Support to Terminals Available in 1-pole only

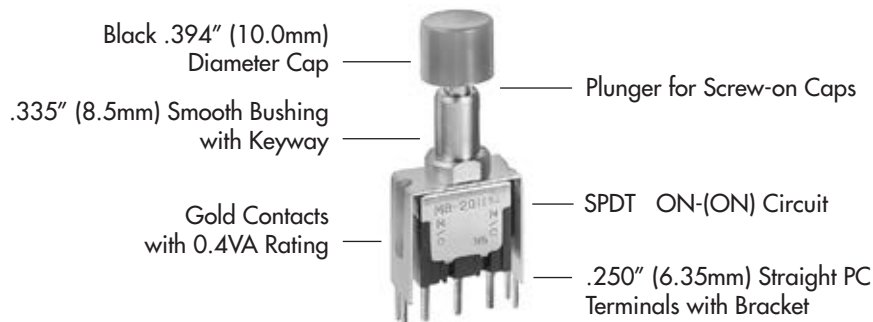
#### IMPORTANT:

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

**MB2011SS2G13-CA**



## POLES & CIRCUITS

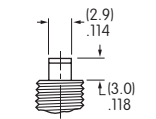
Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal	Down	Normal	Down	
						Note: Terminal numbers are not actually on the switch.
SP	MB2011 MB2065	ON	(ON)	2-3	2-1	SPDT
DP	MB2061 MB2085	ON	(ON)	2-3 5-6	2-1 5-4	DPDT
4P	MB2181 MB2185	ON	(ON)	2-3 5-6 8-9 11-12	2-1 5-4 8-7 11-10	4PDT

## PLUNGER TYPE

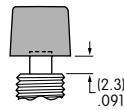
On alternate action models, after transferring circuit, the plunger returns to its original position and does not latch down.

**S**

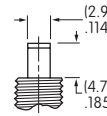
### Plunger for Screw-on Caps



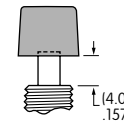
Momentary Plunger Length



Momentary Cap Location



Alternate Plunger Length

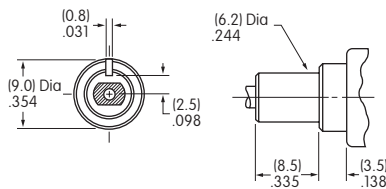


Alternate Cap Location

## BUSHINGS

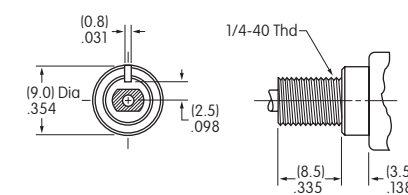
**S2**

.335" (8.5mm)  
Smooth with Keyway



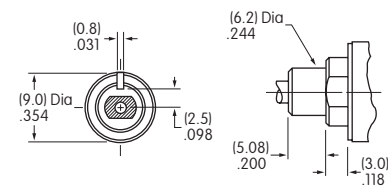
**S1**

.335" (8.5mm)  
Threaded with Keyway



**A2**

.200" (5.08mm)  
Smooth with Keyway

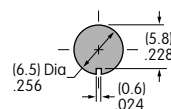


Standard hardware: 2 hex nuts (AT513H)  
& 1 lockwasher (AT509)  
Optional hardware: Locking ring (AT507)

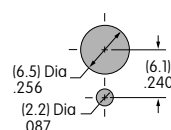
Only available in part numbers  
MB2011SA2W31 & MB2011SA2G31

### Panel Cutouts

For S2, S1, or A2 Bushing  
with Keyway



With Optional  
Locking Ring



Maximum Panel Thickness with  
Standard Hardware: .154" (3.9mm)

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

### CONTACT MATERIALS & RATINGS

<b>W</b>	Silver over Silver	Power Level	6A @ 125V AC & 3A @ 250V AC
<b>G</b>	Gold over Brass or Copper	Logic Level	0.4VA maximum @ 28V AC/DC maximum Note: Complete explanation of operating range in Supplement section.
<b>A</b>	Gold over Silver	Power Level or Logic Level	6A @ 125V AC & 3A @ 250V 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.

### TERMINALS

<b>13</b>	.250" (6.35mm) Straight PC with Bracket	<b>40</b>	.150" (3.81mm) Vertical PC	<b>45</b>	.100" (2.54mm) Vertical PC
<b>30</b>	Right Angle PC with .646" (16.4mm) Support to Terminal	<b>31</b>	Right Angle PC with .500" (12.7mm) Support to Terminal		

Only Available in 1 & 2 Pole

Note: Full dimensioned drawings appear on the following pages.

### CAPS & CAP COLORS

<b>B</b>	AT413 .315" (8.0mm) Diameter Screw-on Cap		<b>C</b>	AT407 .394" (10.0mm) Diameter Screw-on Cap	
Cap Material: PBT Finish: Glossy			Cap Material: PBT Finish: Glossy		

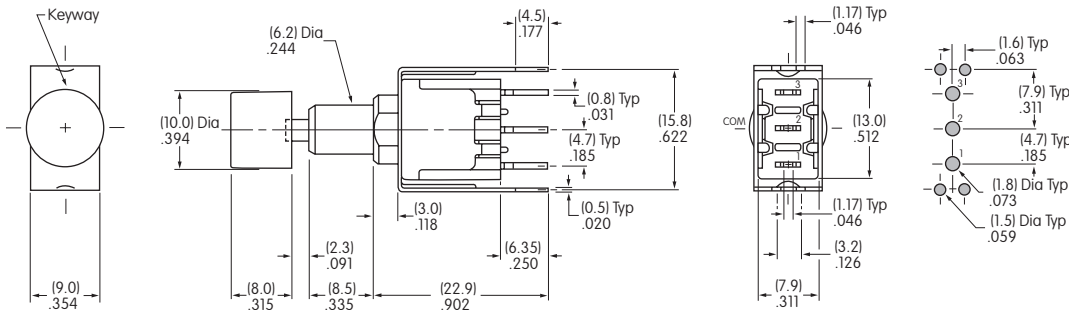
Cap Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray

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

## TYPICAL SWITCH DIMENSIONS

### Single Pole

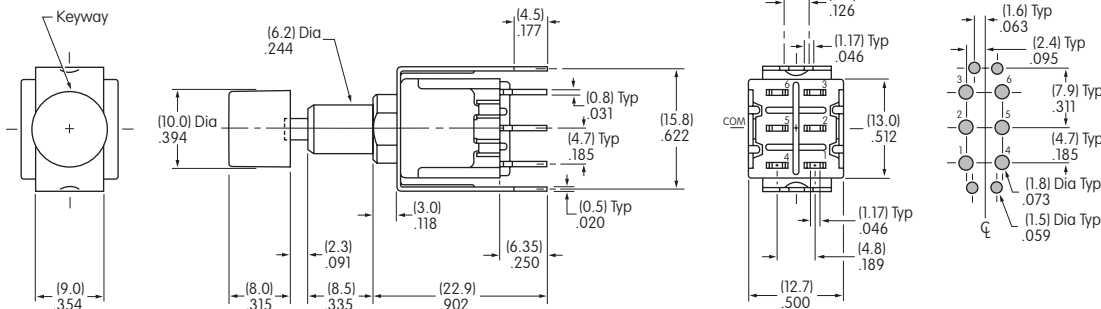
### Straight PC with Bracket



MB2011SS2G13-CA

### Double Pole

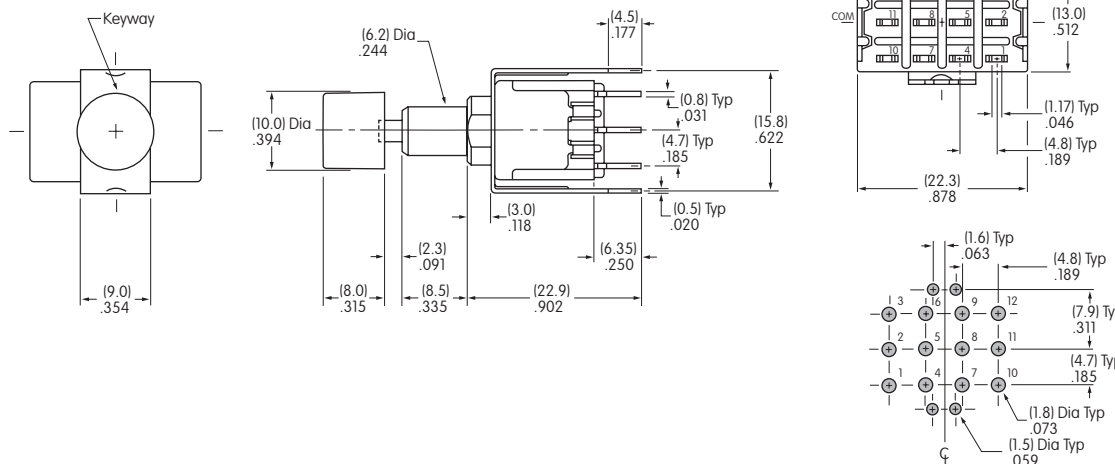
### Straight PC with Bracket



MB2061SS2G13-CA

### Four Pole

### Straight PC with Bracket

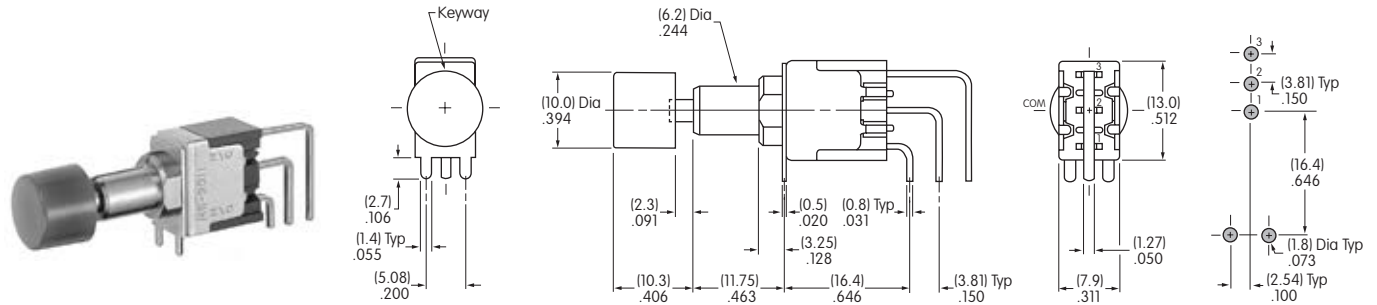


MB2181SS2G13-CA

## TYPICAL SWITCH DIMENSIONS

### .150" (3.81mm) Vertical PC

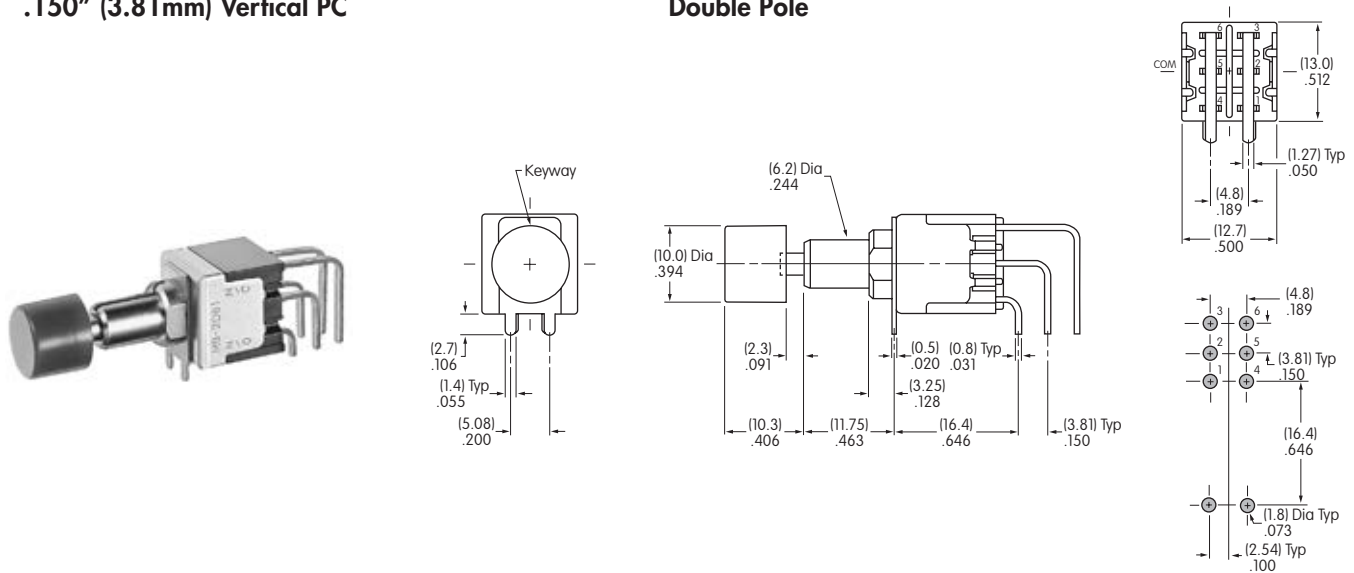
### Single Pole



MB2011SS2G40-CA

### .150" (3.81mm) Vertical PC

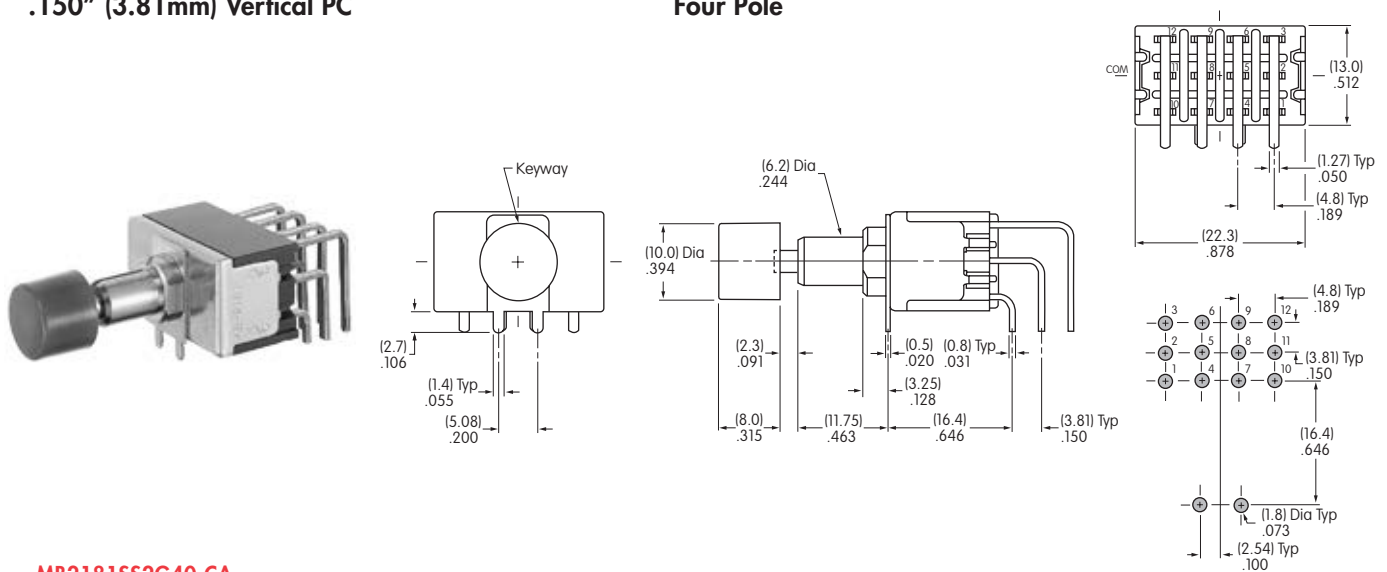
### Double Pole



MB2061SS2G40-CA

### .150" (3.81mm) Vertical PC

### Four Pole

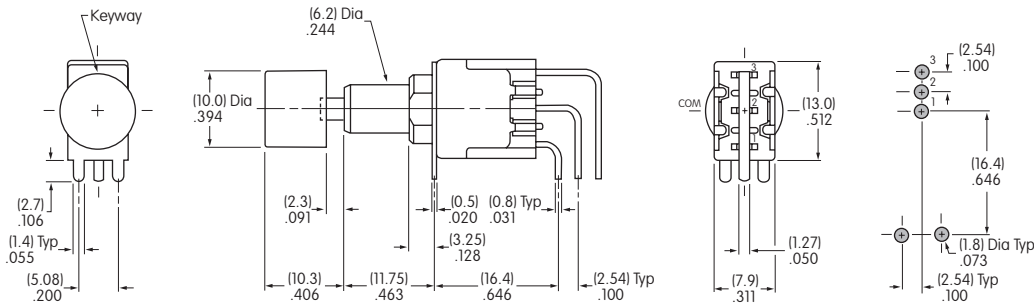


MB2181SS2G40-CA

TYPICAL SWITCH DIMENSIONS

Single Pole

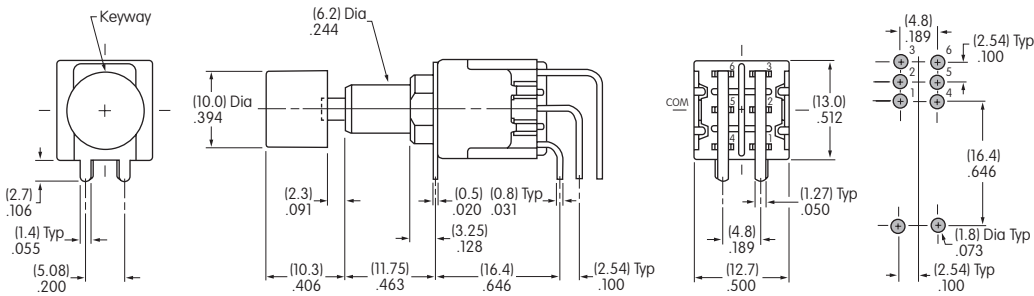
.100" (2.54mm) Vertical PC



MB2011SS2G45-CA

Double Pole

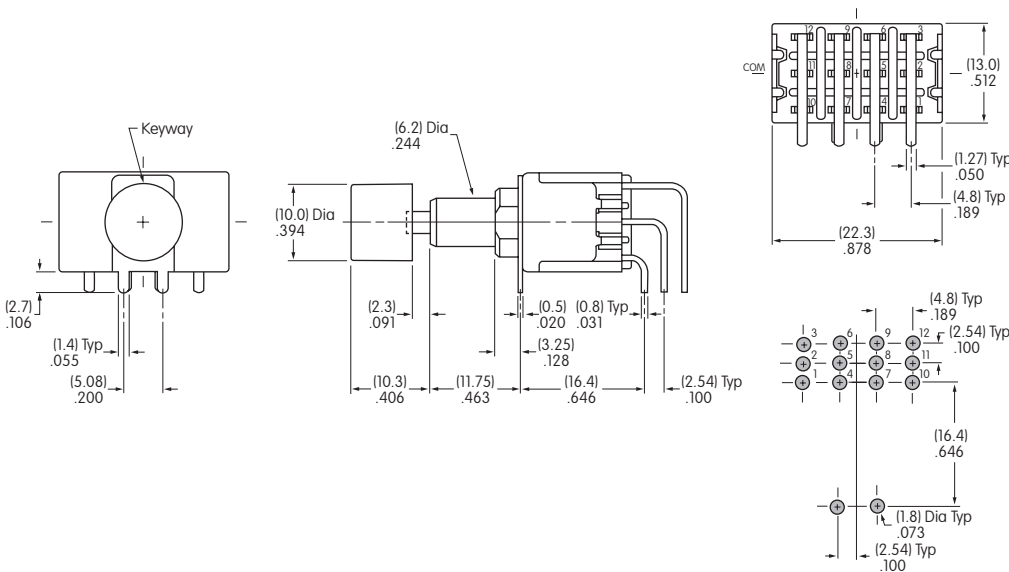
.100" (2.54mm) Vertical PC



MB2061SS2G45-CA

Four Pole

.100" (2.54mm) Vertical PC

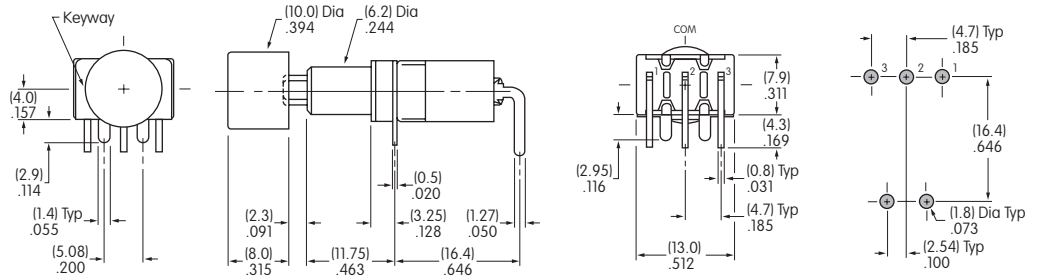


MB2181SS2G45-CA

## TYPICAL SWITCH DIMENSIONS

### Right Angle PC

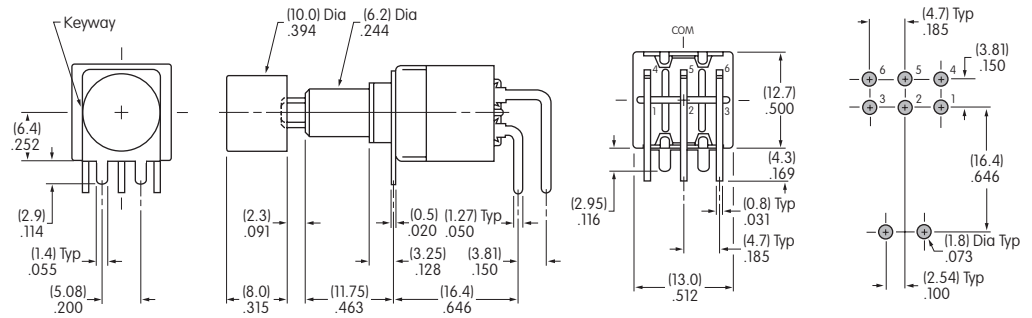
### Single Pole



**MB2011SS2G30-CA**

### Right Angle PC

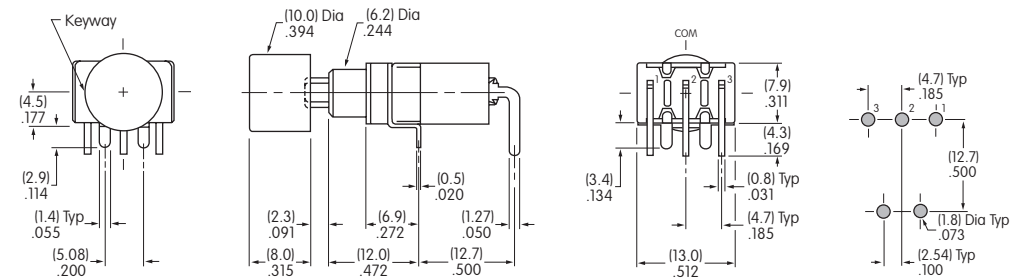
### Double Pole



**MB2061SS2G30-CA**

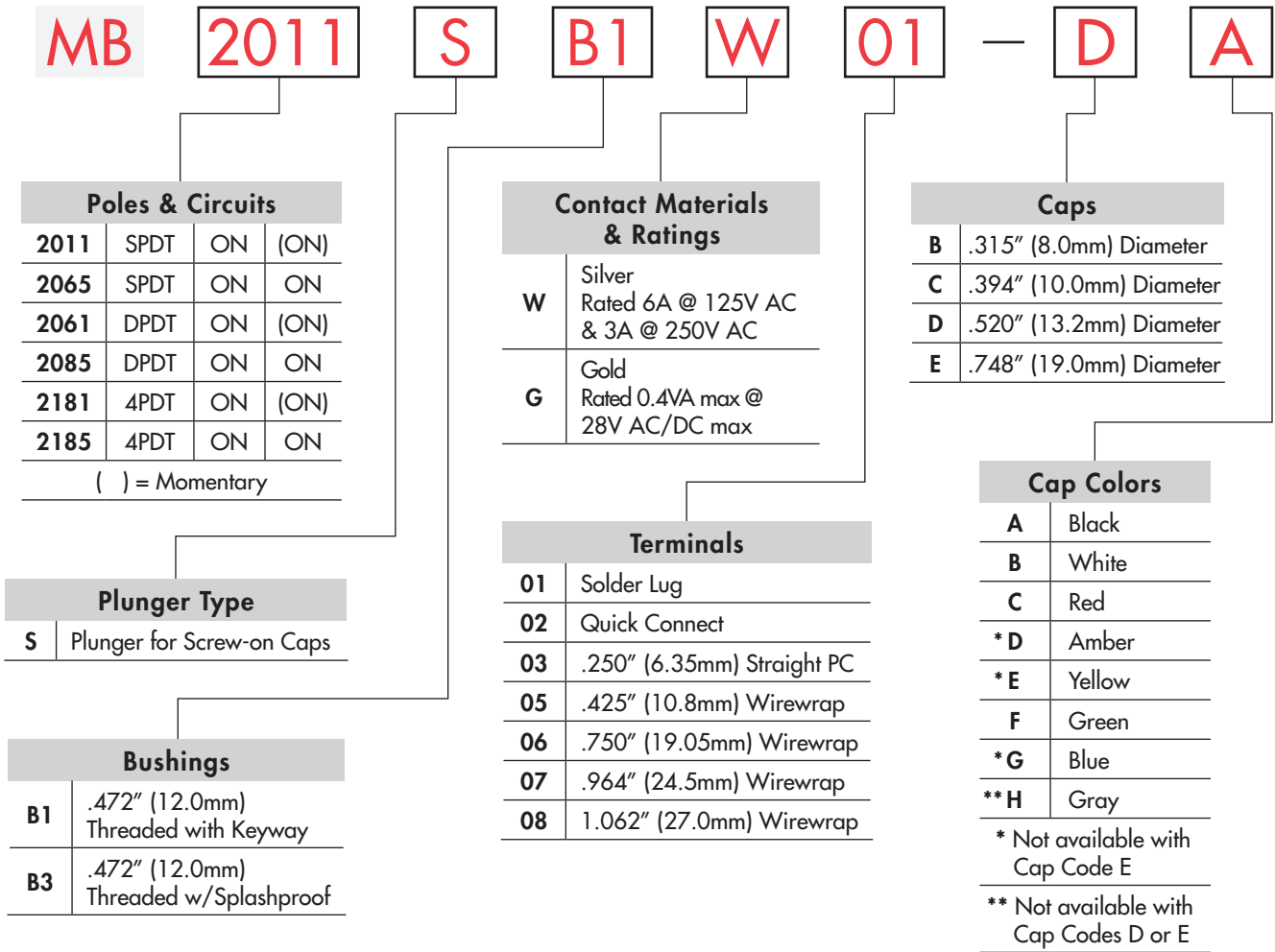
### Right Angle PC with .500" (12.7mm) Support to Terminal

### Single Pole



**MB2011SA2G31-CA**

TYPICAL SWITCH ORDERING EXAMPLE



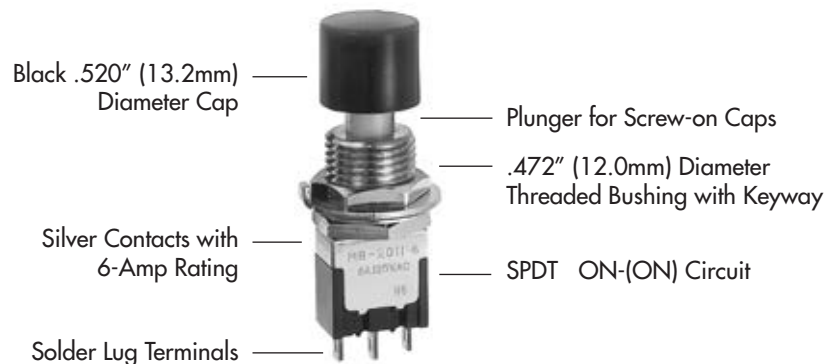
IMPORTANT:



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

**MB2011SB1W01-DA**



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

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt






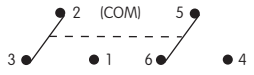
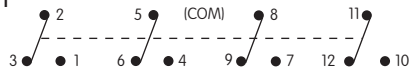
Touch

Indicators

Accessories

Supplement

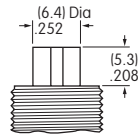
## POLES & CIRCUITS

		Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
Pole	Model	Normal 	Down 	Normal 	Down 	Note: Terminal numbers are not actually on the switch.
SP	MB2011 MB2065	ON	(ON)	2-3	2-1	SPDT 
DP	MB2061 MB2085	ON	(ON)	2-3 5-6	2-1 5-4	DPDT 
4P	MB2181 MB2185	ON	(ON)	2-3 5-6 8-9 11-12	2-1 5-4 8-7 11-10	4PDT 

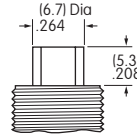
## PLUNGER TYPE

**S**

**Plunger for Screw-on Caps**  
Plunger is plastic for B1 bushing.



Plunger is metal for B3 bushing.



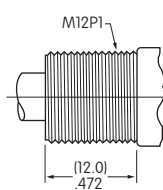
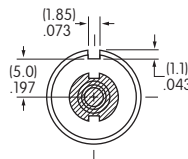
On alternate action models, after transferring circuit, the plunger returns to its original position, and does not latch down.

## BUSHINGS

**B1**

**.472" (12.0mm) Diameter Threaded with Keyway**

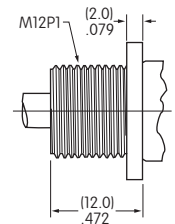
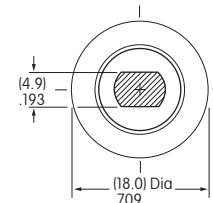
Maximum Panel Thickness with Standard Hardware: .217" (5.5mm)



**B3**

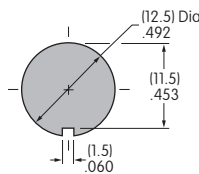
**.472" (12.0mm) Diameter Threaded Splashproof**

Maximum Panel Thickness with Standard Hardware: .217" (5.5mm)

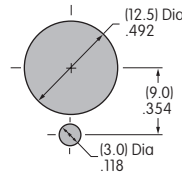


## Panel Cutouts

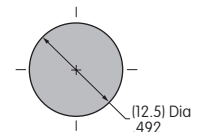
**For B1 Bushing with Keyway**



**For B1 Bushing with Locking Ring**



**For B3 Bushing without Keyway**



## CONTACT MATERIALS & RATINGS

**W**

Silver over Silver

Power Level

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

**G**

Gold over Brass or Copper

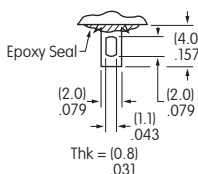
Logic Level

0.4VA maximum @ 28V AC/DC maximum

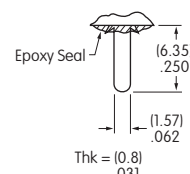
Note: Complete explanation of operating range in Supplement section.

## TERMINALS

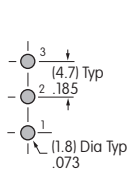
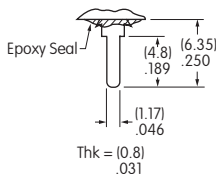
**01** Solder Lug



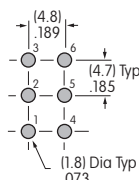
**02** .062" (1.57mm) Wide Quick Connect



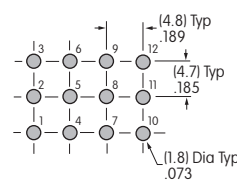
**03** .250" (6.35mm) Straight PC



Single Pole



Double Pole



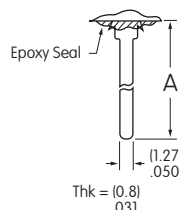
Four Pole

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

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

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

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



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

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

## CAPS & CAP COLORS

**B** AT078  
.315" (8.0mm)  
Diameter Screw-on Cap

**C** AT079  
.394" (10.0mm)  
Diameter Screw-on Cap

**D** AT414  
.520" (13.2mm)  
Diameter Screw-on Cap

**E** AT412  
.748" (19.0mm)  
Diameter Screw-on Cap

Material:  
Polystyrene  
Finish:  
Glossy



Material:  
Polystyrene  
Finish:  
Glossy



Material:  
PBT  
Finish:  
Glossy



Material:  
Polystyrene  
Finish:  
Glossy

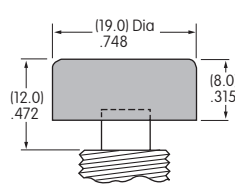
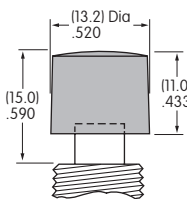
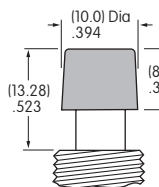
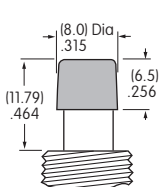


Colors Available:  
A B C E F G H

Colors Available:  
A B C E F G H

Colors Available:  
A B C D E F G

Colors Available:  
A B C F



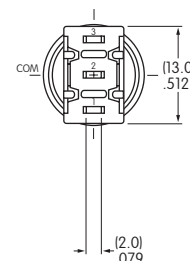
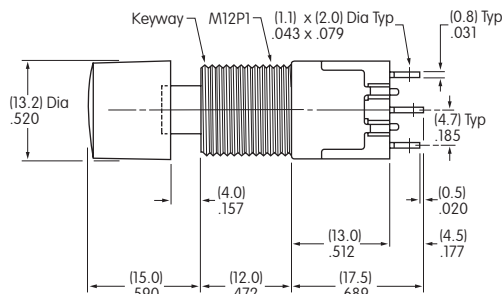
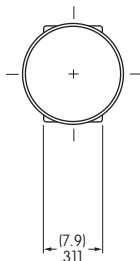
Cap Color Codes:

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

## TYPICAL SWITCH DIMENSIONS

### Solder Lug

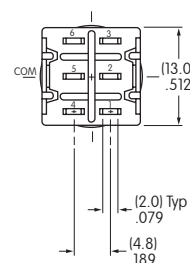
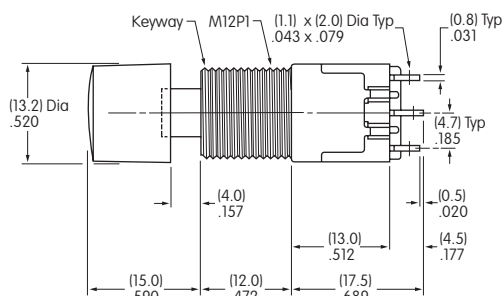
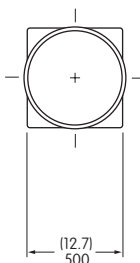
### Single Pole



**MB2011SB1W01-DA**

### Solder Lug

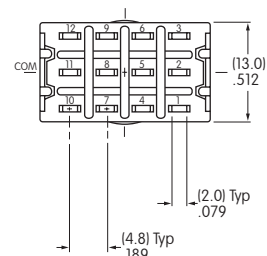
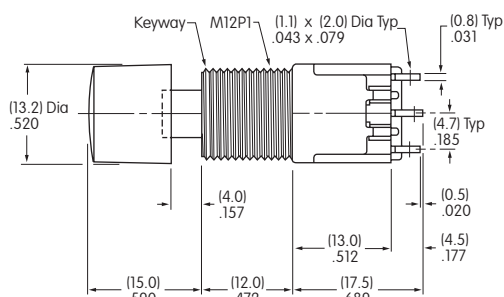
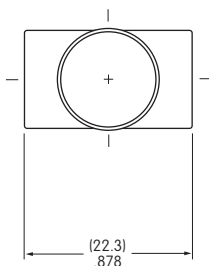
### Double Pole



**MB2061SB1W01-DA**

### Solder Lug

### Four Pole



**MB2181SB1W01-DA**

Toggle

Rockers

Pushbuttons

Programmable Illuminated PB

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

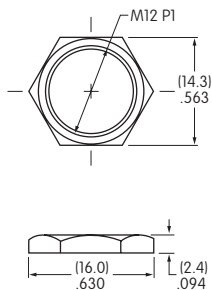
Supplement

## HARDWARE

### Standard Hardware for B1 Bushing

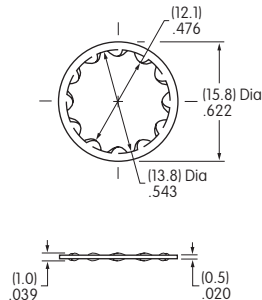
#### AT503M Hex Face Nut

Material:  
Brass with Chrome plating



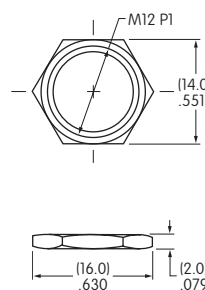
#### AT508 Lockwasher

Material:  
Steel with Zinc/Chromate



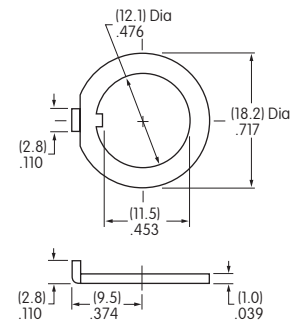
#### AT527M Hex Nut

Material:  
Steel with Nickel plating



#### AT506M Locking Ring

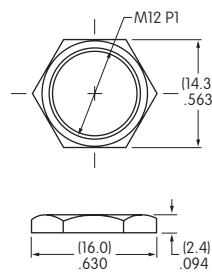
Material:  
Steel with Zinc/Chromate



### Standard Hardware for B3 Bushing

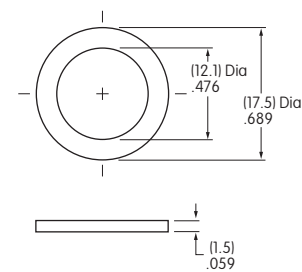
#### AT503M Hex Face Nut

Material:  
Brass with Chrome plating



#### AT401P O-ring

Material:  
Nitrile butadiene rubber

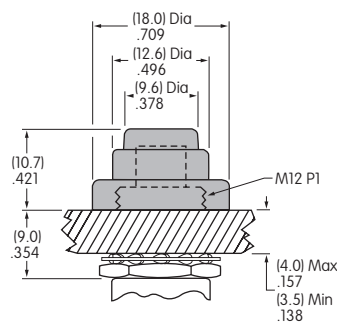


### Optional Splashproof Boot for B1 Bushing

#### AT4043 Splashproof Boot

Material: Silicone Rubber  
Operating Life: 100,000 for momentary  
50,000 for alternate action

When using a splashproof boot, no cap is required.



## CUSTOM ASSEMBLY ORDERING EXAMPLE

The MB2000 pushbutton series offers flexibility to accommodate a variety of applications. Using a basic large bushing model, different accessories can be assembled onto the switch to achieve the mounting variations shown on the following two pages.

- These switches have:
- 12mm diameter threaded bushing with keyway
  - Silver contacts
  - 6-Amp rating
  - Solder lug terminals

Other 12mm bushing options can be used; see details in preceding Large Bushing Ordering tables.

**MB2011**

**SB1W01**

**4**

**C**

**A**

Poles & Circuits			
<b>2011</b>	SPDT	ON	(ON)
<b>2065</b>	SPDT	ON	ON
<b>2061</b>	DPDT	ON	(ON)
<b>2085</b>	DPDT	ON	ON
4-pole available			
( ) = Momentary			

Mounter Shapes For Shroud	
<b>4</b>	Round
<b>5</b>	Rectangular

Cap Colors For Shroud	
<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>F</b>	Green
<b>G</b>	Blue
<b>H</b>	Gray

Mounter Colors For Shroud	
<b>A</b>	Black
<b>B</b>	White
<b>H</b>	Gray

Cap Colors For Snap-In	
<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>F</b>	Green



**Round Shroud**  
**MB2011SB1W01-4C-A**



**Rectangular Shroud**  
**MB2011SB1W01-5C-A**

See custom assemblies on following pages.

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

MOUNTER SHAPES FOR SHROUDS

**4** AT455 Round

Material: Polycarbonate  
Colors: A B H



**5** AT453 Rectangular

Material: Polycarbonate  
Colors: A B H



CAPS & CAP COLORS FOR SHROUDS

AT454 Round  
Insert Cap

Material: Polycarbonate  
Colors: A B C F G H



AT452 Rectangular  
Insert Cap

Material: Polycarbonate  
Colors: A B C F G H



AT080 Screw Adaptor for Insert Caps

Material: Brass



Color Codes:

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

Toggle

Rockers

**C** Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

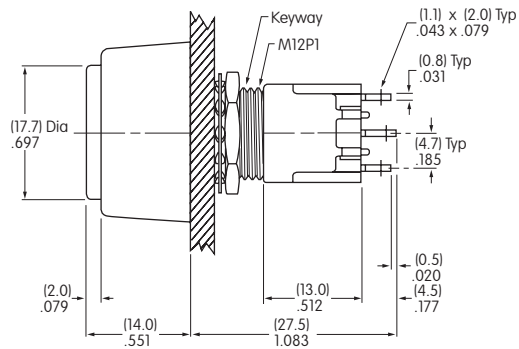
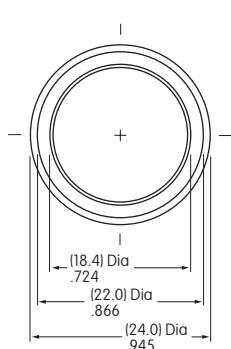
Accessories

Supplement

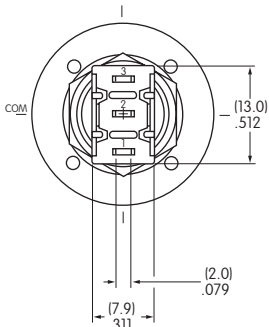
## CUSTOM ASSEMBLY WITH ROUND SHROUD



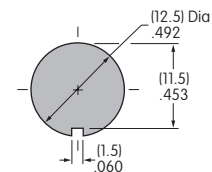
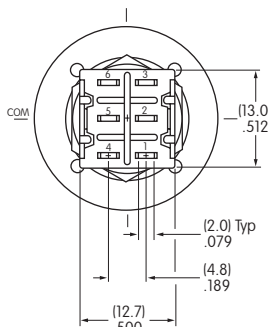
**MB2011SB1W01-4C-A**



### Single Pole



### Double Pole

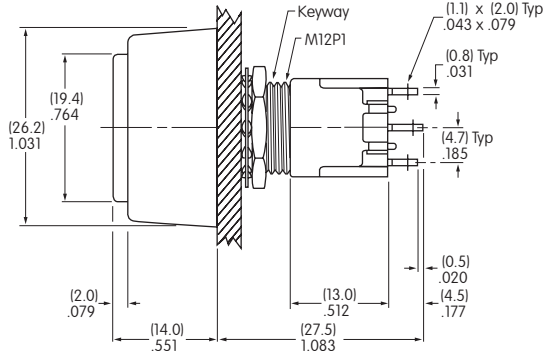
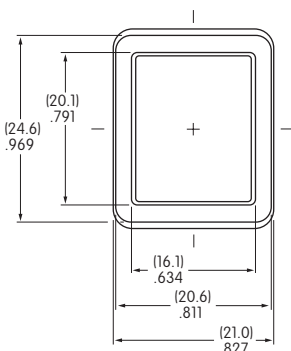


Effective Panel Thickness:  
.217" (5.5mm) maximum

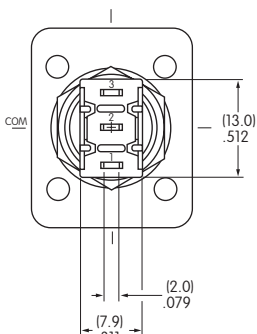
## CUSTOM ASSEMBLY WITH RECTANGULAR SHROUD



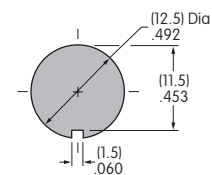
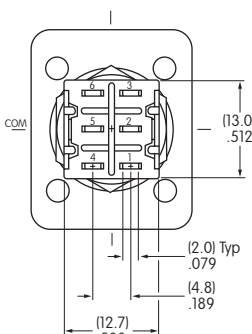
**MB2011SB1W01-5C-A**



### Single Pole



### Double Pole



Effective Panel Thickness:  
.217" (5.5mm) maximum

# General Specifications

## Electrical Capacity (Resistive Load)

<b>Power Level (silver):</b>	3A @ 125V AC
<b>Logic Level (gold):</b>	0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
<b>Logic/Power Level: (gold over silver)</b>	Combines silver & gold ratings
	Note: Find additional explanation of dual rating & operating range in Supplement section.

## Other Ratings

<b>Contact Resistance:</b>	20 milliohms maximum for silver; 30 milliohms maximum for gold
<b>Insulation Resistance:</b>	1,000 megohms minimum @ 500V DC
<b>Dielectric Strength:</b>	1,000V AC minimum between contacts for 1 minute minimum; 1,500V AC minimum between contacts & case for 1 minute minimum
<b>Mechanical Life:</b>	200,000 operations minimum
<b>Electrical Life:</b>	25,000 operations minimum for silver; 100,000 operations minimum for gold
<b>Nominal Operating Force:</b>	Single pole 2.45N; double pole 3.92N
<b>Travel</b>	Pretravel .024" (0.6mm); Overtravel .016" (0.4mm); Total Travel .039" (1.0mm)

## Materials & Finishes

<b>Plunger:</b>	Brass with nickel plating
<b>Bushing:</b>	Brass with nickel plating
<b>Frame:</b>	Stainless steel
<b>Case:</b>	Polybutylene terephthalate (PBT) (UL94V-0)
<b>Base:</b>	Diallyl phthalate resin (UL94V-0)
<b>Movable Contactor:</b>	Phosphor bronze with silver or gold plating
<b>Movable Contacts:</b>	Silver alloy (code W); copper with gold plating (code G); or silver alloy with gold plating (code A)
<b>Stationary Contacts:</b>	Silver alloy with silver plating (code W); copper or brass with gold plating (code G); or silver with gold plating (code A)
<b>Terminals:</b>	Copper or brass with silver plating; copper or brass with gold plating

## Environmental Data

<b>Operating Temp Range:</b>	-30°C through +85°C (-22°F through +185°F)
<b>Humidity:</b>	90 ~ 95% humidity for 96 hours @ 40°C (104°F)
<b>Vibration:</b>	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
<b>Shock:</b>	50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 3 shocks in each direction)

## Installation

<b>Mounting Torque:</b>	1.5Nm (13.0 lb•in) for double nut; 0.7Nm (6.0 lb•in) for single nut
<b>Cap Installation Force:</b>	80.0N (18.0 lbf) maximum downward force on actuator
<b>Soldering:</b>	Wave Soldering (PC version): See Profile B in Supplement section. Manual Soldering: See Profile B in Supplement section.
<b>Cleaning:</b>	These devices are not process sealed. Hand clean locally using alcohol based solution. See Cleaning Specifications in Supplement section.

## Standards & Certifications

<b>Flammability Standards:</b>	UL94V-0 case & base
<b>UL:</b>	<b>File No. E44145 - Recognized only when ordered with marking on switch.</b> Add "/U" or "/CUL" before dash in part number to order UL recognized switch. All single and double pole models recognized at 3A @ 125V AC or 0.4VA max. @ 28V DC max.
<b>CSA:</b>	<b>File No. 023535_0_000 - Certified only when ordered with marking on switch.</b> Add "/C" before dash in part number to order CSA certified switch. Single pole models with PC, solder lug, or Wirewrap terminals & double pole with PC or Wirewrap terminals certified at 3A @ 125V AC or 0.4VA @ 28V maximum.

# Distinctive Characteristics

Snap-acting mechanism gives smooth actuation, short stroke, light touch, and audible feedback. This mechanism also provides long mechanical life.

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

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

Compatible companions with M series toggles. Body, bushing, and footprint dimensions ideal for mounting MB2400 pushbuttons and M toggles next to one another.

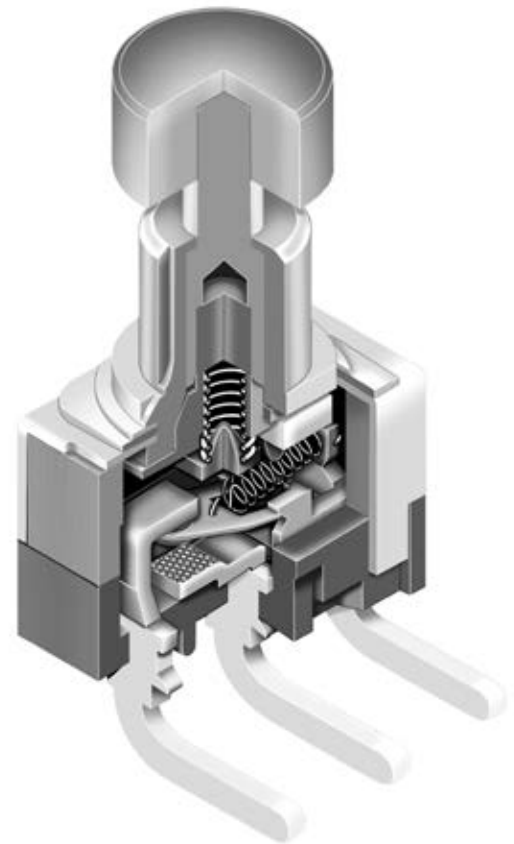
Stainless steel frame resists corrosion.

Longer center solder lug terminal simplifies wiring and soldering.

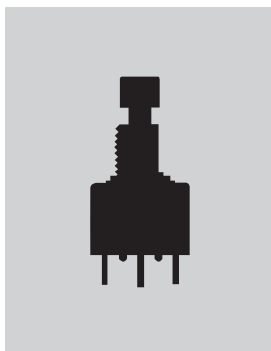
Silver contacts of specially composed alloy for hardness.


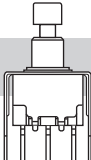
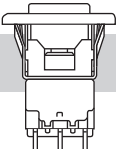
Epoxy sealed terminals prevent entry of solder flux and other contaminants.

Prominent external insulating barriers increase insulation resistance and dielectric strength.



Actual Size



	Bushing Mount	Page C98
	Bracket PC Mount	Page C102
	Snap-in Mount	Page C108

- Toggle
- Rockers
- Pushbuttons**
- Illuminated PB
- Programmable
- Keylocks
- Rotaries
- Slides
- Tactiles
- Tilt
- Touch
- Indicators
- Accessories
- Supplement

### TYPICAL SWITCH ORDERING EXAMPLE

**MB24**

**11**

**E1**

**W**

**01**

**F**

**A**

#### Poles & Circuits

<b>11</b>	SPDT	ON	(ON)
<b>61</b>	DPDT	ON	(ON)
( ) = Momentary			

#### Contact Materials & Ratings

<b>W</b>	Silver Rated 3A @ 125V AC
<b>G</b>	Gold Rated 0.4VA max @ 28V AC/DC max
<b>A</b>	Gold over Silver Rated 3A @ 125V AC & 0.4VA max @ 28V AC/DC max

#### Caps

<b>F</b>	.201" (5.1mm) Diameter
<b>H</b>	.295" (7.5mm) Diameter

#### Bushings

<b>E1</b>	.285" (7.24mm) Threaded with D Flat
<b>E2</b>	.285" (7.24mm) Smooth with D Flat
<b>A1</b>	.280" (7.1mm) Threaded with Keyway
<b>A2</b>	.280" (7.1mm) Smooth with Keyway
<b>S1</b>	.350" (8.9mm) Threaded with Keyway
<b>S2</b>	.350" (8.9mm) Smooth with Keyway

#### Terminals

<b>01</b>	Solder Lug
<b>03</b>	.250" (6.35mm) Straight PC
<b>05</b>	.425" (10.8mm) Wirewrap
<b>06</b>	.750" (19.05mm) Wirewrap
<b>07</b>	.964" (24.5mm) Wirewrap

#### Cap Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red

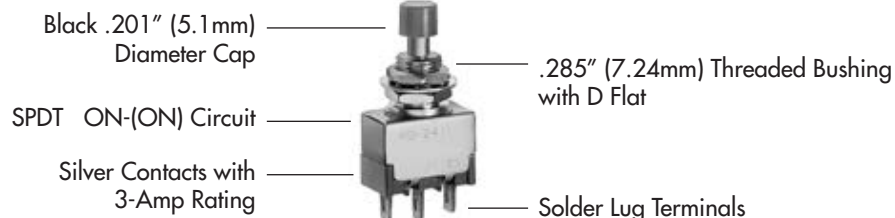
#### IMPORTANT:



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

**MB2411E1W01-FA**



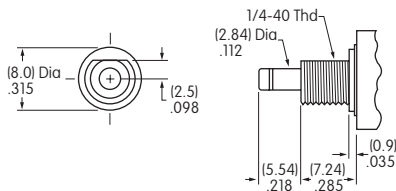
## POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal	Down	Normal	Down	
						Note: Terminal numbers are not actually on the switch.
SP	MB2411	ON	(ON)	1-3	1-2	SPDT
DP	MB2461	ON	(ON)	1-3 4-6	1-2 4-5	DPDT

## BUSHINGS

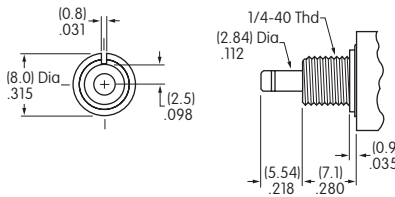
Note: Plunger selection is not required for MB2400 pushbuttons. The plunger can be used with or without a cap.

**E1** .285" (7.24mm)  
Threaded with D Flat



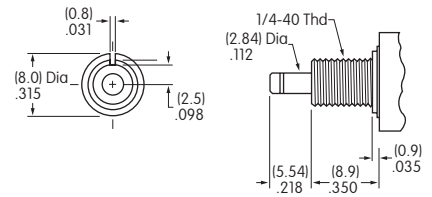
Maximum Panel Thickness with Standard Hardware: .068" (1.74mm)

**A1** .280" (7.1mm)  
Threaded with Keyway



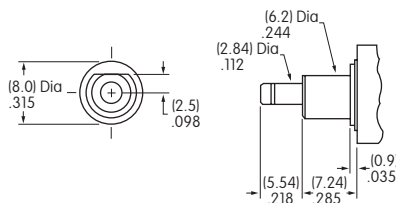
Maximum Panel Thickness with Standard Hardware: .068" (1.74mm)

**S1** .350" (8.9mm)  
Threaded with Keyway

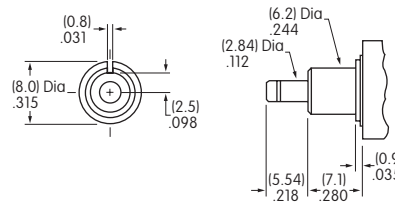


Maximum Panel Thickness with Standard Hardware: .134" (3.40mm)

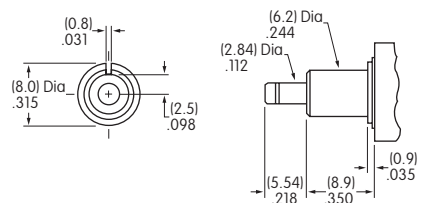
**E2** .285" (7.24mm)  
Smooth with D Flat



**A2** .280" (7.1mm)  
Smooth with Keyway

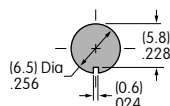


**S2** .350" (8.9mm)  
Smooth with Keyway

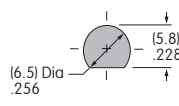


### Panel Cutouts

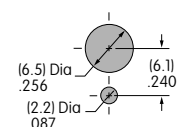
For A1, A2, S1, or S2 Bushing with Keyway



For E1 or E2 Bushing with D Flat



With Optional Locking Ring



Standard hardware includes 2 hex nuts & 1 lockwasher.  
Hardware is illustrated following the Typical Switch Dimension drawings.

## CONTACT MATERIALS & RATINGS

**W**

Silver over Silver

Power Level

3A @ 125V AC

**G**

Gold over Brass or Copper

Logic Level

0.4VA maximum @ 28V AC/DC maximum

Note: Complete explanation of operating range in Supplement section.

**A**

Gold over Silver

Power Level  
or Logic Level

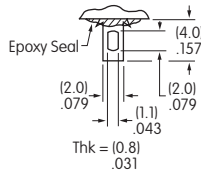
3A @ 125V AC  
or 0.4VA maximum @ 28V AC/DC maximum

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.

## TERMINALS

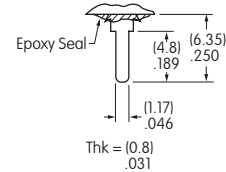
**01**

Solder Lug



**03**

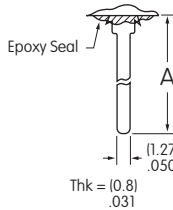
.250" (6.35mm)  
Straight PC



Wirewrap or Extended PC

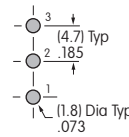
**05**

.425"  
(10.8mm)

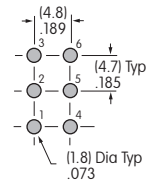


Refer to footprints if using  
as extended PC terminal.

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



Single Pole



Double Pole

**06**

.750"  
(19.05mm)

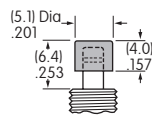
**07**

.964"  
(24.5mm)

## CAPS & CAP COLORS

**F**

AT475  
.201" (5.1mm)  
Diameter Cap



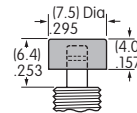
Material: Polyamide

Finish: Glossy



**H**

AT496  
.295" (7.5mm)  
Diameter Cap



Material: Polyamide

Finish: Glossy



Cap Colors  
Available:

**A**

Black

**B**

White

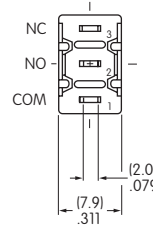
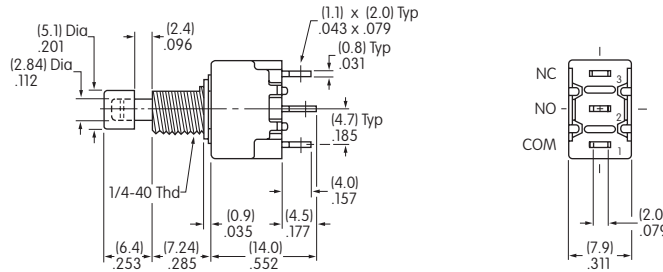
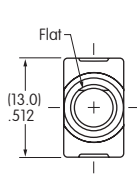
**C**

Red

## TYPICAL SWITCH DIMENSIONS

### Single Pole

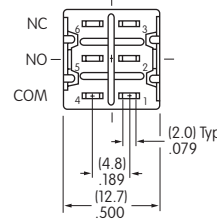
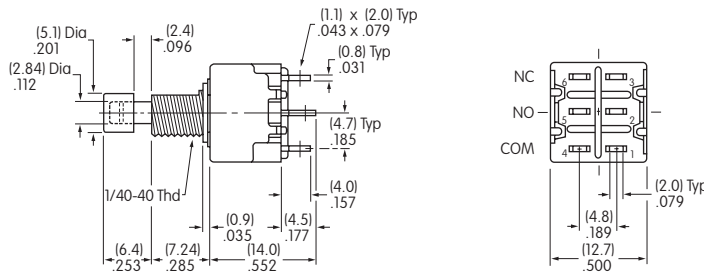
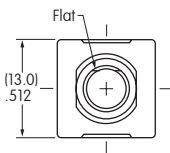
### Solder Lug



MB2411E1W01-FA

### Double Pole

### Solder Lug

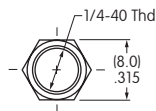


MB2461E1W01-FA

## HARDWARE

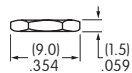
### Standard Hardware

#### AT513H Inch Threaded Hexagon Nut



2 included with each switch

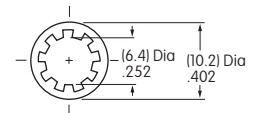
Material:  
Brass with Nickel Plating



#### AT509 Lockwasher

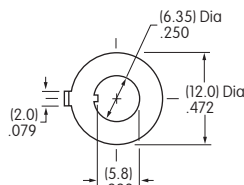
1 included with each switch

Material:  
Steel with Zinc/Chromate



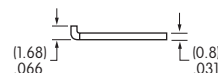
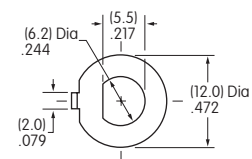
#### AT507H Locking Ring for A1 or S1 Bushing

Material:  
Steel with Zinc/Chromate



#### AT515 Locking Ring for E1 Bushing

Material:  
Steel with Zinc/Chromate



### TYPICAL SWITCH ORDERING EXAMPLE

**MB24**

**11**

**A2**

**G**

**40**

**F**

**A**

#### Poles & Circuits

<b>11</b>	SPDT	ON	(ON)
<b>61</b>	DPDT	ON	(ON)

( ) = Momentary

#### Bushings

<b>A2</b>	.280" (7.1mm) Smooth with Keyway
<b>A1</b>	.280" (7.1mm) Threaded with Keyway
<b>E2</b>	.285" (7.24mm) Smooth with D Flat
<b>E1</b>	.285" (7.24mm) Threaded with D Flat
<b>S2</b>	.350" (8.9mm) Smooth with Keyway
<b>S1</b>	.350" (8.9mm) Threaded with Keyway

#### Contact Materials & Ratings

<b>W</b>	Silver Rated 3A @ 125V AC
<b>G</b>	Gold Rated 0.4VA max @ 28V AC/DC max
<b>A</b>	Gold over Silver Rated 3A @ 125V AC & 0.4VA max @ 28V AC/DC max

#### Caps

<b>F</b>	.201" (5.1mm) Dia.
<b>H</b>	.295" (7.5mm) Dia.

#### Cap Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red

#### Terminals

##### With Bracket

<b>13</b>	.250" (6.35mm) Straight PC with .465" (11.8mm) Bracket
<b>15</b>	.425" (10.8mm) Straight PC with .630" (16.0mm) Bracket
<b>17</b>	.964" (24.5mm) Straight PC with 1.150" (29.2mm) Bracket

##### With Reinforced Bracket

<b>23</b>	.250" (6.35mm) Straight PC with .465" (11.8mm) Bracket
<b>25</b>	.425" (10.8mm) Straight PC with .630" (16.0mm) Bracket
<b>26</b>	.750" (19.05mm) Straight PC with .953" (24.2mm) Bracket

##### With Terminal Support

<b>30</b>	Right Angle PC
<b>40</b>	Vertical PC

#### 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






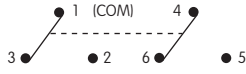
**MB2411A2G40-FA**

.280" (7.1mm) Smooth Bushing with Keyway  
Black .201" (5.1mm) Diameter Cap



SPDT ON-(ON) Circuit  
Vertical PC Terminals  
Gold Contacts with 0.4VA Rating

## POLES & CIRCUITS

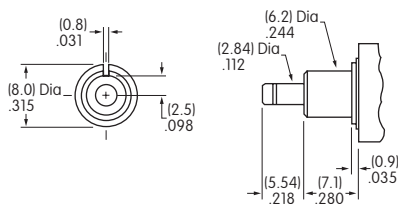
Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal	Down	Normal	Down	
SP	MB2411	ON 	(ON) 	1-3 	1-2 	SPDT 
DP	MB2461	ON	(ON)	1-3 4-6	1-2 4-5	DPDT 

Note: Terminal numbers are not actually on the switch.

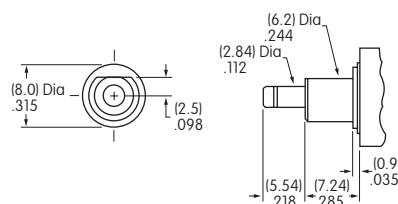
## BUSHINGS

Note: Plunger selection is not required for MB2400 pushbuttons.  
The plunger can be used with or without a cap.

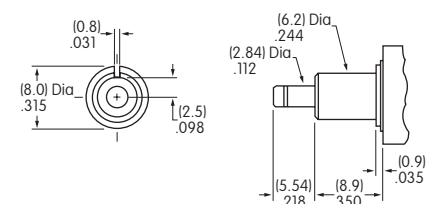
**A2** .280" (7.1mm)  
Smooth with Keyway



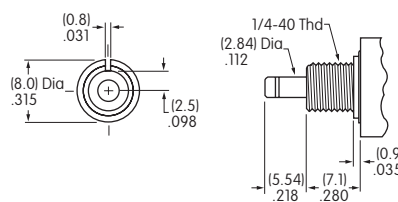
**E2** .285" (7.24mm)  
Smooth with D Flat



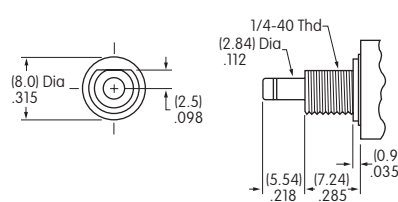
**S2** .350" (8.9mm)  
Smooth with Keyway



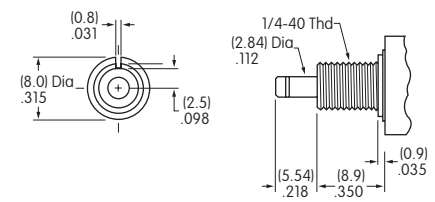
**A1** .280" (7.1mm)  
Threaded with Keyway



**E1** .285" (7.24mm)  
Threaded with D Flat



**S1** .350" (8.9mm)  
Threaded with Keyway



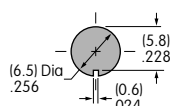
Maximum Panel Thickness with Standard Hardware: .068" (1.74mm)

Maximum Panel Thickness with Standard Hardware: .068" (1.74mm)

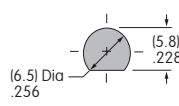
Maximum Panel Thickness with Standard Hardware: .134" (3.40mm)

### Panel Cutouts

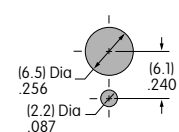
For A1, A2, S1, or S2 Bushing with Keyway



For E1 or E2 Bushing with D Flat



With Optional Locking Ring



Standard hardware includes 2 hex nuts & 1 lockwasher.  
Hardware is illustrated following the Typical Switch Dimension drawings.

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

### CONTACT MATERIALS & RATINGS

**W**

Silver over Silver

Power Level

3A @ 125V AC

**G**

Gold over Brass or Copper

Logic Level

0.4VA maximum @ 28V AC/DC maximum

Note: Complete explanation of operating range in Supplement section.

**A**

Gold over Silver

Power Level  
or Logic Level

3A @ 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.

### TERMINALS

#### Straight PC Mount with Bracket

**13**

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

**15**

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

**17**

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

**23**

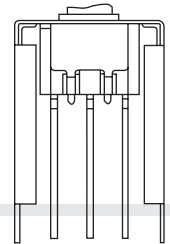
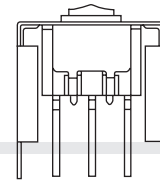
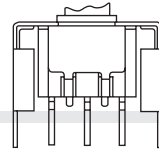
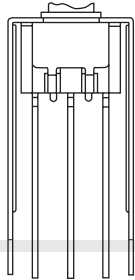
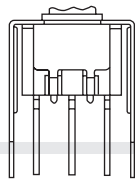
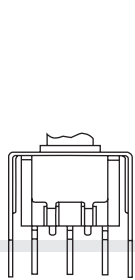
.250" (6.35mm)  
Terminal with  
.465" (11.8mm)  
Bracket

**25**

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

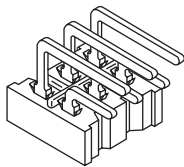
**26**

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



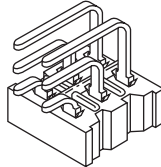
**30**

Right Angle PC



**40**

Vertical PC

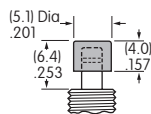


PCB footprints are on the following  
Typical Switch Dimension pages.

### CAPS & CAP COLORS

**F**

AT475  
.201" (5.1mm)  
Diameter Cap

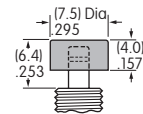


Material: Polyamide  
Finish: Glossy



**H**

AT496  
.295" (7.5mm)  
Diameter Cap



Material: Polyamide  
Finish: Glossy



Cap Colors  
Available:

**A**

Black

**B**

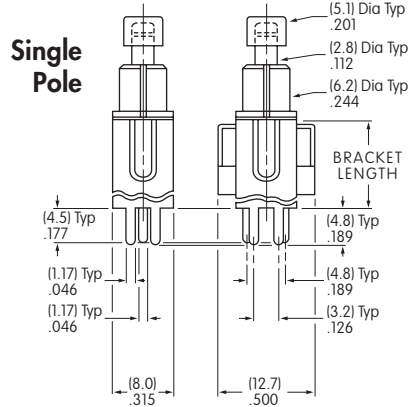
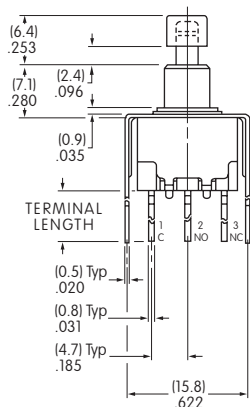
White

**C**

Red

## TYPICAL SWITCH DIMENSIONS

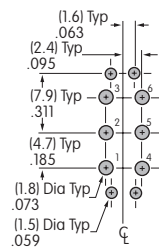
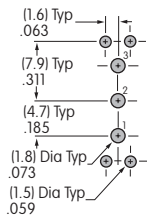
### Straight PC • Bracket



Double Pole

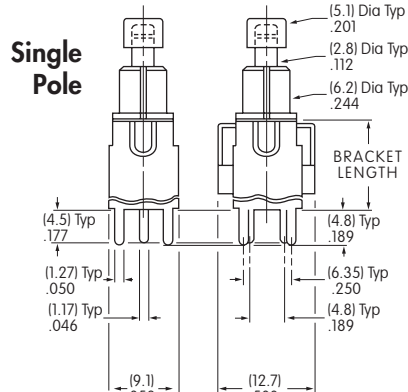
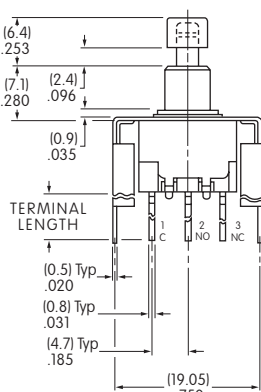


**MB2411A2G13-FA**



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

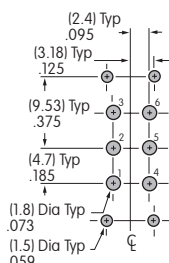
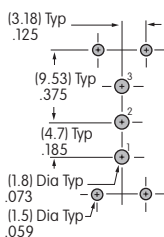
### Straight PC • Reinforced Bracket



Double Pole



**MB2411A2G23-FA**



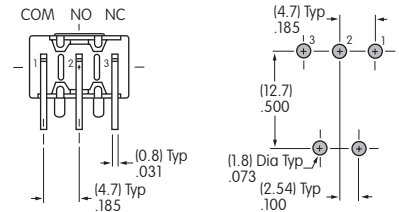
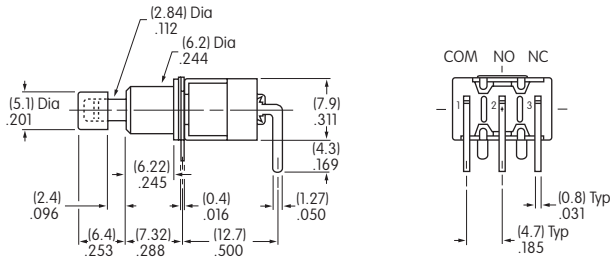
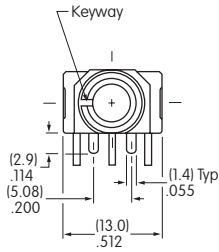
Terminal Code:	Terminal Length:	Bracket Length:
<b>23</b>	.250 (6.35mm)	.465 (11.8mm)
<b>25</b>	.425 (10.8mm)	.630 (16.0mm)
<b>26</b>	.750 (19.05mm)	.953 (24.2mm)

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

## TYPICAL SWITCH DIMENSIONS

### Right Angle PC

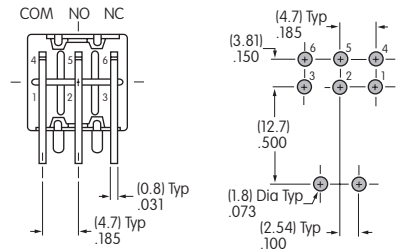
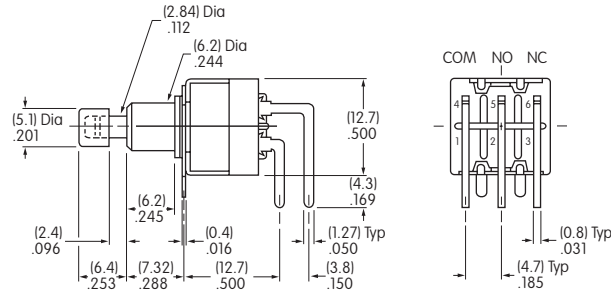
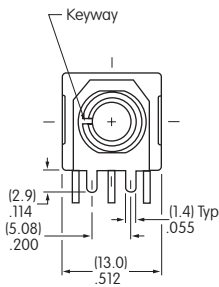
### Single Pole



**MB2411A2G30-FA**

### Right Angle PC

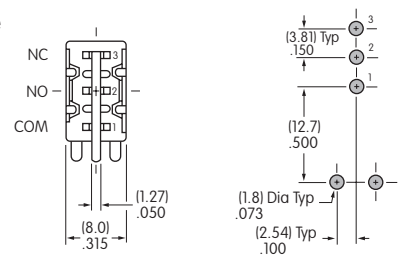
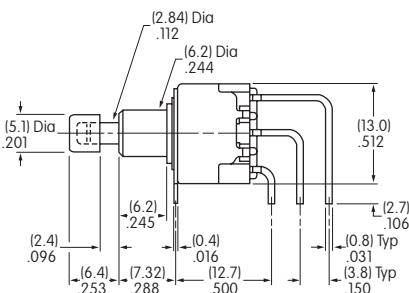
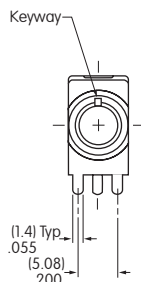
### Double Pole



**MB2461A2G30-FA**

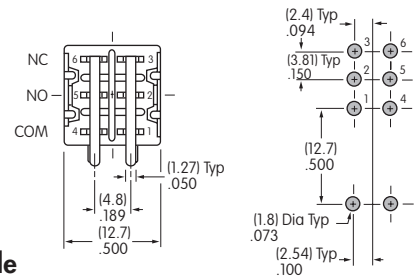
### Vertical PC

### Single Pole



**MB2411A2G40-FA**

### Double Pole



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

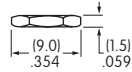
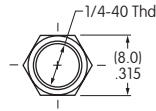
## HARDWARE

### Standard Hardware

#### AT513H Inch Threaded Hexagon Nut

2 included with each switch

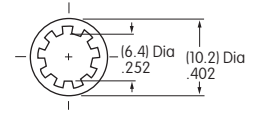
Material:  
Brass with Nickel Plating



#### AT509 Lockwasher

1 included with each switch

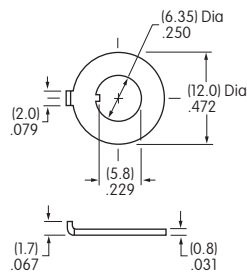
Material:  
Steel with Zinc/Chromate



### Optional Hardware

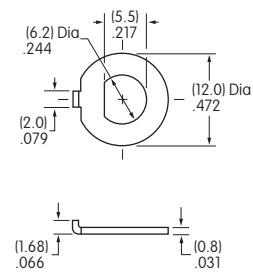
#### AT507H Locking Ring for A1 or S1 Bushing

Material:  
Steel with Zinc/Chromate



#### AT515 Locking Ring for E1 Bushing

Material:  
Steel with Zinc/Chromate



Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

### TYPICAL SWITCH

**MB24**

**11**

**J**

**W**

**01**

**C**

#### Poles & Circuits

<b>11</b>	SPDT	ON	(ON)
<b>61</b>	DPDT	ON	(ON)
( ) = Momentary			

#### Contact Materials & Ratings

<b>W</b>	Silver Rated 3A @ 125V AC
<b>G</b>	Gold Rated 0.4VA max @ 28V AC/DC max
<b>A</b>	Gold over Silver Rated 3A @ 125V AC & 0.4VA max @ 28V AC/DC max

#### Cap & Cap Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>E</b>	Yellow
<b>F</b>	Green
<b>G</b>	Blue
<b>H</b>	Gray

#### Mounting Frame

<b>J</b>	Snap-in Frame
----------	---------------

#### Terminals

<b>01</b>	Solder Lug
<b>03</b>	.250" (6.35mm) Straight PC
<b>05</b>	.425" (10.8mm) Wirewrap
<b>06</b>	.750" (19.05mm) Wirewrap
<b>07</b>	.964" (24.5mm) Wirewrap

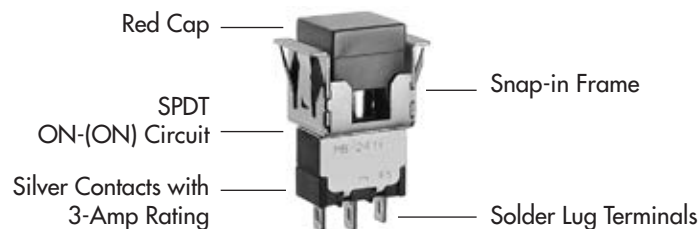
#### IMPORTANT:



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.

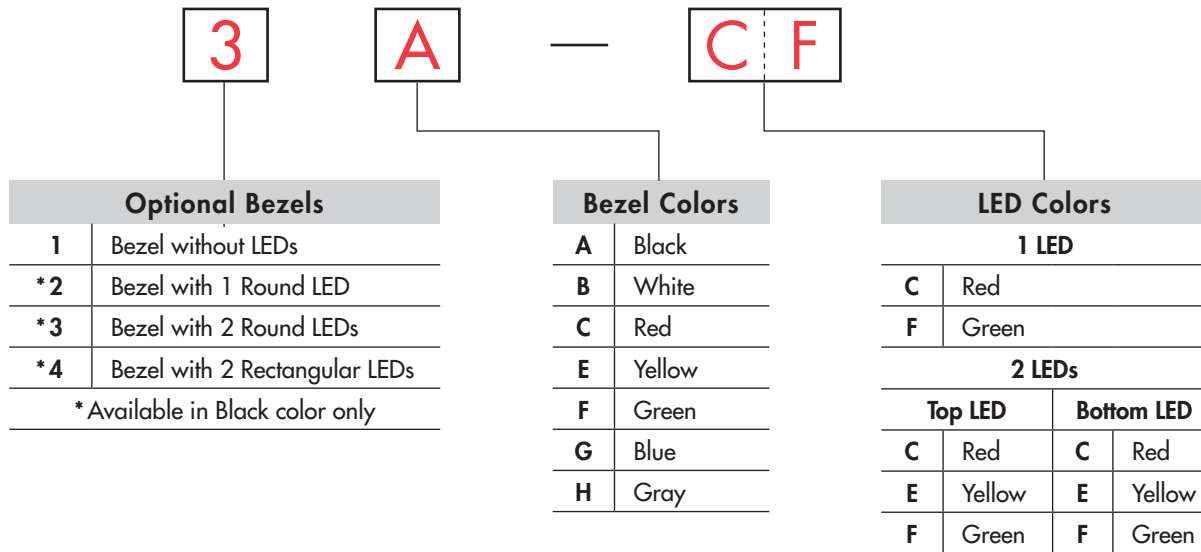
#### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**MB2411JW01-C**



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

## ORDERING EXAMPLE



### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**MB2411JW01-C-3A-CF**



Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

## POLES & CIRCUITS

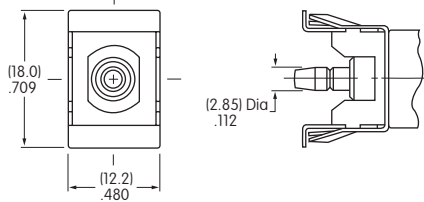
		Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
Pole	Model	Normal	Down	Normal	Down	
SP	MB2411	ON	(ON)	1-3	1-2	SPDT 
DP	MB2461	ON	(ON)	1-3 4-6	1-2 4-5	DPDT 

Note: Terminal numbers are not actually on the switch.

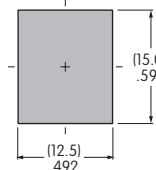
## MOUNTING FRAME

**J**

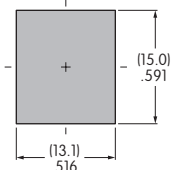
### Snap-in Frame



Panel Cutout  
for Single Pole  
without Bezel



Panel Cutout  
for Double Pole  
without Bezel



Panel Thickness without Bezel: .039" ~ .157" (1.0mm ~ 4.0mm)  
 Panel Thickness with Bezel: .039" ~ .126" (1.0mm ~ 3.2mm)

## CONTACT MATERIALS & RATINGS

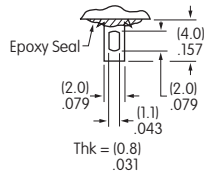
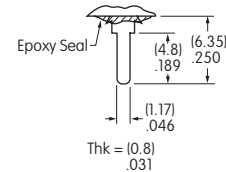
**W**
**Silver over Silver**
**Power Level**
**3A @ 125V AC**
**G**
**Gold over Brass or Copper**
**Logic Level**
**0.4VA maximum @ 28V AC/DC maximum**

Note: Complete explanation of operating range in Supplement section.

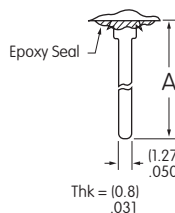
**A**
**Gold over Silver**
**Power Level  
or Logic Level**
**3A @ 125V AC  
or 0.4VA maximum @ 28V AC/DC maximum**

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.

## TERMINALS

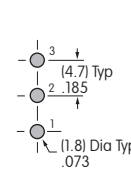
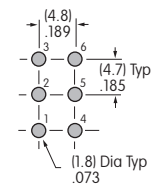
**01**
**Solder Lug**

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


### Wirewrap or Extended PC



Refer to footprints if using as extended PC terminal.

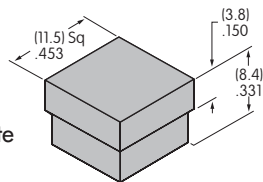
Dimension A = terminal lengths as shown beside the code boxes at left.


**Single Pole**

**Double Pole**

## CAP & CAP COLORS

### AT465 .453" (11.5mm) Square Cap

Material: Polycarbonate  
Finish: Glossy



Contact factory for matte finish.

Legend details at end of this section.

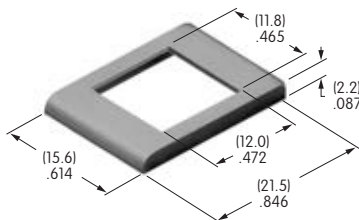
<b>A</b>	Black	<b>B</b>	White	<b>C</b>	Red	<b>E</b>	Yellow
<b>F</b>	Green	<b>G</b>	Blue	<b>H</b>	Gray		

## OPTIONAL SNAP-IN BEZELS & BEZEL COLORS

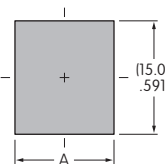
### 1 AT207 Bezel

Material: Polycarbonate  
Finish: Glossy

Contact factory for matte finish.



<b>A</b>	Black	<b>F</b>	Green
<b>B</b>	White	<b>G</b>	Blue
<b>C</b>	Red	<b>H</b>	Gray
<b>E</b>	Yellow		

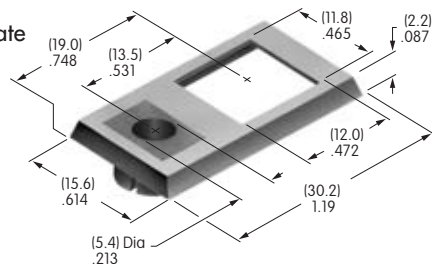


	Single Pole	Double Pole
A	(12.5)mm .492"	(13.1)mm .516"

### 2 AT208 Bezel for AT070 LED

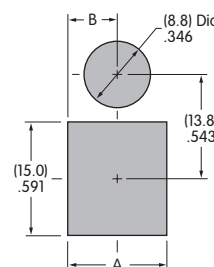
Material: Polycarbonate  
Finish: Glossy

Contact factory for matte finish.



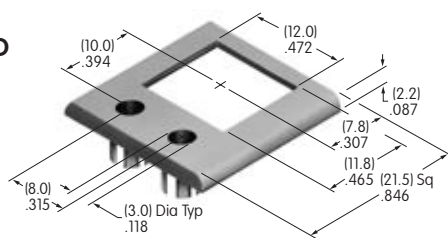
**A** Black  
LED colors & specifications on next page.

	Single Pole	Double Pole
A	(12.5)mm .492"	(13.1)mm .516"
B	(6.25)mm .246"	(6.55)mm .258"



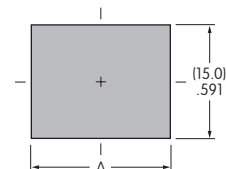
### 3 AT212 Bezel for AT617 LED

Material: Polycarbonate  
Finish: Semi-glossy



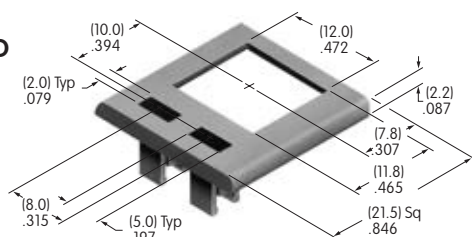
**A** Black  
LED colors & specifications on next page.

	Single Pole	Double Pole
A	(18.4)mm .724"	(18.7)mm .736"



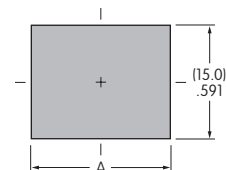
### 4 AT213 Bezel for AT618 LED

Material: Polycarbonate  
Finish: Semi-glossy



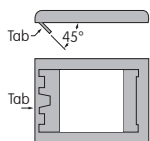
**A** Black  
LED colors & specifications on next page.

	Single Pole	Double Pole
A	(18.4)mm .724"	(18.7)mm .736"

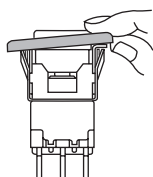


## Bezel Assembly

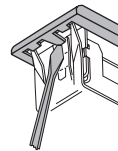
1. Pry out tab on bezel to a 45° angle.



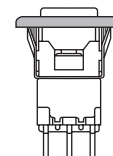
2. Insert switch frame under tab and snap on the bezel.



3. Push tab back into place.



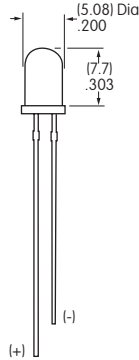
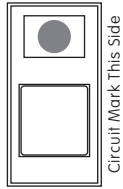
4. Snap assembled bezel and switch into panel.



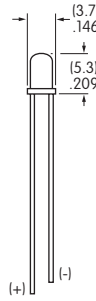
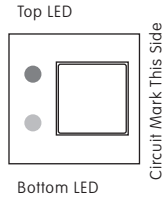
## LED COLORS & SPECIFICATIONS

### Bezel Orientation on Switch

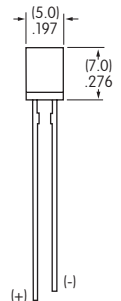
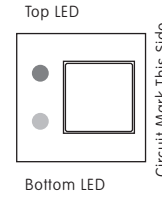
**AT070 LED**  
For Bezel AT208  
with 1 LED



**AT617 LED**  
For Bezel AT212  
with 2 Round LEDs



**AT618 LED**  
For Bezel AT213  
with 2 Rectangular LEDs



Note: Lead lengths may differ from manufacturing lot to lot. The longer lead is the anode (+).

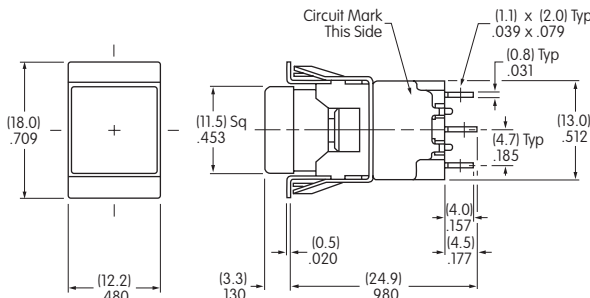
		AT070		AT617			AT618		
		<b>C</b>	<b>F</b>	<b>C</b>	<b>E</b>	<b>F</b>	<b>C</b>	<b>E</b>	<b>F</b>
	Color	Red	Green	Red	Yellow	Green	Red	Yellow	Green
Maximum Forward Current	$I_{FM}$	25mA	50mA	30mA	30mA	30mA	25mA	30mA	25mA
Typical Forward Current	$I_F$	20mA	30mA	20mA	20mA	20mA	20mA	20mA	20mA
Forward Voltage	$V_F$	2.8V	2.1V	2.1V	2.1V	2.2V	2.25V	2.1V	2.2V
Maximum Reverse Voltage	$V_{RM}$	4V	5V	5V	5V	5V	5V	5V	5V
Current Reduction Rate Above 25°C	$\Delta I_F$	0.33 mA/°C	0.40 mA/°C	0.40 mA/°C	0.40 mA/°C	0.40 mA/°C	0.33 mA/°C	0.40 mA/°C	0.33 mA/°C
Ambient Temperature Range (when used with a bezel)		-10° ~ +70°C		-15° ~ +70°C			-25° ~ +70°C		

The electrical specifications shown are determined at a basic temperature of 25°C.  
LED circuit is independent of switch operation. LED is colored in OFF state.

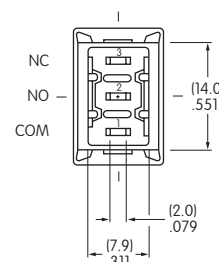
If the source voltage is greater than the rated voltage of the LED, a ballast resistor must be connected in series with the LED.  
The ballast resistor calculation and more lamp detail are shown in the Supplement section.

## TYPICAL SWITCH DIMENSIONS

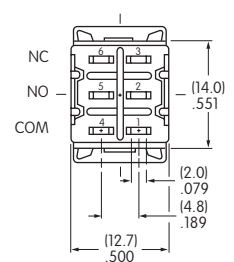
**Solder Lug**



**Single Pole**



**Double Pole**

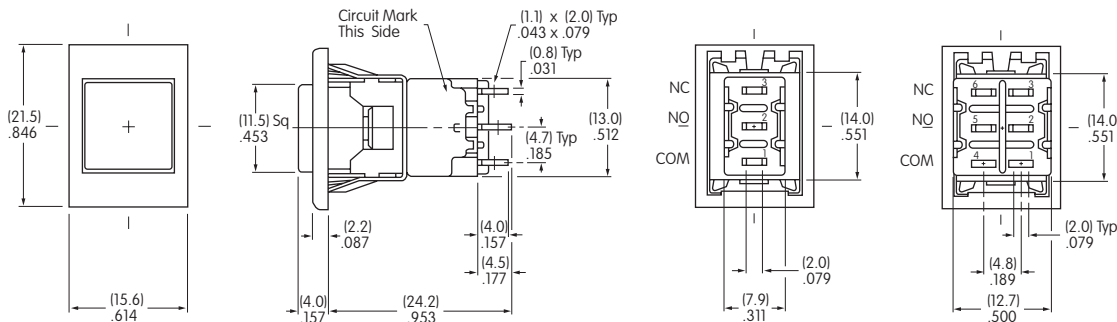


MB2411JW01-C

## TYPICAL SWITCH DIMENSIONS

### Single & Double Pole

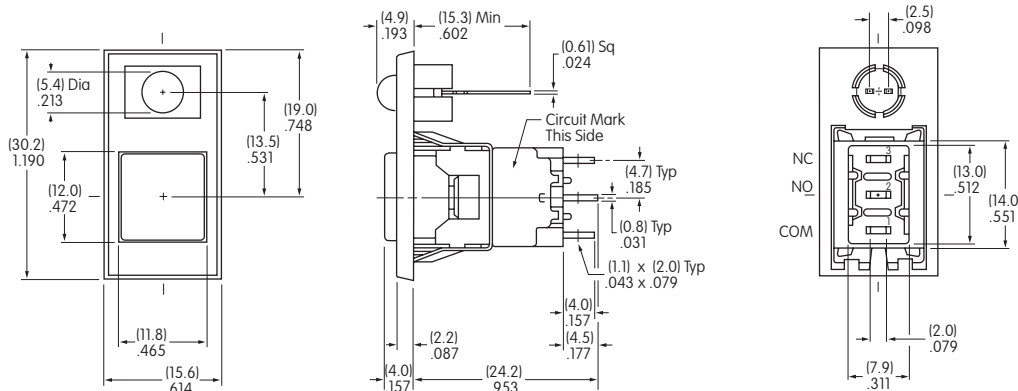
### Solder Lug • AT207 Bezel



MB2411JW01-C-1A

### Single Pole

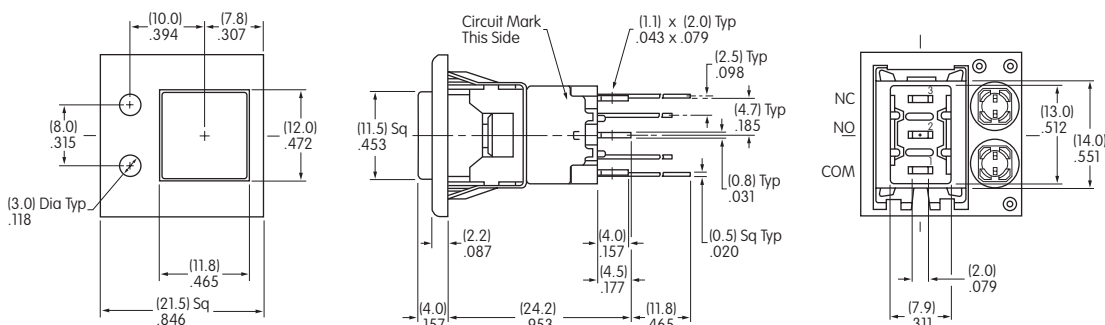
### Solder Lug • AT208 Bezel



MB2411JW01-C-2A-C

### Single Pole

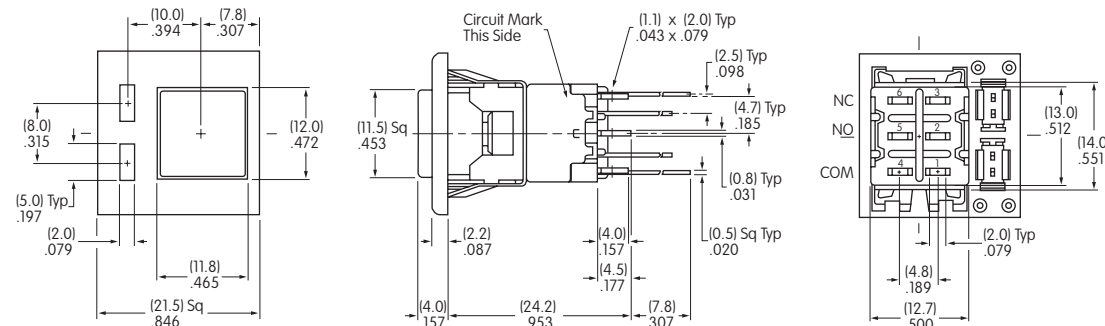
### Solder Lug • AT212 Bezel



MB2411JW01-C-3A-CF

### Double Pole

### Solder Lug • AT213 Bezel

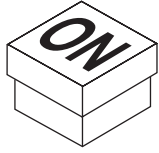


MB2461JW01-C-4A-CF

### LEGENDS

NKK Switches can provide custom legends for caps. Contact factory for more information.

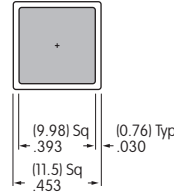
#### Suggested Printable Area for Cap



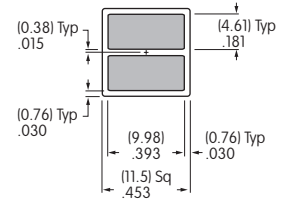
#### Recommended Print Method:

Screen Print or Pad Print

Epoxy based ink is recommended.



AT465



AT465

Shaded areas are printable areas.

# General Specifications

## Electrical Capacity (Resistive Load)

**Power Level (code W):** 3A @ 125V AC

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

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

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

## Other Ratings

**Contact Resistance:** 20 milliohms maximum for silver; 30 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:** 200,000 operations minimum

**Electrical Life:** 25,000 operations minimum for silver; 100,000 operations minimum for gold

**Nominal Operating Force:** Single pole 2.45N; double pole 3.92N

**Travel:** Pretravel .024" (0.6mm); Overtravel .016" (0.4mm); Total Travel .039" (1.0mm)

## Materials & Finishes

**Plunger:** Brass with nickel plating

**Bushing:** Brass with nickel plating

**Mounting & Body Frames:** Stainless steel

**Support Bracket:** Brass with tin plating

**Case:** Polybutylene terephthalate (PBT) (UL94V-0)

**Base:** Diallyl phthalate resin

**Movable Contactor:** Phosphor bronze with silver or gold plating

**Movable Contacts:** Silver alloy (code W); copper with gold plating (code G)

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

**Terminals:** Copper with silver plating; 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 100 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<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

**Mounting Torque:** 1.5Nm (13 lb•in) for double nut; 0.7Nm (6 lb•in) for single nut

**Cap Installation Force:** 80N (18 lbf) maximum downward force on actuator

## Processing

**Soldering:** Wave Soldering Recommended: See Profile B in Supplement section.

Manual Soldering: See Profile B in Supplement section.

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

## Standards & Certifications

**Flammability Standards:** UL94V-0 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 single & double pole models recognized at 3A @ 125V AC or 0.4VA max. @ 28V AC/DC max.

**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.

Single pole & double pole models certified at 3A @ 125V AC or 0.4VA max. @ 28V AC/DC max.

# Distinctive Characteristics

Short stroke and light touch.

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

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

Stainless steel frame resists corrosion.

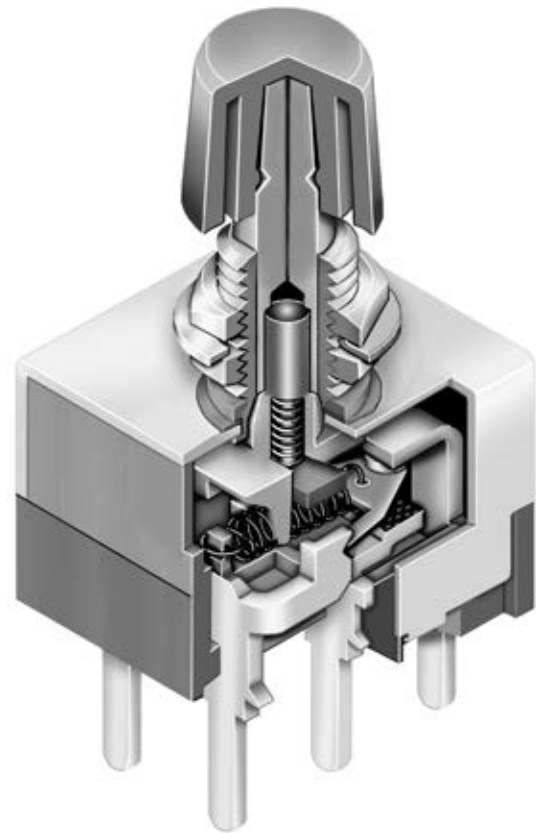
Longer center solder lug terminal simplifies wiring and soldering.

Patented silver contacts of specially composed alloy for hardness.

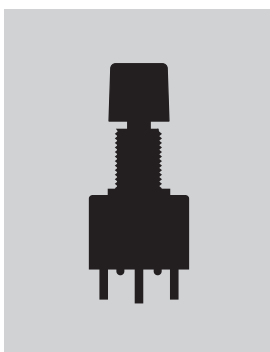
Epoxy sealed terminals prevent entry of solder flux and other contaminants.

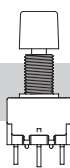
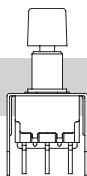
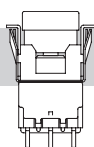
Snap-acting mechanism gives smooth actuation and audible feedback.

Prominent external insulating barriers increase insulation resistance and dielectric strength.



Actual Size



	Bushing Mount	Page C118
	Bracket PC Mount	Page C121
	Snap-in Mount	Page C124

- Toggle
- Rockers
- Pushbuttons**
- Illuminated PB
- Programmable
- Keylocks
- Rotaries
- Slides
- Tactiles
- Tilt
- Touch
- Indicators
- Accessories
- Supplement

### TYPICAL SWITCH ORDERING EXAMPLE

**MB25**

**11**

**S4**

**W**

**01**

**B**

**C**

#### Poles & Circuits

<b>11</b>	SPDT	ON	(ON)
<b>21</b>	DPDT	ON	(ON)

( ) = Momentary

#### Contact Materials & Ratings

<b>W</b>	Silver Rated 3A @ 125V AC
<b>G</b>	Gold Rated 0.4VA max @ 28V AC/DC max

#### Caps

<b>B</b>	.315" (8.0mm) Diameter
<b>C</b>	.394" (10.0mm) Diameter

#### Bushing

<b>S4</b>	.315" (8.0mm) Threaded with Keyway
-----------	---------------------------------------

#### Terminals

<b>01</b>	Solder Lug
<b>03</b>	.250" (6.35mm) Straight PC

#### Cap Colors

<b>A</b>	Black
<b>B</b>	White
<b>C</b>	Red
<b>E</b>	Yellow
<b>F</b>	Green
<b>G</b>	Blue

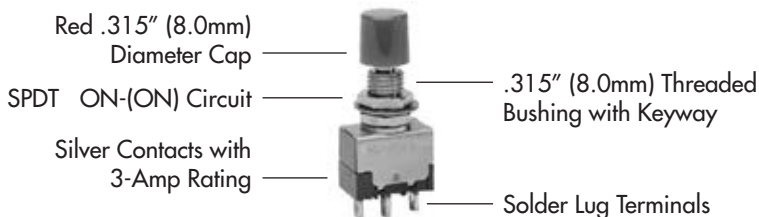
#### IMPORTANT:



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.






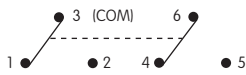
#### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**MB2511S4W01-BC**



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

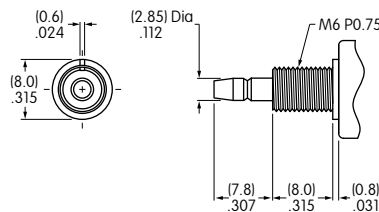
## POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal  Keyway	Down 	Normal  Keyway	Down 	
SP	MB2511	ON	(ON)	3-1	3-2	SPDT 
DP	MB2521	ON	(ON)	3-1 6-4	3-2 6-5	DPDT 

Note: Terminal numbers are not actually on the switch.

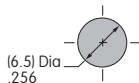
## BUSHING

**S4** .315" (8.0mm)  
Threaded with Keyway

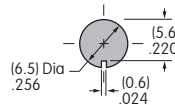


### Panel Cutouts

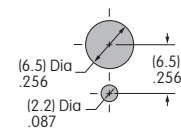
Without Keyway



With Keyway



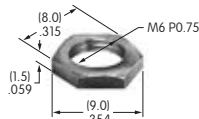
With Optional Locking Ring



Maximum Panel Thickness with Standard Hardware: .134" (3.4mm)

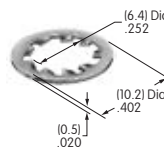
### Standard Hardware

**AT513M** Threaded  
Hex Nut



2 included  
with each switch  
Brass with  
nickel plating

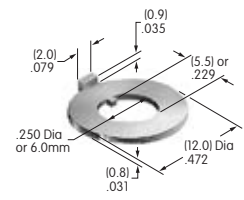
**AT509**  
Lockwasher



1 included  
with each switch  
Steel with  
zinc/chromate

### Optional Hardware

**AT507M**  
Locking Ring



Steel with  
zinc/chromate

## CONTACT MATERIALS & RATINGS

**W**

Silver over Silver

Power Level

3A @ 125V AC

**G**

Gold over Brass or Copper

Logic Level

0.4VA maximum @ 28V AC/DC maximum

Note: Complete explanation of operating range in Supplement section.

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

Toggle

Rockers

Pushbuttons

Programmable Illuminated PB

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

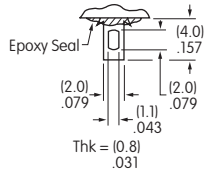
Indicators

Accessories

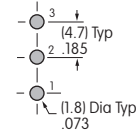
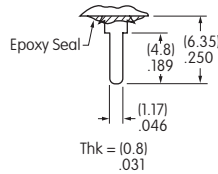
Supplement

## TERMINALS

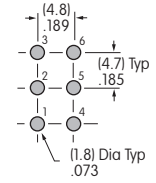
**01** Solder Lug



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



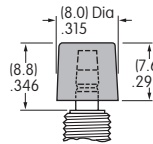
Single Pole



Double Pole

## CAPS & CAP COLORS

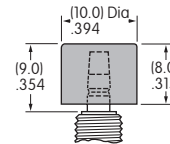
**B** AT443  
.315" (8.0mm) Diameter Cap



Material: Polycarbonate

Finish: Glossy

**C** AT442  
.394" (10.0mm) Diameter Cap



Material: Polycarbonate

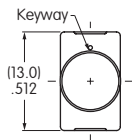
Finish: Glossy

Cap Colors Available:

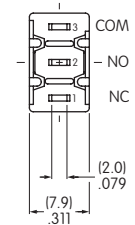
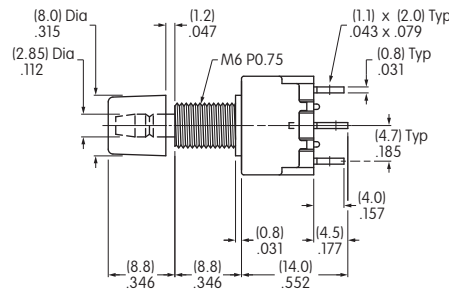
- A** Black
- B** White
- C** Red
- E** Yellow
- F** Green
- G** Blue

## TYPICAL SWITCH DIMENSIONS

Solder Lug

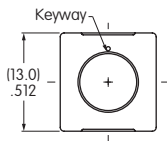


Single Pole

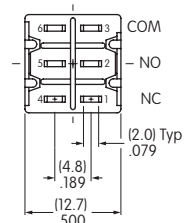
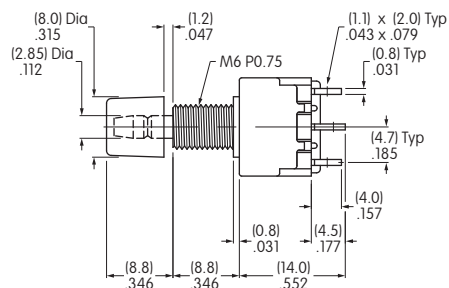


MB2511S4W01-BC

Solder Lug

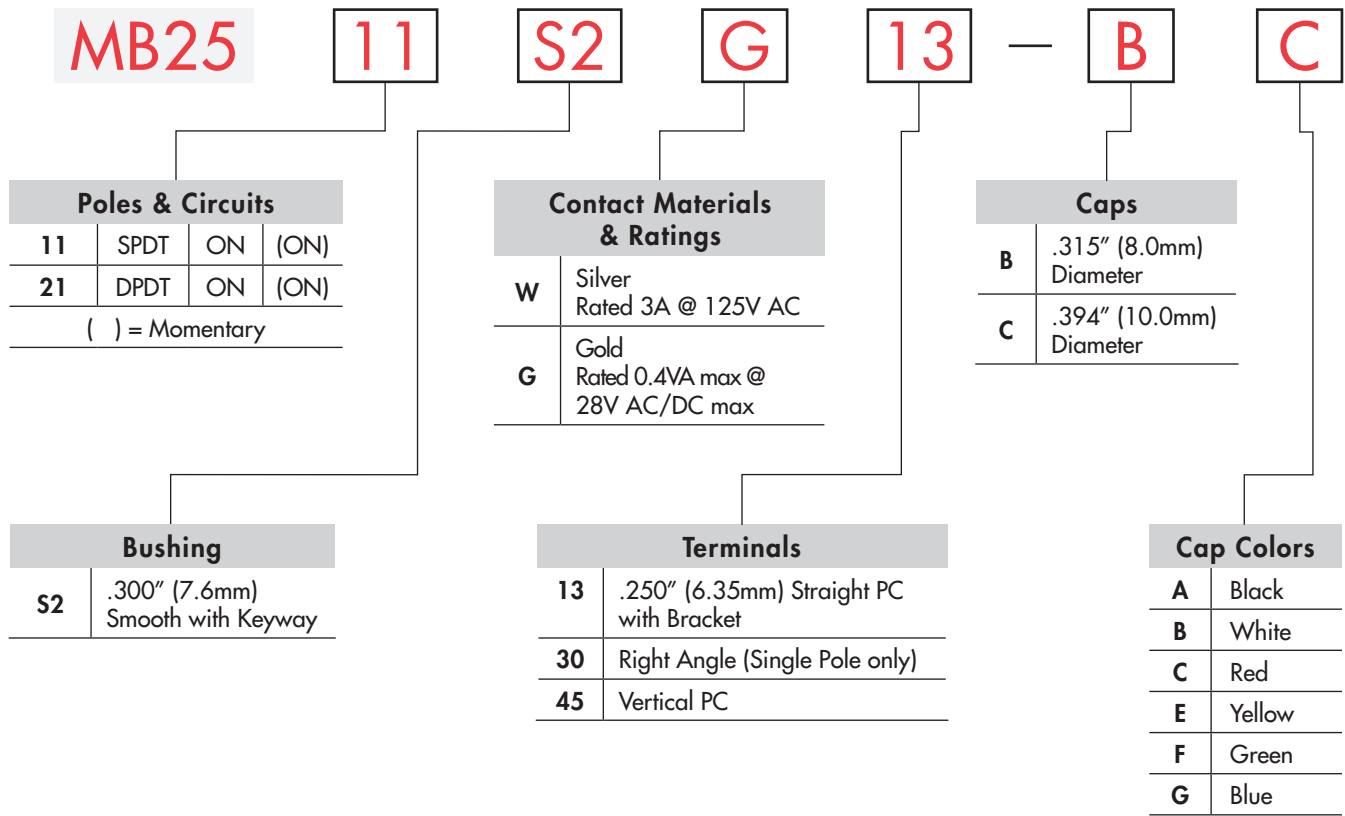


Double Pole



MB2521S4W01-BC

TYPICAL SWITCH ORDERING EXAMPLE



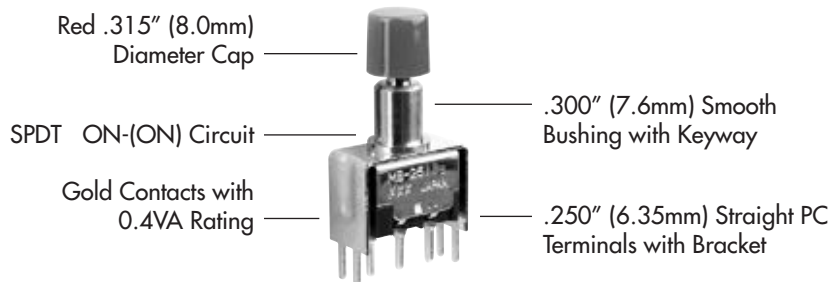
**IMPORTANT:**



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

**MB2511S2G13-BC**



- Toggle
- Rockers
- Pushbuttons**
- Illuminated PB
- Programmable
- Keylocks
- Rotaries
- Slides
- Tactiles
- Tilt
- Touch
- Indicators
- Accessories
- Supplement

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

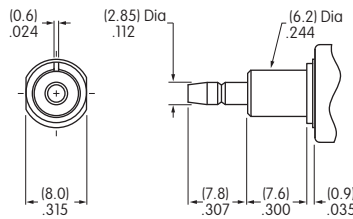
Supplement

### POLES & CIRCUITS

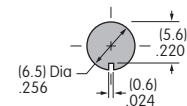
Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal	Down	Normal	Down	
						Note: Terminal numbers are not actually on the switch.
SP	MB2511	ON	(ON)	3-1	3-2	SPDT
DP	MB2521	ON	(ON)	3-1 6-4	3-2 6-5	DPDT

### BUSHING

**S2** .300" (7.6mm)  
Smooth with Keyway



#### Panel Cutout



### CONTACT MATERIALS & RATINGS

**W** Silver over Silver

Power Level

3A @ 125V AC

**G** Gold over Brass or Copper

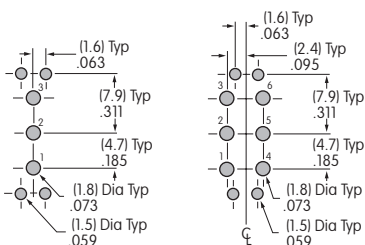
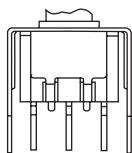
Logic Level

0.4VA maximum @ 28V AC/DC maximum

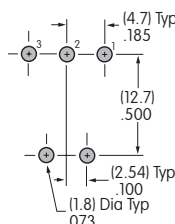
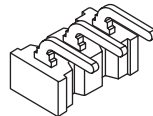
Note: Complete explanation of operating range in Supplement section.

### TERMINALS

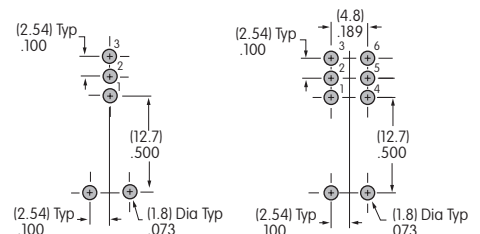
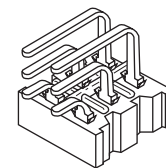
**13** .250" (6.35mm) Terminal  
with .465" (11.8mm) Bracket



**30** Right Angle PC  
Single Pole only



**45** Vertical PC



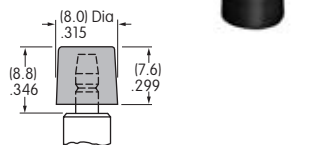
## CAPS & CAP COLORS

**B** AT443  
.315" (8.0mm) Diameter Cap



Material: Polycarbonate

Finish: Glossy

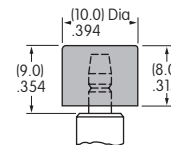


**C** AT442  
.394" (10.0mm) Diameter Cap



Material: Polycarbonate

Finish: Glossy



Cap Colors Available:



Black



White



Red



Yellow



Green



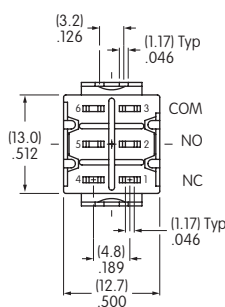
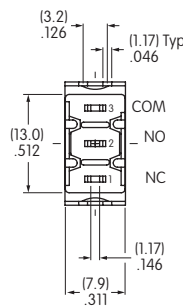
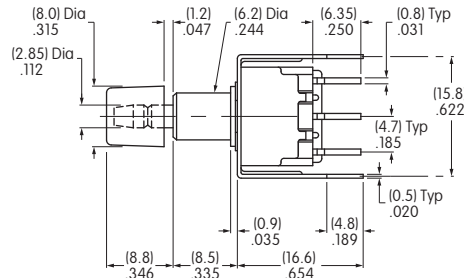
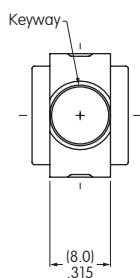
Blue

## TYPICAL SWITCH DIMENSIONS

Single Pole

Double Pole

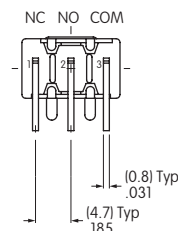
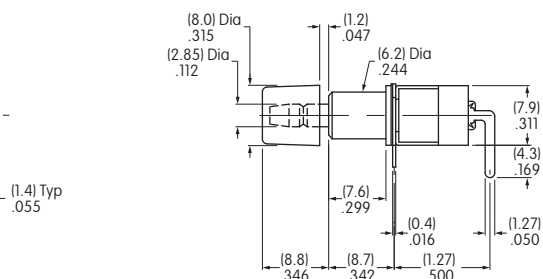
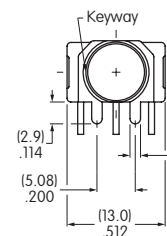
Straight PC • Bracket



MB2511S2G13-BC

Single Pole

Right Angle PC

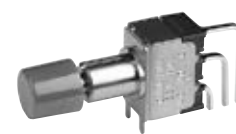
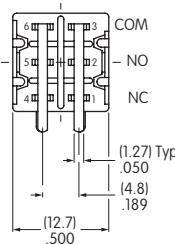
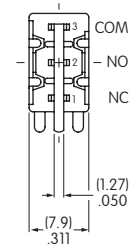
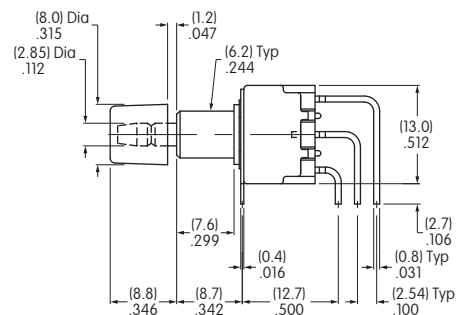
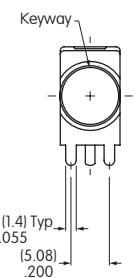


MB2511S2G30-BC

Single Pole

Double Pole

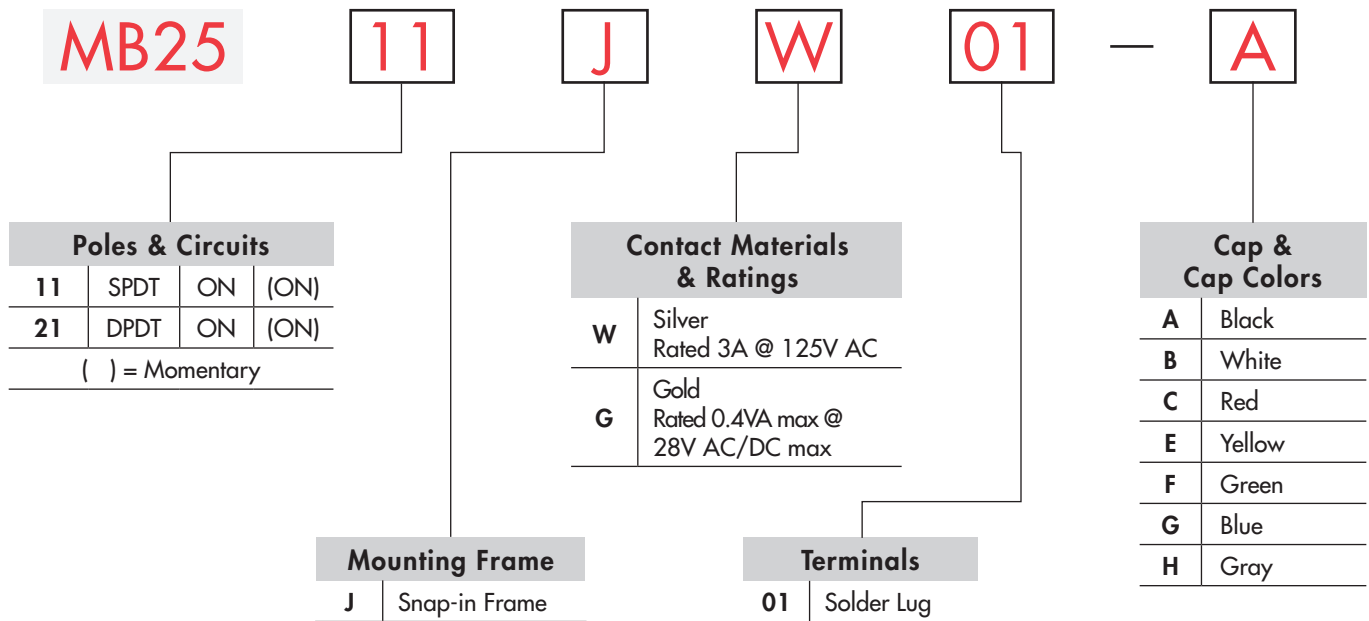
Vertical PC



MB2511S2G45-BC

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

### TYPICAL SWITCH ORDERING EXAMPLE



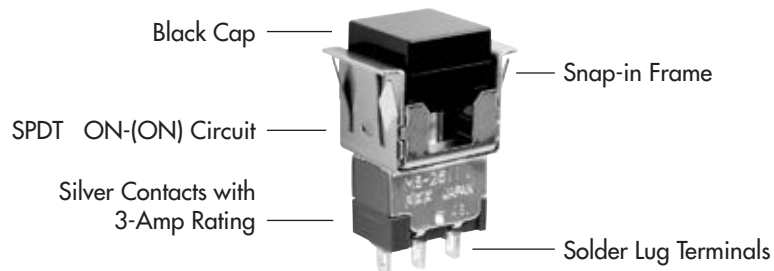
#### IMPORTANT:












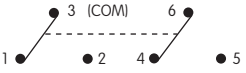
Switches are supplied without UL, cULus & CSA marking unless specified. **UL, cULus & CSA recognized only when ordered with marking on the switch.** Specific models, ratings, & ordering instructions are noted on the General Specifications page.

#### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

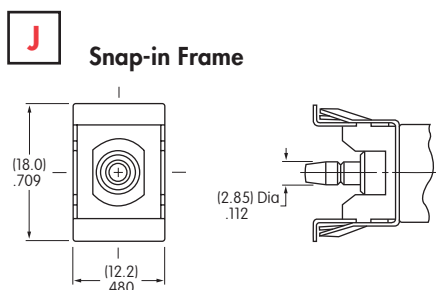
**MB2511JW01-A**



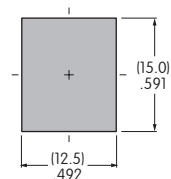
## POLES & CIRCUITS

Pole	Model	Plunger Position ( ) = Momentary		Connected Terminals		Throw & Switch Schematics
		Normal	Down	Normal	Down	
SP	MB2511	ON 	(ON) 	3-1 	3-2 	Note: Terminal numbers are not actually on the switch. SPDT 
DP	MB2521	ON 	(ON) 	3-1 6-4 	3-2 6-5 	DPDT 

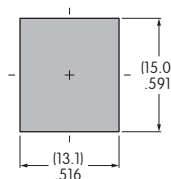
## MOUNTING FRAME



Panel Cutout for Single Pole without Bezel



Panel Cutout for Double Pole without Bezel



Panel Thickness without Bezel: .039" ~ .157" (1.0mm ~ 4.0mm)  
Panel Thickness with Bezel: .039" ~ .126" (1.0mm ~ 3.2mm)

## CONTACT MATERIALS & RATINGS

**W** Silver over Silver

Power Level

3A @ 125V AC

**G** Gold over Brass or Copper

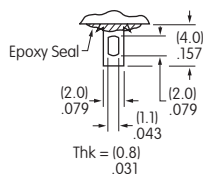
Logic Level

0.4VA maximum @ 28V AC/DC maximum

Note: Complete explanation of operating range in Supplement section.

## TERMINALS

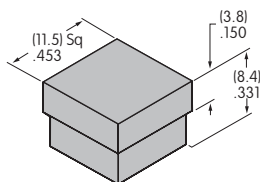
**01** Solder Lug



## CAP & CAP COLORS

AT465  
.453" (11.5mm) Square Cap

Material: Polycarbonate  
Finish: Glossy



Contact factory for matte finish.

Cap Colors Available:

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

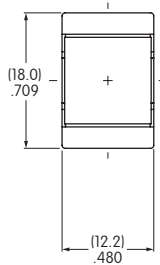
Toggles  
Rockers  
Pushbuttons  
Illuminated PB  
Programmable  
Keylocks  
Rotaries  
Slides  
Tactiles  
Tilt  
Touch  
Indicators  
Accessories  
Supplement

## TYPICAL SWITCH DIMENSIONS

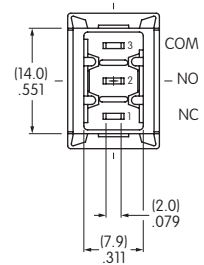
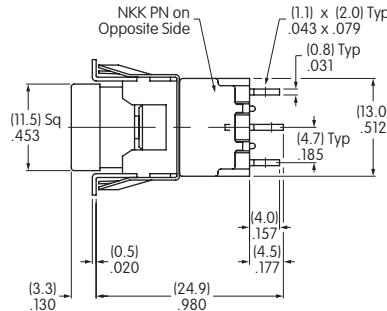
### Solder Lug



**MB2511JW01-A**



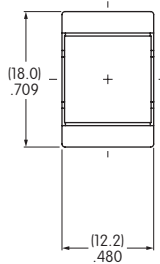
### Single Pole



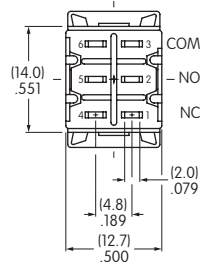
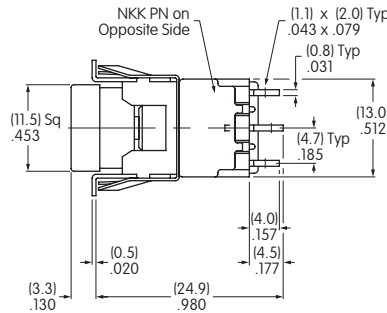
### Solder Lug



**MB2521JW01-C**



### Double Pole



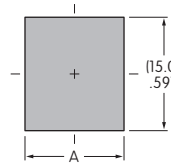
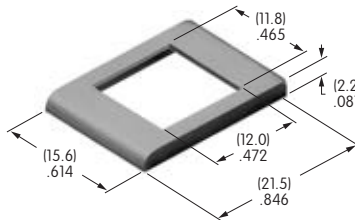
## OPTIONAL SNAP-IN BEZELS & BEZEL COLORS

### AT207 Bezel

Material: Polycarbonate  
Finish: Glossy

Colors:  
Black, White, Red, Yellow,  
Green, Blue, Gray

Contact factory for matte finish.



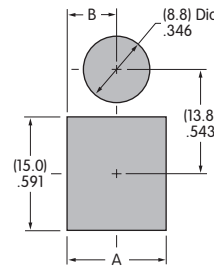
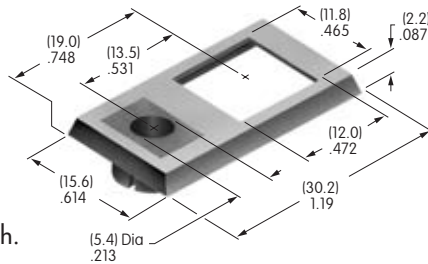
	Single Pole	Double Pole
A	(12.5mm) .492"	(13.1mm) .516"

### AT208 Bezel for AT070 LED

Material: Polycarbonate  
Finish: Glossy

Color: Black

Contact factory for matte finish.

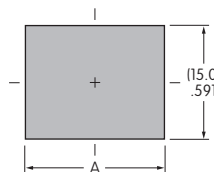
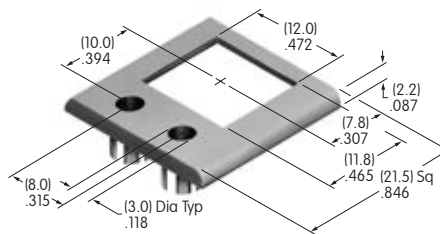


	Single Pole	Double Pole
A	(12.5mm) .492"	(13.1mm) .516"
B	(6.25mm) .246"	(6.55mm) .258"

### AT212 Bezel for AT617 LED

Material: Polycarbonate  
Finish: Semi-glossy

Color: Black



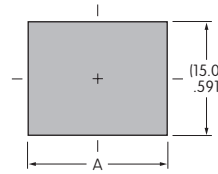
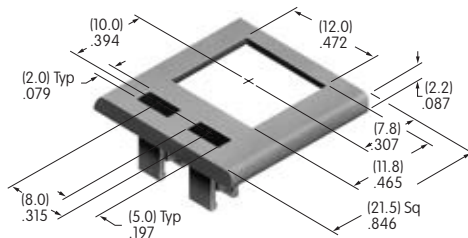
	Single Pole	Double Pole
A	(18.4mm) .724"	(18.7mm) .736"

## OPTIONAL SNAP-IN BEZELS & BEZEL COLORS

### AT213 Bezel for AT618 LED

Material:  
Polycarbonate  
Finish:  
Semi-glossy

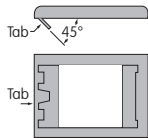
Color:  
Black



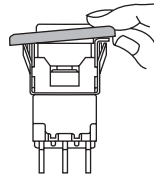
	Single Pole	Double Pole
A	(18.4mm) .724"	(18.7mm) .736"

### Bezel Assembly

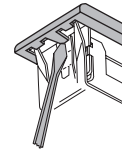
1. Pry out tab on bezel to a 45° angle.



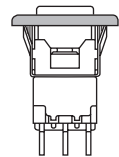
2. Insert switch frame under tab and snap on the bezel.



3. Push tab back into place.



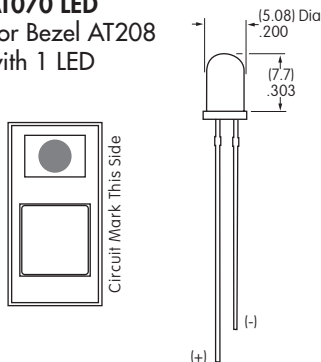
4. Snap assembled bezel and switch into panel.



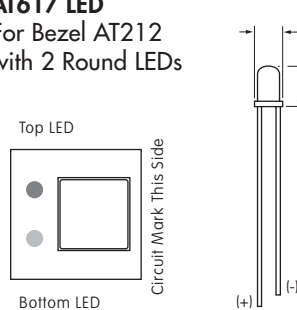
## LED COLORS & SPECIFICATIONS

### Bezel Orientation on Switch

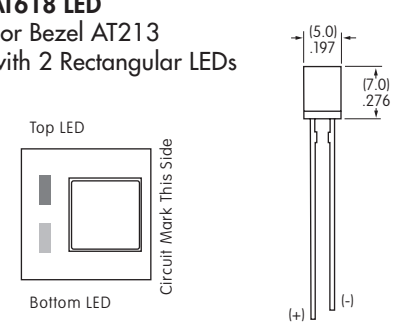
#### AT070 LED For Bezel AT208 with 1 LED



#### AT617 LED For Bezel AT212 with 2 Round LEDs



#### AT618 LED For Bezel AT213 with 2 Rectangular LEDs



Note: Lead lengths may differ from manufacturing lot to lot. The longer lead is the anode (+).

		AT070		AT617			AT618		
		C	F	C	E	F	C	E	F
Color		Red	Green	Red	Yellow	Green	Red	Yellow	Green
Maximum Forward Current	$I_{FM}$	25mA	50mA	30mA	30mA	30mA	25mA	30mA	25mA
Typical Forward Current	$I_F$	20mA	30mA	20mA	20mA	20mA	20mA	20mA	20mA
Forward Voltage	$V_F$	2.8V	2.1V	2.1V	2.1V	2.2V	2.25V	2.1V	2.2V
Maximum Reverse Voltage	$V_{RM}$	4V	5V	5V	5V	5V	5V	5V	5V
Current Reduction Rate Above 25°C	$\Delta I_F$	0.33 mA/°C	0.40 mA/°C	0.40 mA/°C	0.40 mA/°C	0.40 mA/°C	0.33 mA/°C	0.40 mA/°C	0.33 mA/°C
Ambient Temperature Range (when used with a bezel)		-10° ~ +70°C		-15° ~ +70°C			-25° ~ +70°C		

The electrical specifications shown are determined at a basic temperature of 25°C.  
LED circuit is independent of switch operation. LED is colored in OFF state.

If the source voltage is greater than the rated voltage of the LED, a ballast resistor must be connected in series with the LED.  
The ballast resistor calculation and more lamp detail are shown in the Supplement section.

### GENERAL SPECIFICATIONS FOR SB25, SB60s, SB221s, SB265

#### Electrical Capacity (Resistive Load)

**Power Level:** Shown in the following tables

#### Other Ratings

<b>Contact Resistance:</b>	10 milliohms maximum
<b>Insulation Resistance:</b>	200 megohms minimum @ 500V DC for SB221s, SB25, & SB265; 1,000 megohms minimum @ 500V DC for SB60s.
<b>Dielectric Strength:</b>	1,500V AC minimum for SB265 & SB25 for 1 minute minimum; 2,000V AC minimum between contacts for SB221s & SB60s for 1 minute minimum; 1,500V AC minimum between contacts & case for SB221s & SB60s for 1 minute minimum
<b>Mechanical Life:</b>	50,000 operations minimum for SB221s; 30,000 operations minimum for SB25, SB60s, SB265
<b>Electrical Life:</b>	10,000 operations minimum
<b>Total Travel:</b>	SB221s .116" (2.95mm); SB60s .094" (2.4mm); SB265 .213" (5.4mm); SB25 .195" (4.95mm)
<b>Operating Temp Range:</b>	-10°C through +70°C (+14°F through +158°F)

#### Materials & Finishes

<b>Cap:</b>	Polybutylene terephthalate (PBT) (AT414)
<b>Plunger:</b>	Polyacetal
<b>Bushing:</b>	Brass with nickel plating
<b>Case:</b>	Phenolic resin or melamine phenolic resin
<b>Case Cover:</b>	Steel with zinc plating
<b>Movable &amp; Stationary Contacts:</b>	Copper with silver plating for SB221s; silver alloy with silver plating for SB25, SB60s, & SB265
<b>Terminals:</b>	Copper with tin plating for SB25 & SB60s; copper with silver plating for SB265



#### Installation



**Soldering Time & Temp:** Manual Soldering (Solder Lug): See Profile A in Supplement section.

#### Standards & Certifications

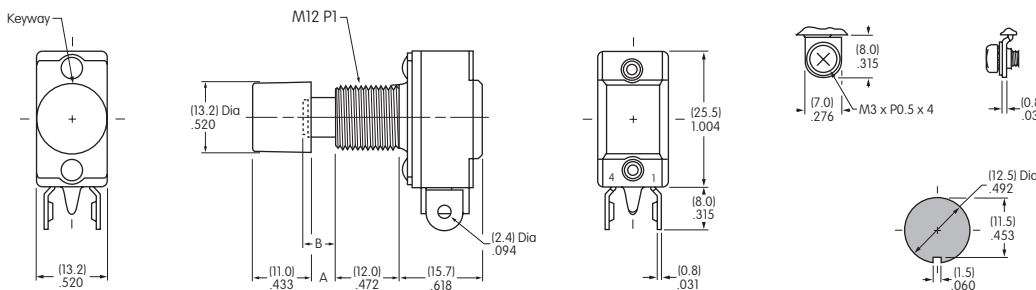
- UL:** **File No. E44145 - Recognized only when ordered with marking on switch.**  
Add "/U" or "/CUL" to end of part number to order UL recognized switch.  
UL or cULus recognition designated beside part numbers on following pages.  
See Supplement section to find UL or cULus rating details.
- CSA:**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

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)			Pushbutton Position/Connected Terminals ( ) = Momentary		Electrical Capacity (Resistive)	
Model	* Approvals UL cULus SP	Pole & Throw	Normal 	Down 	AC 125V	AC 250V
SB221NO	— — ✓	SPST	OFF —	(ON) 1-4	3A	1.5A
SB221NC	✓ ✓ ✓	SPST	ON 1-4	(OFF) —	3A	1.5A
SB221TNO	— — ✓	SPST	OFF —	(ON) 1-4	3A	1.5A
SB221TNC	✓ ✓ ✓	SPST	ON 1-4	(OFF) —	3A	1.5A

Suffix T = Screw Lug      **Throw & Schematic:**      SPST SB221NO       SPST SB221NC       Note: Terminal numbers are actually on the switch.

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





Dimension A: .185" (4.7mm) for NO model & .150" (3.8mm) for NC model.  
Dimension B Plunger Extension: .197" (5.0mm) for NO model & .161" (4.1mm) for NC model.

Panel Thickness .193" (4.9mm)

**SB221NO**  
Supplied with AT414 Black Cap



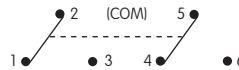
## DOUBLE POLE WITH SOLDER LUG

* UL & cULus recognized only when ordered with marking on switch (see General Specs)			Pushbutton Position/Connected Terminals ( ) = Momentary		Electrical Capacity (Resistive)	
Model	* Approvals UL cULus SP	Pole & Throw	Normal 	Down 	AC 125V	AC 250V
SB61A	✓ ✓ —		ON 2-3 5-6	(ON) 2-1 5-4	10A	5A
SB61B	— — —	DPDT	ON 2-3 5-6	(ON) 2-1 5-4	3A	1.5A
SB63A	— — —	DPDT	ON 2-3 5-6	(ON) or Lockdown ON 2-1 5-4	10A	5A

Lockdown for SB63A is achieved by actuating and then turning the button clockwise.

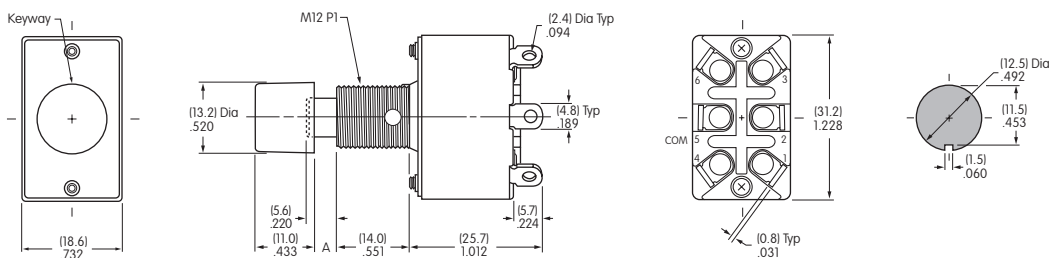
**Throw & Schematic:**

DPDT



Note: Terminal numbers are actually on the switch.

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



Dimension A: .169" (4.3mm) for SB61 model and .130" (3.3mm) for SB63 model.

Panel Thickness .193" (4.9mm)

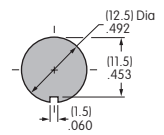
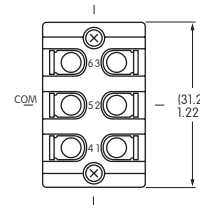
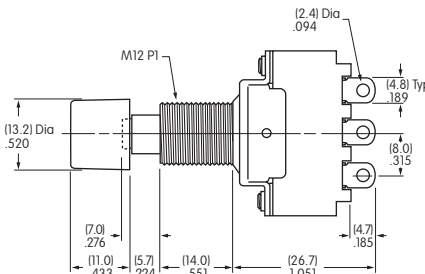
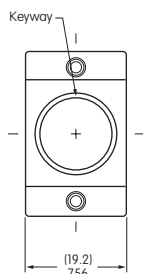
**SB61A**  
Supplied with AT414 Black Cap



### DOUBLE POLE WITH SOLDER LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)			Pushbutton Position/Connected Terminals ( ) = Momentary		Electrical Capacity (Resistive)	
Model	* Approvals	Pole & Throw	Normal	Down	AC 125V	AC 250V
SB25	✓  ✓  ✓	DPDT	ON  2-3 5-6	ON  2-1 5-4	15A	9A
<b>Throw &amp; Schematic:</b>			DPDT		Note: Terminal numbers are actually on the switch.	

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



**SB25**

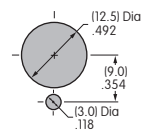
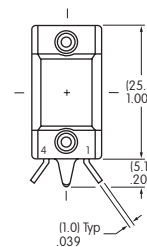
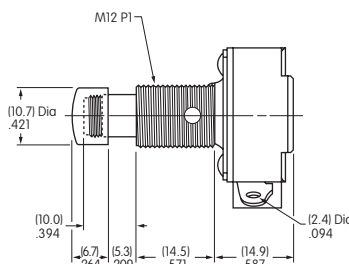
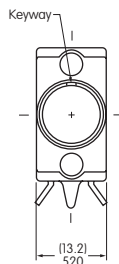
Supplied with AT414 Black Cap

Panel Thickness .193" (4.9mm)

### SINGLE POLE WITH SOLDER LUG

* UL, cULus & CSA recognized only when ordered with marking on switch (see General Specs)			Pushbutton Position/Connected Terminals ( ) = Momentary		Electrical Capacity (Resistive)	
Model	* Approvals	Pole & Throw	Normal	Down	AC 125V	AC 250V
SB265	✓  ✓  ✓	SPST	ON  1-4	OFF  -	6A	3A
<b>Throw &amp; Schematic:</b>			SPST		Note: Terminal numbers are actually on the switch.	

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



**SB265**

Supplied with Chrome Plated Brass Cap

Panel Thickness .291" (7.4mm)

## GENERAL SPECIFICATIONS

### Electrical Capacity

**Resistive Load:** 15A & ½ HP @ 125 or 250V AC for high capacity models  
**Lamp Load:** 5A @ 125V AC

### Other Ratings

**Contact Resistance:** 15 milliohms maximum  
**Insulation Resistance:** 100 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:** 1,000,000 operations minimum  
**Electrical Life:** 50,000 operations minimum  
**Travel:** Pretravel .047" (1.19mm); Overtravel .040" (1.01mm); Differential .011" (0.27mm)  
**Operating Temp Range:** -40°C through +85°C (-40°F through +185°F)

### Materials & Finishes

**Caps & Shrouds:** Polycarbonate with glossy finish or PBT  
**Plunger:** Polyacetal or brass with nickel plating  
**Bushing:** Steel with zinc plating or glass fiber reinforced polyamide  
**Case:** Polyester  
**Movable & Stationary Contacts:** Silver alloy  
**Terminals:** Brass with silver plating

### Standards & Certifications

**UL:** Internal snap switch is UL recognized.  
**CSA:** Internal snap switch is CSA certified.

## TYPICAL SWITCH ORDERING EXAMPLE

**SCB** **2** **5** **P** **15** **A** — **4** **CA**

Poles	
1	SPDT
2	DPDT

Circuits		
5	ON	(ON)
6	ON	ON
( ) = Momentary		

Bushings	
P	Plastic (with momentary only)
S	Steel

Rating	
15	15A

Terminals	
A	.187" (4.75mm) Quick Connect
* B	.250" (6.35mm) Quick Connect
Note: Contact factory for availability of screw lug and solder lug models.	
* Available in Americas only	

Caps & Shrouds	
For Momentary	
3	.520" (13.2mm) Diameter Cap
For Momentary & Alternate Action	
4	Round Cap & Shroud (AT454 & AT455)
5	Rectangular Cap & Shroud (AT452 & AT453)

Colors		
	Caps	Shrouds
A	Black	A
B	White	B
C	Red	-
F	Green	-
G	Blue	-
H	Gray	H

**DESCRIPTION FOR TYPICAL ORDERING EXAMPLE**

**SCB25P15A-4CA**

Round Red Cap with Black Shroud

Plastic Bushing

DPDT ON-(ON) Circuit

15A Rating

.187" (4.75mm) Quick Connect Terminals

Note: Standard hardware is provided with caps. See Bushing detail for more information.

Toggles

Rockers

Pushbuttons

Programmable Illuminated PB

Keylocks

Rotaries

Slides

Tactiles

Tilt






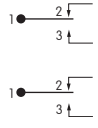
Touch

Indicators

Accessories

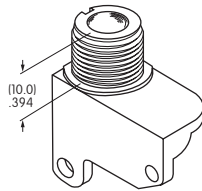
Supplement

## POLES & CIRCUITS

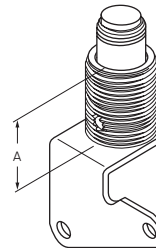
		Plunger Position ( ) = Momentary		Connected Terminals		Throw & Schematics
Pole	Model	Normal  Keyway	Down 	Normal  Keyway	Down 	Note: Terminal numbers are actually on the switch.
SP	SCB15 SCB16	ON ON	(ON) ON	1-2	1-3	SPDT 
DP	SCB25 SCB26	ON ON	(ON) ON	1-2 1-2	1-3 1-3	SP with 2 switches 

## BUSHINGS

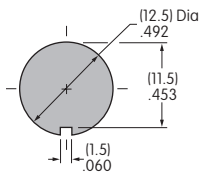
**P** Plastic  
(for Momentary only)



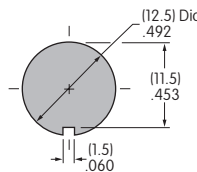
**S** Steel



"A" =  
11.2mm  
Momentary  
15.5mm  
Alternate Action



Maximum Effective Panel Thickness:  
.165" (4.2mm) without Shroud  
.157" (4.0mm) with Shroud



Maximum Effective Panel Thickness:  
Momentary: .177" (4.5mm) without Shroud  
.157" (4.0mm) with Shroud  
Alternate Action: .354" (9.0mm)

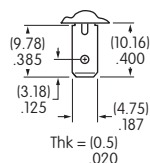
### Standard Hardware Provided with Caps

Cap Option 3: AT504M Knurled Face Nut, AT508 Lockwasher, AT527M Hex Mounting Nut

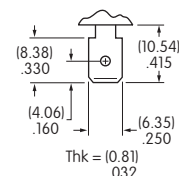
Cap Options 4 & 5: AT508 Lockwasher & AT527M Hex Mounting Nut

## TERMINALS

**A** .187" (4.75mm)  
Quick Connect

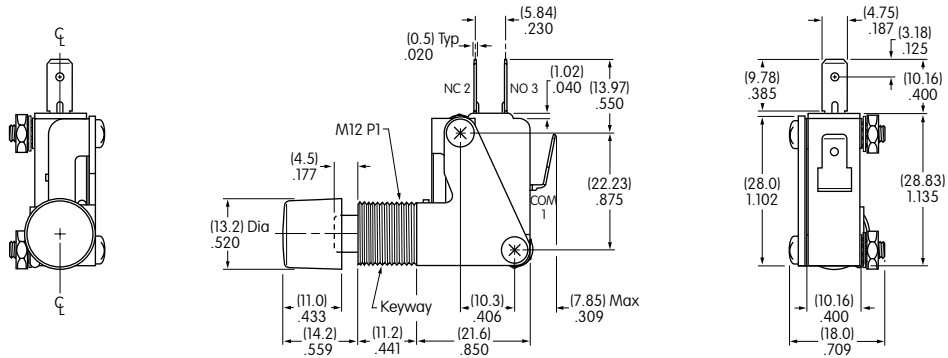


**B** .250" (6.35mm)  
Quick Connect



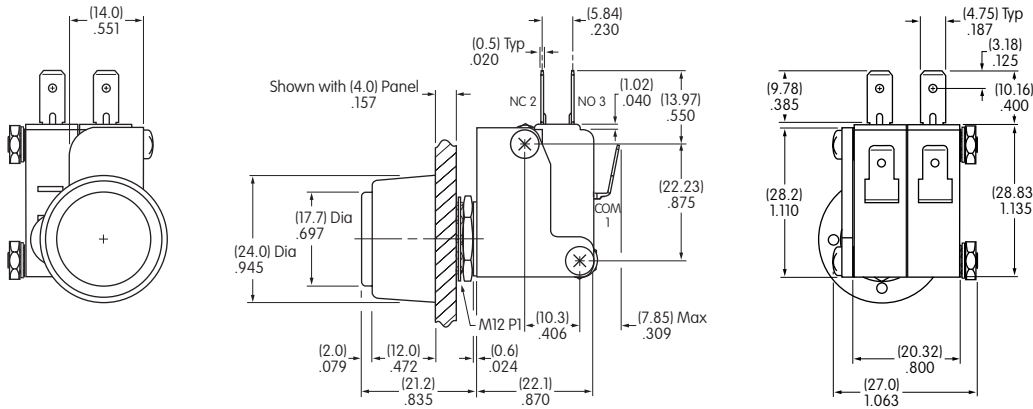
TYPICAL SWITCH DIMENSIONS

.520" (13.2mm) Dia. Cap • .187" (4.75mm) Quick Connect



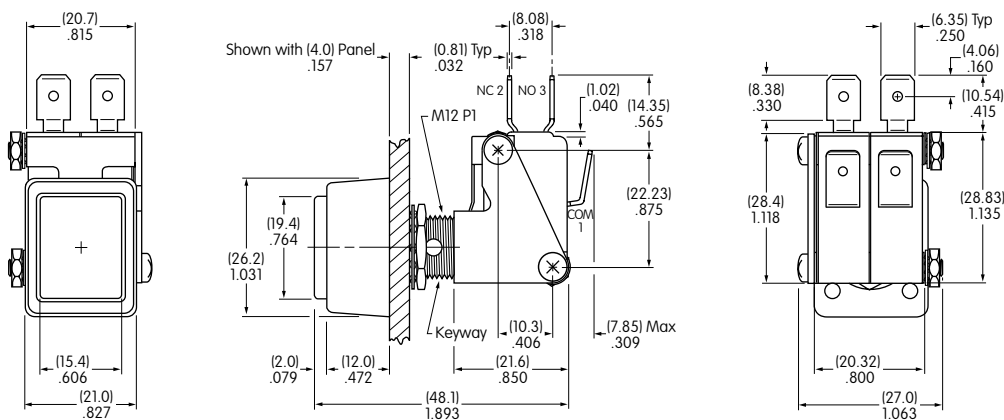
SCB15S15A-3C

Round Cap & Shroud • .187" (4.75mm) Quick Connect



SCB25P15A-4CA

Rectangular Cap & Shroud • .250" (6.35mm) Quick Connect



SCB26S15B-5CA

# General Specifications

## Electrical Capacity (Resistive Load)

**Power Level:** 6A @ 125V AC & 3A @ 250V AC or 6A @ 30V DC

## Other Ratings

<b>Contact Resistance:</b>	10 milliohms maximum for solder lug & screw terminal models 30 milliohms maximum for wire lead terminal models
<b>Insulation Resistance:</b>	200 megohms minimum @ 500V DC
<b>Dielectric Strength:</b>	1,500V AC minimum for 1 minute minimum
<b>Mechanical Life:</b>	30,000 operations minimum
<b>Electrical Life:</b>	15,000 operations minimum
<b>Contact Timing:</b>	Break before make
<b>Total Travel:</b>	Alternate Action .177" (4.5mm); Momentary Action .110" (2.8mm)

## Materials & Finishes

<b>Plunger:</b>	Brass with nickel plating
<b>Bushing &amp; Outer Case:</b>	Fiberglass reinforced polyamide (UL94V-0 outer case)
<b>Inner Case:</b>	Melamine
<b>Inner Sealing Ring:</b>	Silicone rubber
<b>Outer Sealing Ring:</b>	Nitrile butadiene rubber
<b>Movable Contactor:</b>	Copper with silver plating
<b>Movable Contacts:</b>	Silver alloy with silver plating
<b>Stationary Contacts:</b>	Silver alloy with silver plating
<b>Terminals:</b>	Brass with tin plating
<b>Wire Lead Covers:</b>	Heat resistant polyvinyl chloride (Leads are AWG 16.)

## Environmental Data

<b>Operating Temp Range:</b>	-30°C through +70°C (-22°F through +158°F)
<b>Humidity:</b>	90 ~ 95% humidity for 96 hours @ 40°C (104°F)
<b>Vibration:</b>	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
<b>Shock:</b>	50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

<b>Mounting Torque:</b>	1.5Nm (13 lb•in)
<b>Soldering Time &amp; Temp:</b>	Manual Soldering: See Profile A in Supplement section.

## Standards & Certifications

<b>Flammability Standards:</b>	UL94V-0 outer case
<b>Wiring Material Standards:</b>	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

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

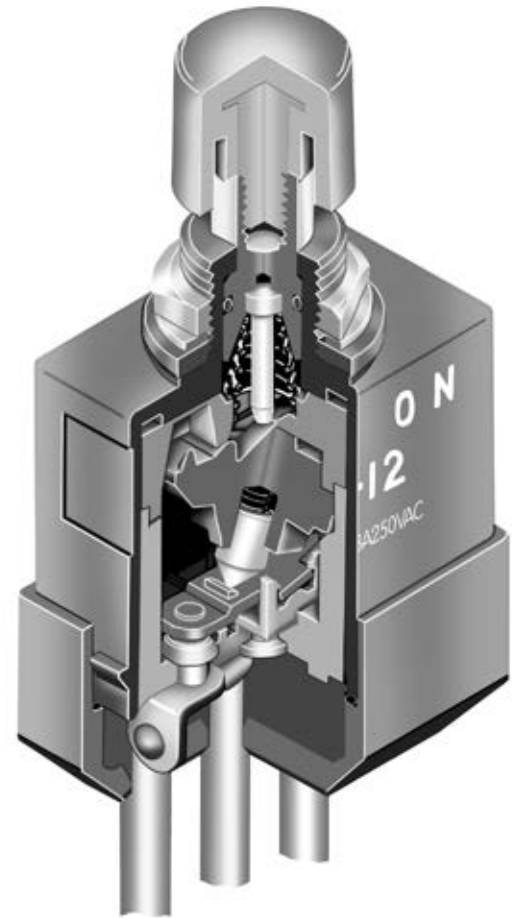
Specially designed contact mechanism for breaking light welds.

Minimal contact bounce is achieved with specially designed interlocked switching mechanism.

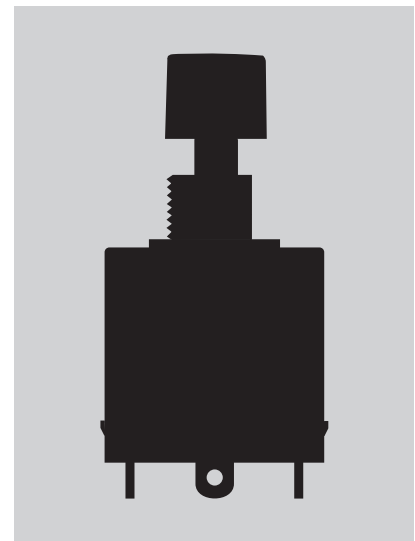
Outer housing of heat resistant resin meets UL94V-0 flammability standard and provides high arc and tracking resistance.

Solder lug and screw terminal models meet IP67 of IEC 60529 Standards at front panel (dust tight and water protected for temporary immersion). Behind panel standard is IP60 (dust tight but not water protected).

Wire lead models conform fully to IP67 of IEC 60529 Standards at front and behind panel (dust tight and water protected for temporary immersion). These models are epoxy sealed at the switch base and covered by an outer case for further protection from dust and water (not operable under water).



Actual Size



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

## TYPICAL SWITCH ORDERING EXAMPLE

**WB**

**1**

**2**

**S**

**D**

**A**

### Poles

**1** SPDT

### Circuits

**2** ON ON  
**5** ON (ON)

( ) = Momentary

### Terminals

**S** Solder Lug  
**T** Screw Lug  
**L** Wire Lead

### Caps

**D** .520" (13.2mm) Dia.  
**E** .748" (19.0mm) Dia.

### Cap Colors

**A** Black  
**B** White  
**C** Red  
**\*D** Amber  
**\*E** Yellow  
**F** Green  
**\*G** Blue  
  
\* Not available with cap code E

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**WB12S-DA**

SPDT  
ON-ON Circuit



Black .520" (13.2mm) Diameter Cap

Solder Lug Terminals

## POLES & CIRCUITS

		Actuator Position ( ) = Momentary		Connected Terminals		Throw & Schematics
Pole	Model	Normal 	Down 	Normal 	Down 	Note: Terminal numbers are not actually on wire lead models.  SPDT
SP	<b>WB12</b>	ON	ON	1-1b	1-1a	
SP	<b>WB15</b>	ON	ON (ON)	1-1b	1-1a	

## 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).

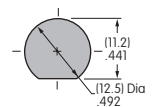
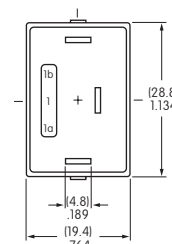
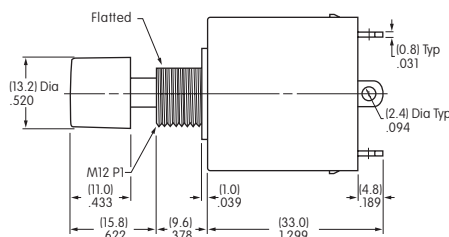
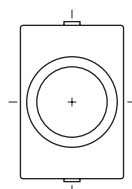
Terminal Numbers & Wire Colors			
Models	1a	1	1b
WB12L, WB15L	White	Black	Red

## TYPICAL SWITCH DIMENSIONS

### Solder Lug



**WB15S-DA**



Panel Thickness  
.157" (4.0mm)

## TYPICAL SWITCH DIMENSIONS

### Screw Lug

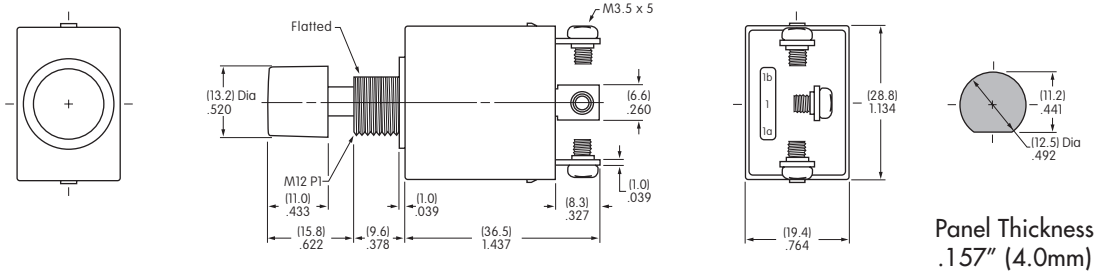


**WB12T-DA**

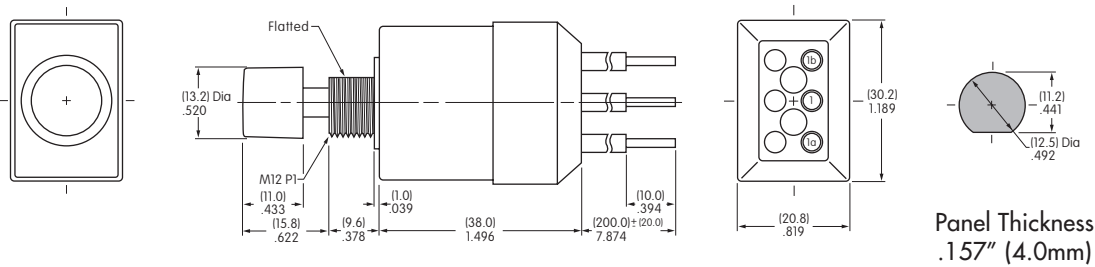
### Wire Lead



**WB12L-DA**



Panel Thickness  
.157" (4.0mm)



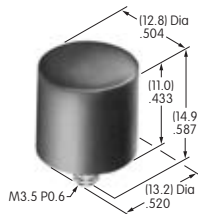
Panel Thickness  
.157" (4.0mm)

## CAPS & CAP COLORS

**D** AT414  
.520" (13.2mm) Diameter

Colors Available:  
A B C D E F G

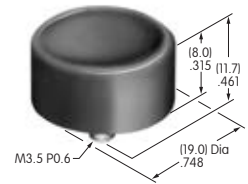
Material: PBT Finish: Glossy



**E** AT412  
.748" (19.0mm) Diameter

Colors Available:  
A B C F

Material: Polystyrene Finish: Glossy

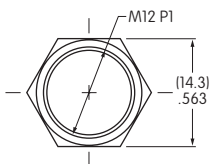


Cap Color Codes: **A** Black **B** White **C** Red **D** Amber **E** Yellow **F** Green **G** Blue **H** Gray

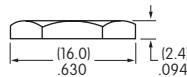
## STANDARD HARDWARE

### AT503M Hex Face Nut

Material:  
Brass with  
chrome plating

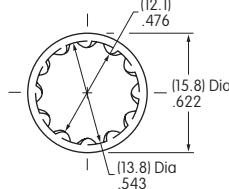


1 supplied  
with each  
switch



### Internal Tooth Lockwasher

Material:  
Phosphor  
bronze/chromate

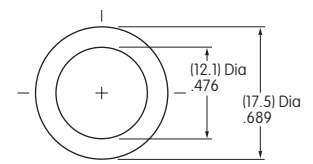


1 supplied  
with each  
switch



### AT401P O-ring

Material:  
Nitrile  
butadiene  
rubber



1 supplied  
with each  
switch

