

# Distinctive Characteristics

Power and logic level capabilities available to suit varying applications.

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

Stainless steel frame resists corrosion.

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

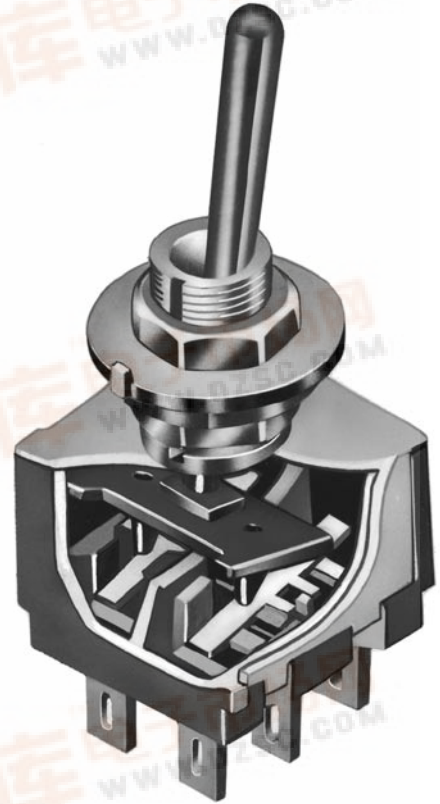
Antijamming design protects contact mechanism from damage if lever is subjected to sharp downward force or other harsh treatment.

Bias guard achieved by interlocking actuator block with lever and interior guide; diagonal force on toggle is not transmitted to actuator block and misalignment of contacts is prevented.

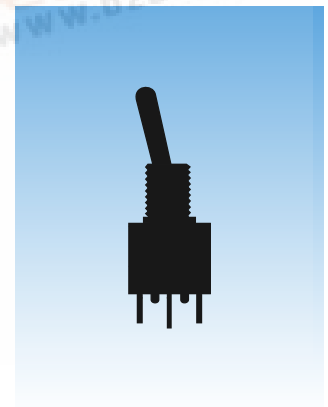
Higher insulating barriers protect against crossover in double pole devices.

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



# General Specifications

### Electrical Capacity (Resistive Load)

|                                    |                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Power Level (No Code or P):</b> | 3A @ 125V AC for silver contacts                                                                    |
| <b>Logic Level (code G or PG):</b> | 0.4VA maximum @ 28V AC/DC maximum for gold contacts<br>(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;<br>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;<br>1,500V AC minimum between contacts & case for 1 minute minimum |
| <b>Mechanical Life:</b>       | 100,000 operations minimum                                                                                                 |
| <b>Electrical Life:</b>       | 20,000 operations minimum for silver;<br>50,000 operations minimum for gold                                                |
| <b>Angle of Throw:</b>        | 25°                                                                                                                        |

### Materials & Finishes

|                             |                                    |
|-----------------------------|------------------------------------|
| <b>Toggle:</b>              | Brass with chrome 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 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<br>& returning in 1 minute; 3 right angled directions for 2 hours |
| <b>Shock:</b>                | 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)                                               |

### Installation

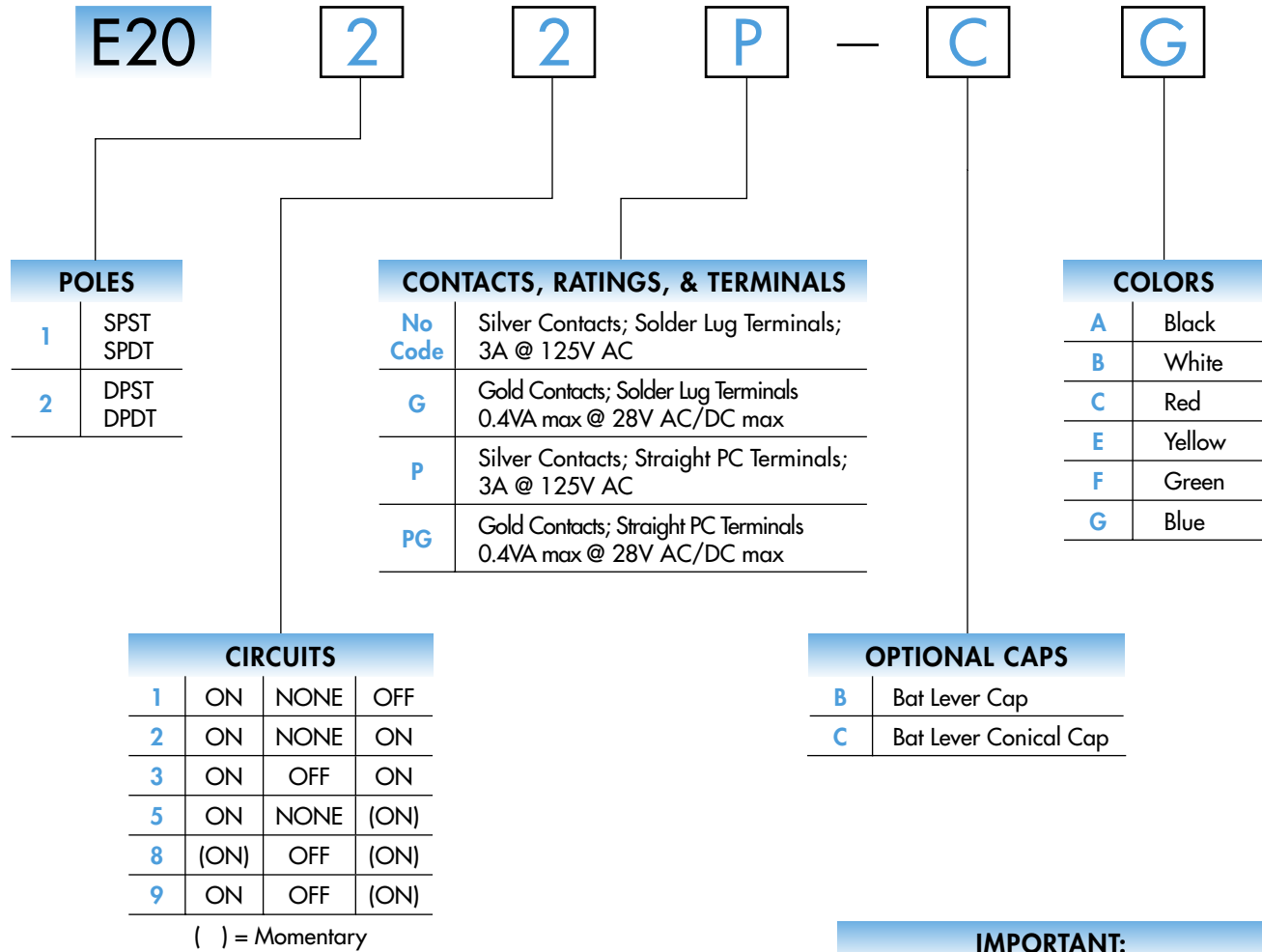
|                                   |                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mounting Torque:</b>           | 1.47Nm (13 lb•in) for double nut; .686Nm (6 lb•in) for single nut                                                                                                                                                                                                                                                                                   |
| <b>Soldering Time &amp; Temp:</b> | Circuits 2 & 5 Manual Soldering: 3 seconds maximum @ 350°C maximum<br>Wave Solder: 5 seconds maximum @ 270°C maximum.<br>Circuits 1, 3, 8, & 9 Manual Soldering: 4 seconds maximum @ 410°C maximum<br>Wave Solder: See Profile A in Supplement section.<br>Note: On circuits 1, 3, 8, & 9 levers must be in center or off position while soldering. |

### Standards & Certifications

|                                |                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flammability Standards:</b> | UL94V-0 case                                                                                                                                                                                                                               |
| <b>UL Recognized:</b>          | All single & double pole models recognized at 3A @ 125V AC;<br>UL File No. WOYR2.E44145;<br>add "/U" to end of part number to order UL mark on switch.                                                                                     |
| <b>CSA Certified:</b>          | Single pole, double throw solder lug & PC models certified at 3A @ 125V AC;<br>double pole, double throw PC models certified at 3A @ 125V AC;<br>CSA File No. 023535-0-000;<br>add "/C" to end of part number to order CSA mark on switch. |



### TYPICAL SWITCH ORDERING EXAMPLE



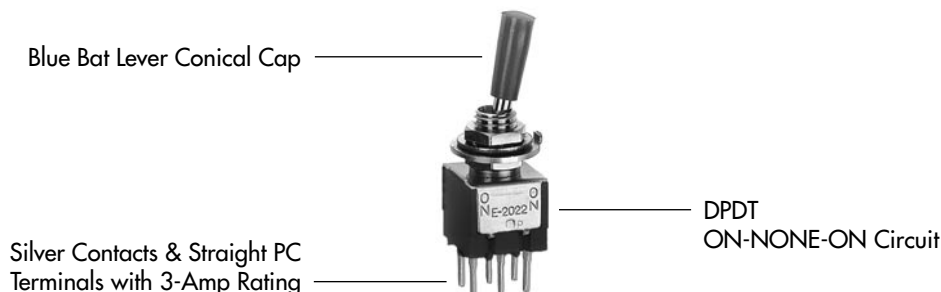
#### IMPORTANT:



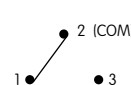
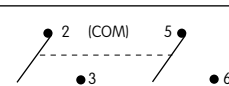
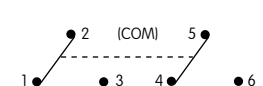
Switches are supplied without UL & CSA marking unless specified. Specific models & ratings noted on General Specifications page.

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**E2022P-CG**



### POLES & CIRCUITS

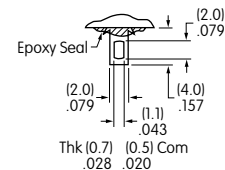
| Pole | Model                                     | Toggle Position<br>( ) = Momentary                                                        |                                                                                             |                                                                                         | Connected Terminals                                                                       |                                                                                             |                                                                                         | Throw & Schematics                                                                          |
|------|-------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|      |                                           | Down<br> | Center<br> | Up<br> | Down<br> | Center<br> | Up<br> |                                                                                             |
| SP   | E2011                                     | ON                                                                                        | NONE                                                                                        | OFF                                                                                     | 2-3                                                                                       | OPEN                                                                                        | OPEN                                                                                    | SPST<br> |
| SP   | E2012<br>E2013<br>E2015<br>E2018<br>E2019 | ON<br>ON<br>ON<br>(ON)<br>ON                                                              | NONE<br>OFF<br>NONE<br>OFF<br>OFF                                                           | ON<br>ON<br>(ON)<br>(ON)<br>(ON)                                                        | 2-3                                                                                       | OPEN                                                                                        | 2-1                                                                                     | SPDT<br> |
| DP   | E2021                                     | ON                                                                                        | NONE                                                                                        | OFF                                                                                     | 2-3 5-6                                                                                   | OPEN                                                                                        | OPEN                                                                                    | DPST<br> |
| DP   | E2022<br>E2023<br>E2025<br>E2028<br>E2029 | ON<br>ON<br>ON<br>(ON)<br>ON                                                              | NONE<br>OFF<br>NONE<br>OFF<br>OFF                                                           | ON<br>ON<br>(ON)<br>(ON)<br>(ON)                                                        | 2-3 5-6                                                                                   | OPEN                                                                                        | 2-1 5-4                                                                                 | DPDT<br> |

### 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**

#### Wiring Specifications

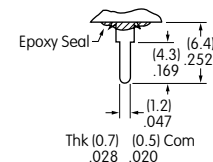
The .043" x .079" (1.1mm x 2.0mm) oblong terminal hole accommodates one solid 18-gauge wire or two solid or stranded 20-gauge wires.

Complete explanation of operating range in Supplement section.



**Straight PC  
Silver Contacts**

**Power Level  
3A @ 125V AC**

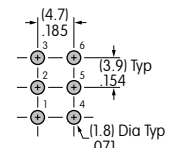
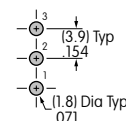


#### PCB Footprints



**Straight PC  
Gold Contacts**

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



Single Pole

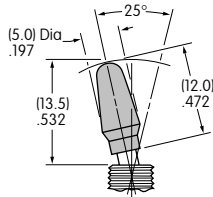
Double Pole

Complete explanation of operating range in Supplement section.

### OPTIONAL CAPS & COLORS

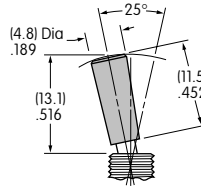
**B** AT415  
Bat Lever Cap

Cap Lever Material  
Polyethylene



**C** AT444  
Bat Lever Conical Cap

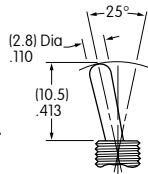
Cap Lever Material  
Polyethylene



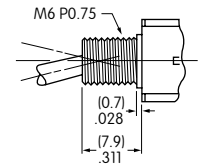
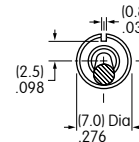
Cap Colors Available:

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

The E Series toggles have a bat lever .413" (10.5mm) long.



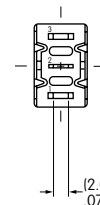
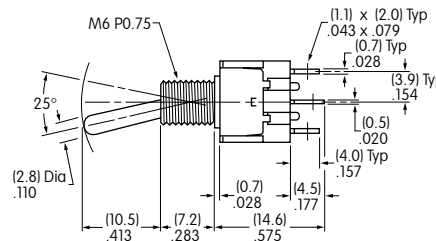
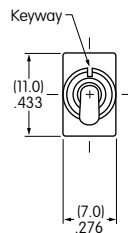
This standard lever is combined with a metric bushing.



### TYPICAL SWITCH DIMENSIONS

Solder Lug

Single Pole

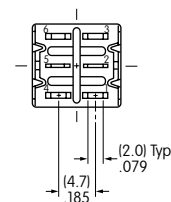
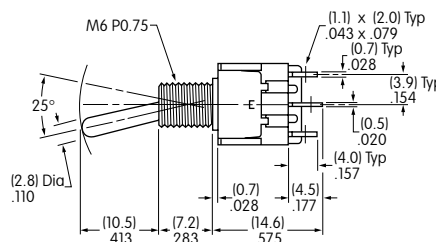
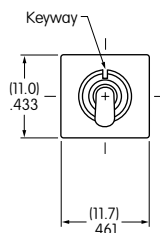


E2012

E2011 model does not have terminal 1.

Solder Lug

Double Pole



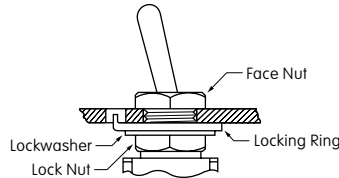
E2022

E2021 model does not have terminals 1 & 4.

### STANDARD HARDWARE

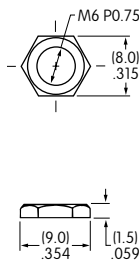
#### Standard Hardware

- 2 AT513M Metric Hexagon Nuts
- 1 AT507M Metric Locking Ring
- 1 AT509 Internal Tooth Lockwasher



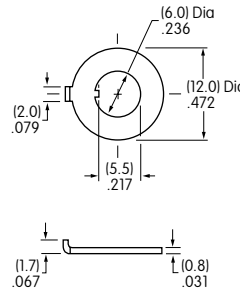
#### AT513M Metric Hexagon Nut

Material:  
Brass with  
Nickel Plating



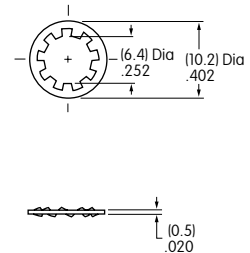
#### AT507M Metric Locking Ring

Material:  
Steel with Zinc/Chromate



#### AT509 Lockwasher

Material:  
Steel with Zinc/Chromate

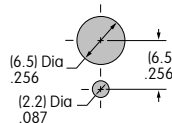


Optional hardware available. See Accessories & Hardware section.

### Panel Thicknesses & Panel Cutouts

#### With Standard Hardware

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



#### Without Locking Ring

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



#### Without Bottom Hex Nut

Maximum Effective Panel Thickness:  
.154" (3.9mm)

#### Without Locking Ring & Bottom Hex Nut

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

### OPTIONAL SPLASHPROOF BOOT

#### AT428M (Metric) Boot for Bat Toggle

Material: Silicone Rubber

