# General Specifications

## Electrical Capacity (Resistive Load)

**Power Level (No Code or P):** 3A @ 125V AC for silver contacts
**Logic Level (code G or PG):** 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

**Contact Resistance:** 10 milliohms maximum for silver;
20 milliohms maximum for gold
**Insulation Resistance:** 1,000 megohms minimum @ 500V DC
**Dielectric Strength:** 1,000V AC minimum between contacts for 1 minute minimum;
1,500V AC minimum between contacts & case for 1 minute minimum
**Mechanical Life:** 100,000 operations minimum
**Electrical Life:** 20,000 operations minimum for silver;
50,000 operations minimum for gold
**Angle of Throw:** 25°

## Materials & Finishes

**Toggle:** Brass with chrome plating
**Bushing:** Brass with nickel plating
**Frame:** Stainless steel
**Case:** Melamine phenolic resin (UL94V-0)
**Movable Contacts:** Copper with silver or gold plating
**Stationary Contacts:** Silver with silver or gold plating
**Terminals:** Copper with silver or 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$^2$) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

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

## Standards & Certifications

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

## TYPICAL SWITCH ORDERING EXAMPLE

E20 [2] [2] [P] – [C] [G]

### POLES

| | |
|---|---|
| 1 | SPST<br>SPDT |
| 2 | DPST<br>DPDT |

### CONTACTS, RATINGS, & TERMINALS

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

### COLORS

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

### CIRCUITS

| | | | |
|---|---|---|---|
| 1 | ON | NONE | OFF |
| 2 | ON | NONE | ON |
| 3 | ON | OFF | ON |
| 5 | ON | NONE | (ON) |
| 8 | (ON) | OFF | (ON) |
| 9 | ON | OFF | (ON) |

( ) = Momentary

### OPTIONAL CAPS

| | |
|---|---|
| B | Bat Lever Cap |
| C | Bat Lever Conical Cap |

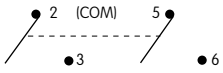
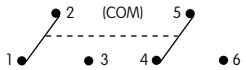
### IMPORTANT:

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

## DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**E2022P-CG**

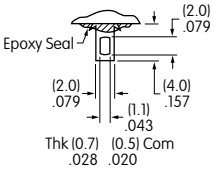
## POLES & CIRCUITS

| Pole | Model | Toggle Position ( ) = Momentary: Down | Center | Up | Connected Terminals: Down | Center | Up | Throw & Schematics |
|---|---|---|---|---|---|---|---|---|
| | | Keyway | | | Keyway | | | Note: Terminal numbers are not actually on the switch. |
| SP | E2011 | ON | NONE | OFF | 2-3 | OPEN | OPEN | SPST   |
| 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   |
| DP | E2021 | ON | NONE | OFF | 2-3 5-6 | OPEN | OPEN | DPST   |
| 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   |

## CONTACT MATERIALS, RATINGS, & TERMINALS

**No Code** **Solder Lug**
**Silver Contacts**

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




**G** **Solder Lug**
**Gold Contacts**

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

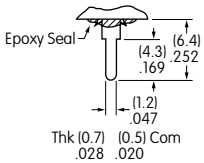
Complete explanation of operating range in Supplement section.

### 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.

**P** **Straight PC**
**Silver Contacts**

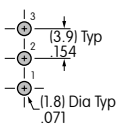
**Power Level**
**3A @ 125V AC**



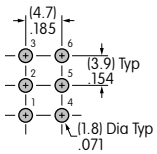

**PG** **Straight PC**
**Gold Contacts**

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

### PCB Footprints




Single Pole



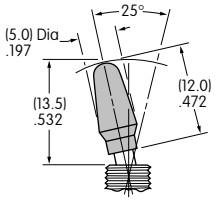

Double Pole

Complete explanation of operating range in Supplement section.

## OPTIONAL CAPS & COLORS

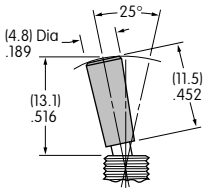
**B** **AT415**
**Bat Lever Cap**

Cap Lever Material
Polyethylene




**C** **AT444**
**Bat Lever Conical Cap**

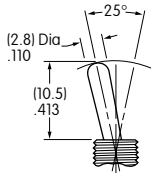
Cap Lever Material
Polyethylene




**Cap Colors Available:**

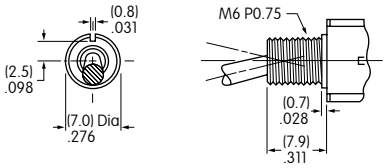
**A** Black **B** White **C** Red

**E** Yellow **F** Green **G** Blue




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

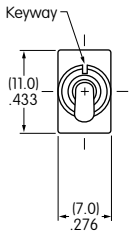
This standard lever is combined with a metric bushing.

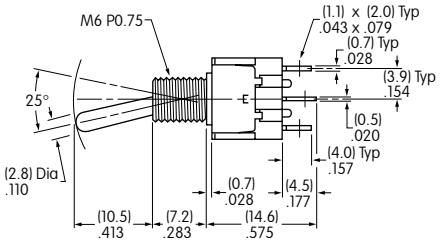


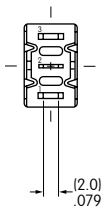

## TYPICAL SWITCH DIMENSIONS

### Solder Lug

### Single Pole



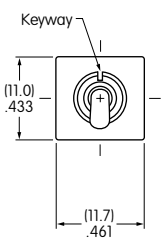



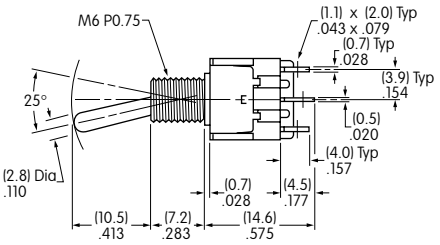

**E2012**

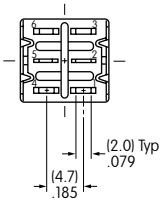
E2011 model does not have terminal 1.

### Solder Lug

### Double Pole



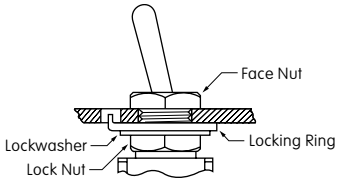

**E2022**

E2021 model does not have terminals 1 & 4.

## STANDARD HARDWARE

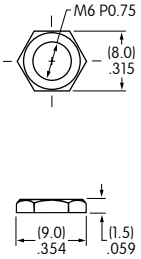
Standard Hardware

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



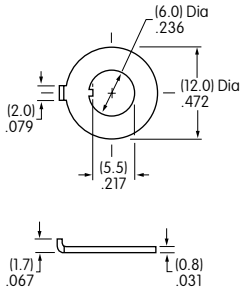

**AT513M Metric Hexagon Nut**

Material:
Brass with
Nickel Plating



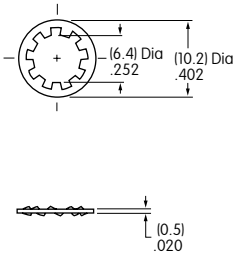

**AT507M Metric Locking Ring**

Material:
Steel with Zinc/Chromate




**AT509 Lockwasher**

Material:
Steel with Zinc/Chromate




Optional hardware available. See Accessories & Hardware section.

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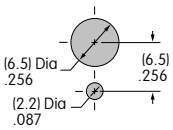
### Panel Thicknesses & Panel Cutouts

**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