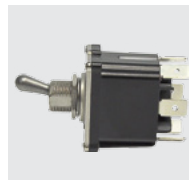


# ST-Series

## SEALED TOGGLE SWITCHES

Designed to comply with MIL-DTL-3950G requirements for environmentally sealed toggle switches, Carling Technologies® ST-Series Sealed Toggle Switch features innovative design and performance principles sure to withstand the most demanding applications.

The ST-Series features a toggle seal composed of dynamic silicone material that bonds to the metal toggle, pin and bushing, providing ideal sealing and protection against the environment, vibration and shock, while withstanding extreme temperature variations. It also utilizes up to three terminal seals per pole and an optional o-ring assures additional under panel sealing protection. All silicone seals on the ST-Series comply with A-A-59588 for silicone rubber performance specifications and, together, these features meet the international IEC 60529 standard for sealing performance to an IP68 level.



### Product Highlights:

- Designed to comply with MIL-DTL-3950G requirements
- IEC 60529 IP68 sealing performance
- Toggle seal bonds to toggle, pin and bushing
- Complies with UL 61058-1 electrical spacing requirements

### Typical Applications:

- Military Equipment
- Armored Vehicles
- Law Enforcement Vehicles
- Off-Highway Vehicles
- Applications requiring stringent sealing and performance capabilities

# ST-Series Switch

## DESIGN FEATURES

### PINNED TOGGLE / BUSHING

Keeps metal toggle firmly in place and prevents rotation

### BRASS ROLLER PIN

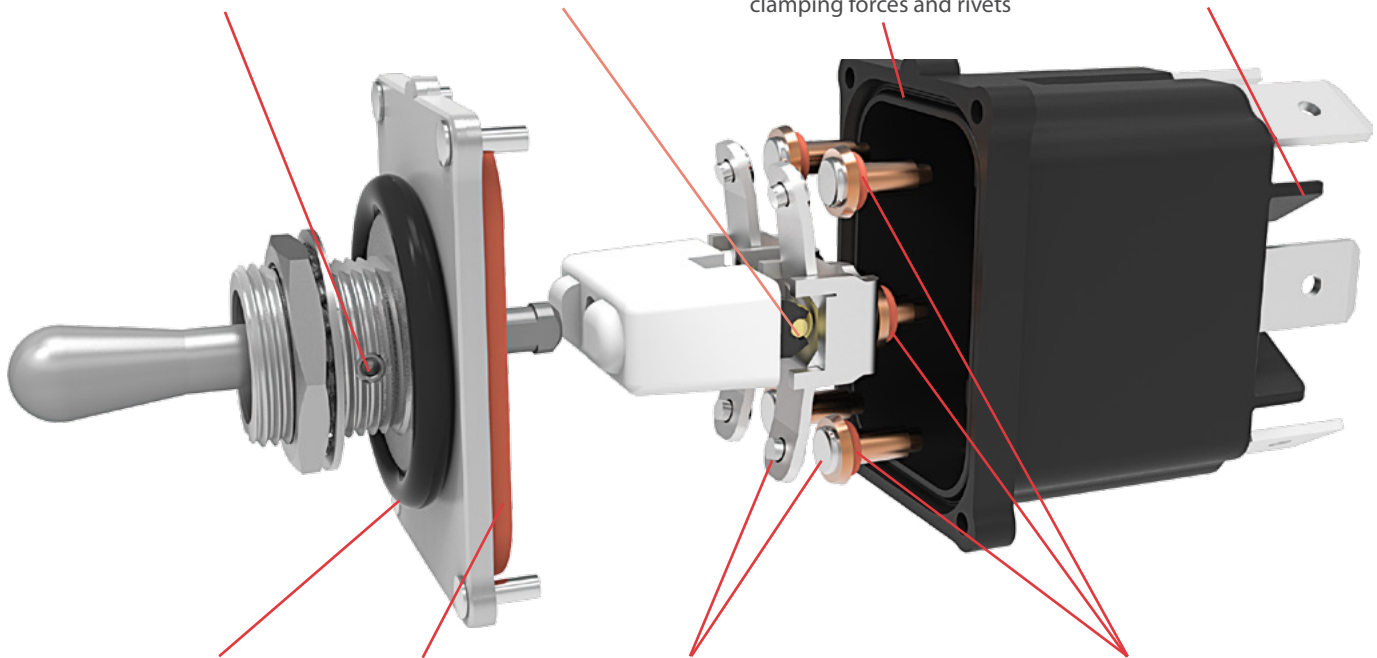
Provides rolling metal on metal actuation for maximum endurance

### BASE SEAL CHANNEL

Perfectly fits the toggle assembly seal decreasing the dependence on clamping forces and rivets

### TERMINAL BARRIERS

Comply with UL-61058-1 electrical spacing requirements



### OPTIONAL O-RING

Assures additional under panel sealing protection

### BUSHING/TOGGLE SEAL

Composed of dynamic silicone material that bonds to the metal toggle, pin and bushing

### RIVETS

High purity copper composite and silver alloy materials handle various electrical loads and maintain low contact resistance

### TERMINAL SEALS

Assure a secure seal at extreme temperatures. Eliminates potential for separated joints associated with insert molded constructions

### Electrical

Contact Rating	16A 12V/24V
Dielectric Strength	MIL-STD-202G, Method 301 (1500 Volts RMS)
Insulation Resistance	MIL-STD-202G, Method 302 (50 MegOhms, 500 VDC)
Initial Contact Resistance	MIL-STD-202G, Method 307 (10 milliOhms max.)
Life	Overload: MIL-DTL-3950G, Section 4.8.11.1 Electrical Endurance and Temperature: UL 61058-1 Momentary circuits: 25,000 operations, minimum. Maintained circuits: 50,000 operations, minimum. Testing ongoing to determine maximum values.
Contacts	Silver Alloy
Terminals	Brass or Copper / silver plated. Tab Terminal: ¼" quick-connect Screw Terminal: #6-32 brass screw and cage clamp MIL-STD-202G, Method 211 Test Condition A, and B: 25 lb. pull test, two terminal bends.

### Physical

Function	Single/Double Pole with Single/Double Throw functions
Operation	Two/ Three position, Maintained/ Momentary circuits
Toggle	Tin plated brass
Actuator	Polyester PBT, UL94-V0 and fungus resistant per ASTM G- 21
Internal Seals	All internal seals are silicone per A-A-59588-1A.
Mounting	15/32"-32 UNS-2A threaded bushing with a keyway. A single nut and lock washer are supplied unassembled.
Bushing/Top Plate	Zinc/aluminum die cast, with tin plating.
Base	Polyester PBT, UL94-V0 and fungus resistant per ASTM G-21
Actuation Force	Initial Actuation Forces ± 0.3 lb (2-Pole circuits)
Angular Movement	14.5 degrees, each side of center

### Mechanical

Life	Mechanical Endurance: 150,000 cycles total (at 25°C)
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### Environmental

Temperature	Operating: -40°C to +85°C Storage: -65°C to +85°C
Vibration	MIL-STD-202G: Method 204D, Test Condition A (10 G peak, Harmonic, 10Hz to 500Hz sweeps, 9 hours total).
Shock	MIL-STD-202G: Method 213B, Test Condition K (30 G, half sine)
Handling Drop	SAE J1455, Section 4.11.3.1, 1 meter drop in each of three planes
Sealing	MIL-STD-202G, Method 110 (sand and dust) IEC 60529, IP68 (dust-tight and continuous immersion in water)
Salt Atmosphere	MIL-STD-202G, Method 101, Test Condition A (96 hrs)
Thermal Shock	MIL-STD-202G, Method 107, Test Condition A (five cycles in air: -55°C, +25°C, +125°C, +25°C)
Moisture Resistance, Humidity	MIL-STD-202G, Method 106 (ten 24-hour stepped cycles)
Chemical Resistance	No permanent loss of function, obvious loss of sealing, distortion, softening, embrittlement, discoloration or corrosion after being brushed for 10 minutes, wetting all exposed surfaces. Relevant chemical compatibility documentation may be used in place of testing.

Chemical	Concentration
Gasoline	100%
Ethylene Glycol	50% in water
Ethanol/Methanol	10% in water
Diesel Fuel	100%

\*Manufacturer reserves the right to change product specification without prior notice.

**ST A 2 E 1 - 53**

1 Series      2 Circuit      3 Poles      4 Rating      5 Termination      6 Toggle Style

**1 SERIES 1**  
**ST** Sealed Toggle

**4 RATING**  
**E** 16A, 12/24V

**2 CIRCUIT**

	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
<b>Position:</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>A</b>	ON	NONE	OFF
<b>B</b>	(ON)	NONE	OFF
<b>C</b>	ON	NONE	(OFF)
<b>D</b>	ON	NONE	ON
<b>F</b>	ON	NONE	(ON)
<b>J</b>	ON	OFF	ON
<b>K</b>	ON	OFF	(ON)
<b>L</b>	(ON)	OFF	(ON)
<b>Special Circuits</b>			
<b>E</b> <sup>2,3</sup>	5 & 6	5 & 3	5 & 1
<b>G</b> <sup>2,4</sup>	2 & 3, 5 & 6	2 & 3	OFF
<b>M</b> <sup>2,4</sup>	(2 & 3, 5 & 6)	2 & 3	OFF

**5 TERMINATION**

**1** .250 (6.4mm) TAB (QC)  
**4** Screw with Cage Clamps  
**B**<sup>5</sup> .250 (6.4mm) TAB (QC). Jumper T2 to T5. No terminal at T5  
**E**<sup>5</sup> Screw with Cage Clamps. Jumper T2 to T5. No terminal at T5

**6 TOGGLE STYLE**

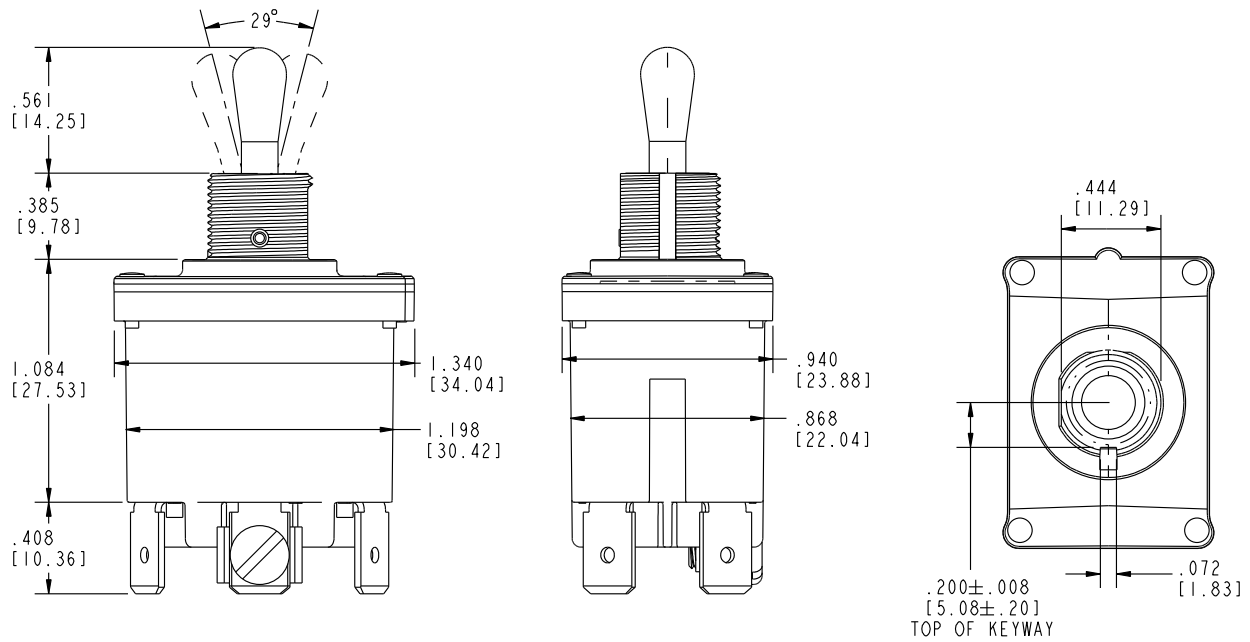
	Toggle Length	Bushing Length
Without Panel Seal		
<b>53</b>	.561	.385
With Panel Seal (Bulk)		
<b>58</b>	.561	.385

**3 POLES**

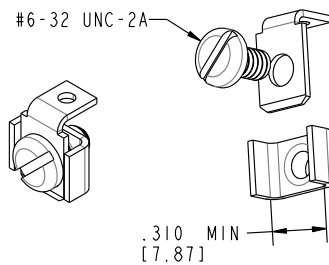
**1** Single pole using terminals 1, 2 & 3  
**2** Double pole using terminals 1, 2, 3, 4, 5 & 6

- Notes:
- Standard hardware is (1) inner tooth lock washer and (1) hex nut bulk.
  - Available only with 2 pole option in selection box # 3.
  - External customer supplied jumper required between terminals 2 & 4 to get SP ON-ON-ON circuit.
  - Available with termination B and E only.
  - Available with special circuit G and M only.

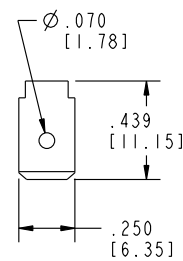
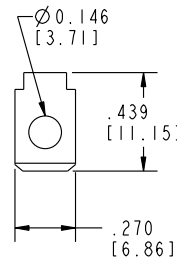
### Dimensional Specifications: in. [mm]



### TERMINALS

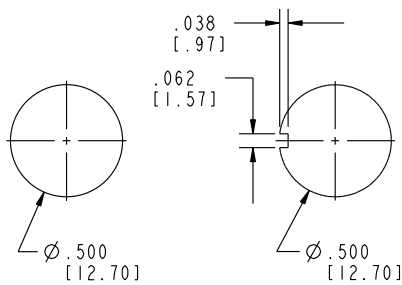


SCREW (AND CAGE) TERMINAL

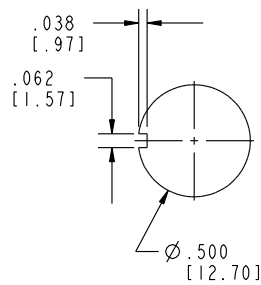


.250 TAB (Q.C.) TERMINAL

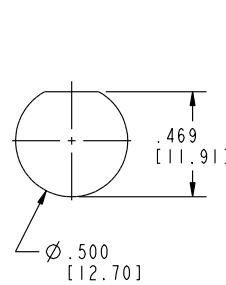
### PANEL CUTOUTS



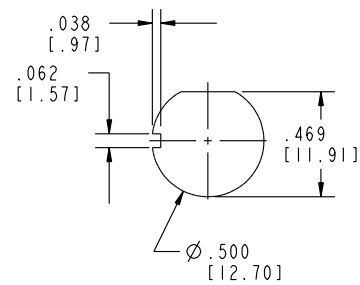
MOUNTING HOLE



WITH KEYWAY



WITH FLAT



WITH KEYWAY, FLAT