

# Installation & Maintenance Instructions

**ASCO® TRIPPOINT® SWITCH UNITS**

**MANUAL RESET SWITCH UNIT WITH GENERAL PURPOSE,  
WATERTIGHT, OR EXPLOSIONPROOF SWITCH ENCLOSURE**

**SD & SE  
SERIES**

**Form No.V5737R2**

## DESCRIPTION

The SD & SE Manual Reset Switch Units are used with transducer units to make Tripoint Pressure Switches or Temperature Switches. The switch units are made of aluminum alloy and designed for rugged industrial use. The switch units have a general purpose, watertight, or explosionproof enclosure. All adjustments and visual scales are accessible from the front of the switch.

The switch may be supplied as a complete unit, with the switch unit and transducer completely assembled. The components may be separate units to be assembled upon installation. The actuation (set) point is adjustable over the full range of the switch. The reactivation (reset) point is fixed relative to the actuation point and cannot be adjusted. The switch assembly can be mated with a wide selection of pressure or temperature transducers to cover a broad range of pressures, fluids or temperatures. The switch will control electrical circuits in response to changes in pressure or temperature.

**IMPORTANT:** These instructions cover the installation and use of this switch on pressure and temperature transducers. Select the paragraphs that apply to your particular installation and application. The word *signal* is used in place of pressure or temperature changes.

## INSTALLATION

Check the nameplate for the correct catalog number, pressure range, temperature range, media, and proof pressure or rated overrange temperature. Never apply incompatible fluids or exceed the pressure or temperature rating of the switch. Installation and inspection to be performed by qualified personnel.

Nameplates are located on cover and on the bottom of the transducer. Check to be sure the third digit in each number is the same. If not, the unit should not be used. (Refer to Figure 3).

**IMPORTANT:** All internal adjustments have been made at the factory. Any adjustment, alteration or repair to the internal parts of the switch other than stated herein voids all warranties. The signal setting adjustments required are made by the adjusting nut on the outside of the switch.

### Temperature Limitations

Ambient temperature limits are — 4°F(–20°C) to 140°F (60°C). To determine fluid temperature limitations, see form No.V5778 for Pressure Transducer catalog numbers and construction materials, then refer to chart below.

TRANSDUCER CONSTRUCTION MATERIALS	RATINGS FLUID TEMPERATURE
Buna N or Neoprene	–4°F(–20°C) to 179°F(82°C)
VITON*	–4°F(–20°C) to 250°F(121°C)
316 Stainless Steel	–50°F(–45°C) to 300°F(149°C)

For steam service, the fluid temperature with a pigtail (siphon tube or condensate loop) installed directly into the transducer will be below 179°F (82°C).

## Assembly of Switch and Transducer Units

**IMPORTANT:** The switch unit and transducer unit may be provided as a complete assembly or as separate units. If separate units are provided refer to Form No. V5778 for a complete listing of switch unit and transducer unit combinations. Form No.V5778 is provided to ensure that the proper switch unit is assembled to the proper transducer unit. Pay careful attention to exploded views provided in Figure 3 for assembly of switch unit and transducer unit. Proceed in the following manner:

**CAUTION:** The third digit in the catalog number on both the switch unit and transducer unit must be identical. If not, do not assemble to each other. If the same proceed.

1. Remove special instructions label and switch range scales from transducer unit.
2. For watertight and explosionproof construction place gasket on base of switch unit.
3. Place transducer unit on base of switch unit and assemble. Insert four bolts and torque bolts in a crisscross manner to  $80 \pm 10$  in–lbs [ $9.0 \pm 1.1$  Nm].
4. Remove backing paper from range scale and install scale on the switch body behind adjusting nut. The scale is slotted to fit over a raised boss on the body. See Figure 2.

### Positioning

Switch may be mounted in any position.

### Mounting

Figure 1 shows partial view of switch body for mounting dimensions.

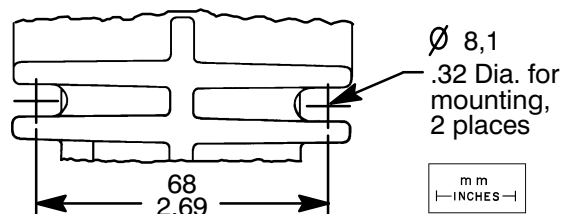


Figure 1. Mounting locations

### Piping/Tubing (Pressure Transducer)

Adequate support of piping and proper mounting of switch should be made to avoid excessive shock or vibration. To minimize the effect of vibration on a switch, mount perpendicular to vibration. Connect piping or tubing to switch at base of transducer. It is recommended that flexible tubing be used whenever possible. Apply pipe compound sparingly to male pipe threads only. If applied to female threads, it may enter the transducer and cause operational difficulty. Avoid pipe strain on switch by properly supporting and aligning piping. When tightening pipe, do not use switch as a lever. Wrenches applied to transducer body or piping are to be located as close as possible to connection point.

**IMPORTANT:** For steam service, install a condensate loop (pigtail or steam syphon tube) directly into the pressure transducer.

**CAUTION:** To avoid damage to the transducer body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If TEFLON\* tape, paste or similar lubricant is used, use extra care due to reduced friction.

**IMPORTANT:** To eliminate undesirable pressure fluctuations in the system, install a surge suppressor.

\*DuPont's Registered Trademark

## Wiring

Wiring must comply with local codes and the National Electrical Code. All switch enclosures are provided with two 3/4" NPT conduit hubs with one plugged when not in use. It is recommended that a flexible conduit connection be used. If rigid conduit is used, do not consider it or use it as a means of support (mounting). For general purpose and watertight construction, the switch cover is removed by loosening two screws then twisting slightly and lifting. For explosionproof construction, the cover unscrews. When explosionproof cover is replaced, torque cover to 135 ± 10 in-lbs [10,7 ± 1,1 Nm]. Use No. 14 AWG copper wire rated for 60°C minimum. All switches have a grounding screw and clamp in the enclosure. For factory wired switch, black lead is common, red lead is normally open, blue lead is normally closed, and the green lead wire is a ground.

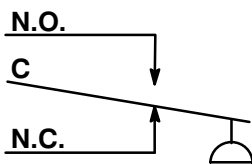
**IMPORTANT:** Electrical load must be within range stated on nameplate. Failure to stay within the electrical range of the switch rating may result in damage to or premature failure of electrical switch.

**CAUTION:** Do not exert excessive screw driver force on snap switch when making terminal connections. When connections are made, be sure there is no stress on the wire leads. Either condition may cause malfunction of switch.

ELECTRICAL RATINGS		
Switch Unit	Ratings for Limit Controls and Pressure Operated Switches	Ratings for Industrial Controls and Temperature Indicating and Regulating Equipment
Standard Switch Rating	5 Amp Res., 125 VAC 5 Amp Res., 250 VAC 1/8 HP 125 VAC 1/4 HP 250 VAC 1/2 HP 125 VDC 1/4 HP 250 VDC	15 Amps Res., 125 VAC 10 Amps Res., 250 VAC 1/8 HP 125 VAC 1/4 HP 250 VAC 1/2 Amp Res., 125 VDC 1/4 Amp Res., 250 VDC
Option K Switch Rating	5 Amps Res., 125/250 VAC 1/8 HP 125 VAC 1/4 HP 250 VAC 1/2 Amp Res., 125 VDC 1/4 Amp Res., 250 VDC	5 Amps Res., 125/250 VAC 1/8 HP 125 VAC 1/4 HP 250 VAC 1/2 Amp Res., 125 VDC 1/4 Amp Res., 250 VDC

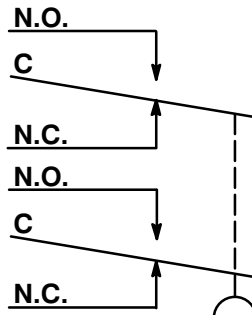
## Schematics

SPDT



Standard Switch

DPDT



Suffix K Switch

## INSTALLATION OF TEMPERATURE TRANSDUCERS

### Direct Probe

The direct probe (local) temperature transducer is provided with 1/2" NPT connection. When installing, do not use switch unit as a lever for tightening. Use wrenching flats provided at base of transducer for tightening.

### Capillary and Bulb

The capillary and bulb (remote) temperature transducers are provided with a length of capillary and a 3/8" diameter sensing bulb.

**CAUTION:** Do not bend capillary at sharp angles. For proper operation, be sure sensing bulb is completely immersed in fluid and not in contact with heating element or anything that would directly affect the temperature of the fluid being sensed.

### Thermal Well (Optional Feature)

A thermal well may be used for capillary and bulb (remote) or direct probe (local) temperature transducers. The thermal well affords protection for the sensing bulb and allows removal of the sensing bulb while maintaining a pressure tight vessel. When installing sensing bulb in thermal well, be sure that it is fully inserted. Where a thermal well already exists, jam nuts may be obtained to adapt the capillary and bulb to the existing thermal well. The existing thermal well must be for a 3/8" diameter sensing bulb.

### Union Connector (Optional Feature)

A union connector will allow direct mounting of the sensing bulb in the fluid being controlled. Install union into piping connection before tightening union onto bulb. For maximum performance, the bulb should be inserted in the union connection so that the end of the sensing bulb is even with the end of the union connector nut. Do not apply excessive torque when tightening union connector nut.

### Adjustment (Signal Setting) of Manual Reset Switch

To make adjustments, (signal setting) a 7/16" wrench and a pressure or temperature gage (within suitable range) are required. If electrical connection (to line of final application) of the switch is not desirable, a battery powered test lamp or ohm meter may be used. Pressure or temperature range scales should be used for initial signal setting. These will be accurate within 5%. Loosen lock ring and turn adjusting nut until red line is even with the desired range. For exact signal setting, proceed as follows:

**WARNING:** To prevent the possibility of personal injury or property damage, turn off electrical power when making permanent electrical connections to switch.

### Adjustment (Signal Setting) of Normally Closed or Normally Open Switch, Increasing Signal (Refer to Figure 2)

1. If the switch is in the line of final application when adjustment (signal setting) is made, be sure switch can be test operated without affecting other equipment.
2. Loosen lock ring on adjustment nut and turn signal adjustment nut full down using a 7/16" wrench.

**CAUTION:** Adjusting nut will turn easily until it hits a stop. Do not over torque; over torquing may cause internal damage resulting in malfunction.

3. Remove switch cover to gain access to snap switch. See section on Wiring for cover removal.
4. Follow the steps in the chart below to make signal setting:

Adjustment Procedure	NORMALLY CLOSED		NORMALLY OPEN	
	Switch Terminal	Test Lamp On-Off	Switch Terminal	Test Lamp On-Off
1. Starting with zero signal, connect test lamp to common.	NC	On (Closed Circuit)	NO	Off (Open Circuit)
2. Apply desired actuation signal. Then back off adjusting nut until switch actuates.	NC	Off (Open Circuit)	NO	On (Closed Circuit)
3. Lower signal to check reactivation.	NC	On (Closed Circuit)	NO	Off (Open Circuit)

5. Cycle between actuation and reactivation signal and make minor adjustment to adjusting nut as required to achieve the exact signal setting.
6. After setting has been made, make permanent electrical connections.

## Adjustment (Signal Setting) of Normally Closed or Normally Open Switch, *Decreasing Signal*

(Refer to Figure 2)

1. If the switch is in the line of final application when adjustment (signal setting) is made, be sure switch can be test operated without affecting other equipment.
2. Loosen lock ring on adjustment nut and turn signal adjustment nut full upwards using a 7/16" wrench.

**⚠ CAUTION:** Adjustment nut will turn easily until it hits a stop. Do not over torque; over torquing may cause internal damage resulting in malfunction.

3. Remove switch cover to gain access to snap switch. See section on *Wiring* for cover removal.
4. Follow steps in chart below to make signal setting.

Adjustment Procedure	NORMALLY CLOSED		NORMALLY OPEN	
	Switch Terminal	Test Lamp On–Off	Switch Terminal	Test Lamp On–Off
1. Starting with initial signal above desired actuation setting, connect test lamp to common.	NC	Off (Open Circuit)	NO	On (Closed Circuit)
2. Decrease signal to desired actuation. Then advance adjusting nut until switch actuates.	NC	On (Closed Circuit)	NO	Off (Open Circuit)
3. Increase signal to check reactuation.	NC	Off	NO	On (Closed Circuit)

5. Cycle between actuation and reactuation signal and make minor adjustment to adjusting nut as required to achieve the exact signal setting.
6. After settings have been made, tighten lock ring and make permanent electrical connections.

## Testing of Installation

If the adjustment of the switch has been made outside of the line of final application, the switch should be retested when installed in the line of final application. Follow adjustment instructions. Be sure switch can be test operated without affecting other equipment.

## MAINTENANCE

**⚠ WARNING:** To prevent the possibility of personal injury or property damage, turn off electrical power and depressurize switch unit before inspection or removal.

**IMPORTANT:** Switch is not field repairable. The switch must be returned to the factory (Automatic Switch Company, Florham Park, New Jersey) or serviced only by an authorized factory representative. Address all service inquiries to Automatic Switch Company, 50–60 Hanover road, Florham Park, New Jersey 07932, Valve Service Department. The only maintenance which may be performed on the manual reset switch is changing the setting of the adjusting nut and replacement of the transducer unit. Replacement of transducer should be done only if external leakage is evident.

## Preventive Maintenance

- While in service, operate the switch (cycle between desired signals) once a month to insure proper operation. If necessary, electrical wiring and pipe connection should be made so that switch can be test operated without affecting other equipment.
- Periodic inspection of the switch, external surfaces only, should be carried out. Switch should be kept clean and free from paint, foreign matter, corrosion, icing, and freezing conditions.
- Keep the medium entering the transducer as free as possible from dirt and foreign material.

## Causes of Improper Operation

Switch will not actuate or actuates and reactuates undesirable.

- **Incorrect Electrical Connection:** Check leads to switch. Be sure they are properly connected. Switch is marked *NO* for Normally Open, *NC* for Normally Closed and *C* for Common.
- **Faulty Control Circuit:** Check electrical power supply to switch. Check for loose or blown fuses, open–circuited or grounded wires, loose connections at terminal block or switch. See nameplate for electrical rating and range.
- **Incorrect Pressure:** Check pressure in system with suitable pressure gage. Pressure must be within range specified on nameplate.
- **Incorrect Adjustment:** Check adjustment nut for proper setting. Refer to adjustment instructions.
- **External Leakage:** Check to see that bolts (4) holding transducer to pressure switch are properly torqued to  $80 \pm 10$  in–lbs [ $9.0 \pm 1.1$  Nm]. If bolts are tight and leakage is still evident, replace transducer. Refer to section on *Assembly of Switch Unit and Transducer Unit*.
- **Excessive Vibration or Surges Causing Switch to Actuate and Reactuate:** Check for fluctuations in system and install pressure surge suppressor. Check switch mounting and be sure there is no excessive vibration.
- **Incorrect Temperature:** Check temperature in system with suitable thermometer. Temperature must be within range specified on nameplate. Check location of capillary and bulb for incorrect mounting. Refer to paragraphs on *Installation Of Temperature Transducers*.

If the operation of the fixed deadband switch cannot be corrected by the above means, the entire switch unit should be replaced or an authorized factory representative consulted.

## Color Code Identification

When the switch cover is removed, the switch unit may be identified by the color of the sealant used on the locknuts of the snap switch. The color of the sealant will correspond directly to the third digit of the switch catalog number.

Third Digit In Catalog Number	Sealant Color Used On Snap Switch Locknuts
1	Yellow
2	Green
3	Red
4	Blue

Example: If the sealant color on the snap switch was red, this would mean that the third digit in the pressure switch catalog number would be 3, possibly SE③0D. It would not be, for example: SE①0D, SE②0D, or SE④0D.

## FOR SERVICE REPLACEMENT, OR NEW TRANSDUCER

Consult Factory, or Authorized Factory Representative or Distributors

## ORDERING INFORMATION

For Manual Reset Switch or New Transducer  
When Ordering, Specify Catalog Numbers, Fluid, Pressure Range, Temperature Range, Serial Numbers, and Proof Pressure or Rated Overrange Temperature.

**NAMEPLATES ARE LOCATED ON SWITCH COVER AND BOTTOM OF TRANSDUCER.**

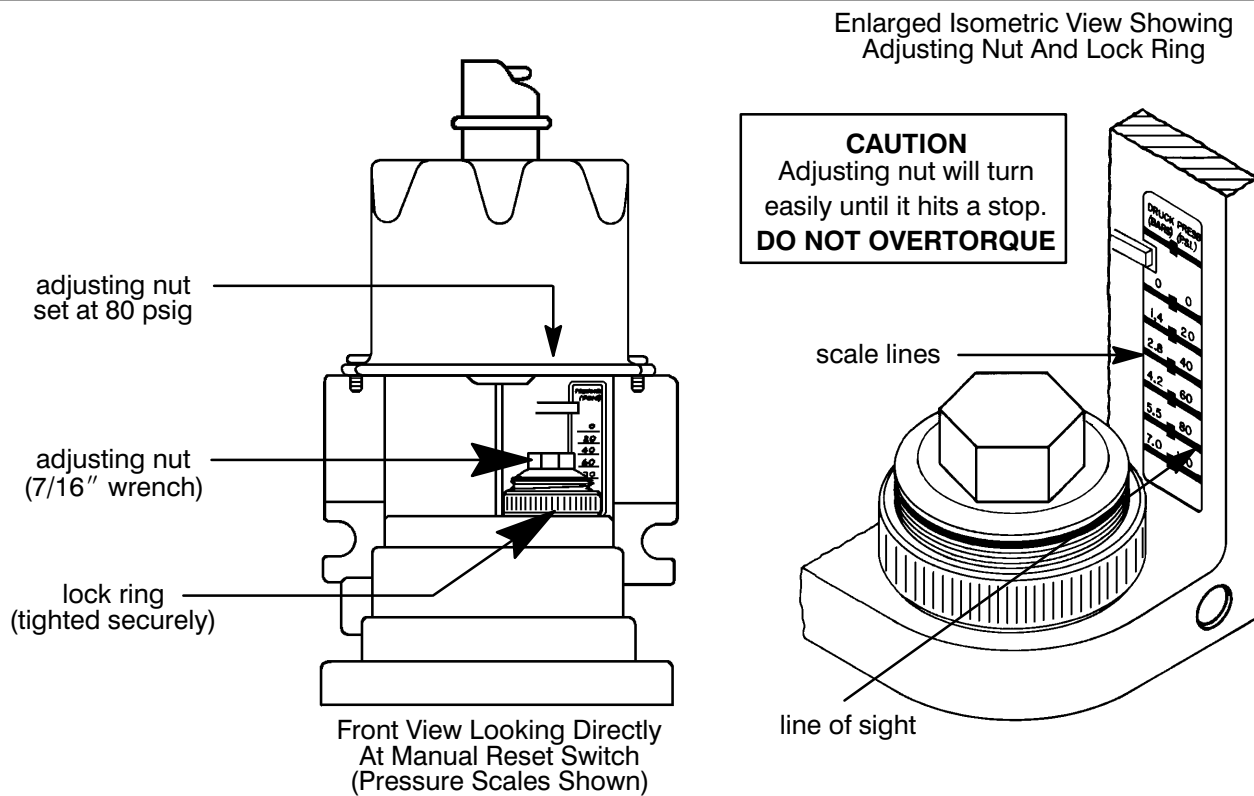


Figure 2. Adjustment (Signal Setting) of Manual Reset Switch.

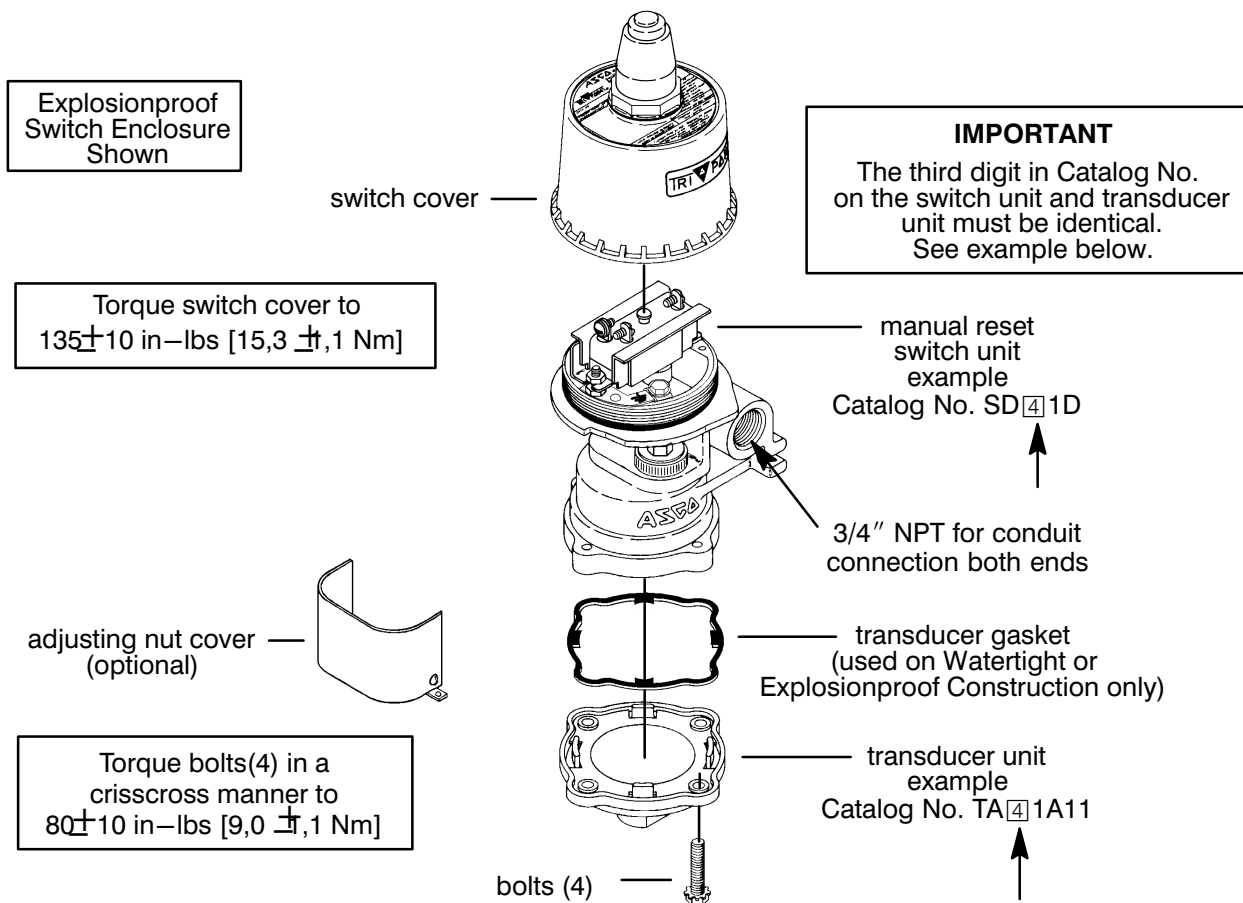


Figure 3. Switch Unit and Transducer Unit to be Assembled.