

Installation & Maintenance Instructions

ASCO® TRIPPOINT® SWITCH UNITS
TWO-STAGE FIXED DEADBAND SWITCH UNITS

OPEN-FRAME TYPE, GENERAL PURPOSE, OR WATERTIGHT SWITCH ENCLOSURE

PC-SERIES

Form No. P7050R1

DESCRIPTION

The PC-Series Two-Stage Fixed Deadband 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 use. The switch unit may be provided as open-frame type or with a general purpose or watertight enclosure. All wiring terminals, 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 unit completely assembled. The components may be separate units to be assembled upon installation. The two-stage switch unit has two adjusting nuts which provide independent adjustment of the two electrical switches. Each switch has an adjustable (set) point and non-adjustable (reset) point. The difference between the set point and the reset point is the fixed deadband. The actuation points of the electrical switches cannot be identical but require a minimum separation. The switch assembly can be mated with a wide selection of pressure and temperature transducers to cover a broad range of pressure, fluids, and temperatures. The switch will control electrical circuits in response to change in pressure and temperature signals.

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 the switch (or switch 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 4).

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 two nuts on the top of the switch.

Temperature Limitations

Switch ambient temperature limits are -4°F (-20°C) to 122°F (50°C). To determine fluid temperature limitations, see Form No. P7051 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 180°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)
All Nylon	Maximum 180°F (82°C)
All Nylon For Water Service	Maximum 130°F (55°C)

For stream service, the fluid temperature with a pigtail (siphon tube or condensate loop) installed directly into the transducer will be below 180°F (82°C).

Assembly Of Switch And Transducer Units (Refer to Figure 4)

IMPORTANT: The switch unit and transducer unit may be purchased as a complete assembly or as separate units. If separate units are purchased, refer to Form No. P7051 for a complete listing of switch unit and transducer unit combinations. Form No. P7051 is provided to ensure that the proper switch unit is assembled to the proper transducer unit.

Pay careful attention to exploded view provided in Figure 4 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 the transducer unit must be identical. If not, do not assemble to each other. If the same, proceed.

1. Remove bolts (4) from base of switch unit. On general purpose or raintight constructions, remove switch cover.
2. Remove instruction label and pressure or temperature switch range scale from the transducer unit.
3. Place transducer unit on base of switch unit and assemble. Start bolts (4) approximately two turns by hand to avoid the possibility of cross threading. After initial engagement, torque bolts (4) in a crisscross manner to 80 ± 10 in-lbs [9.0 ± 1.1 Nm].
4. Remove backing paper from range scale and install on the front of the switch body over the opening for the adjusting indicator point.

Positioning

Switch may be mounted in any position.

Mounting

Refer to Figures 1 and 2 for mounting.

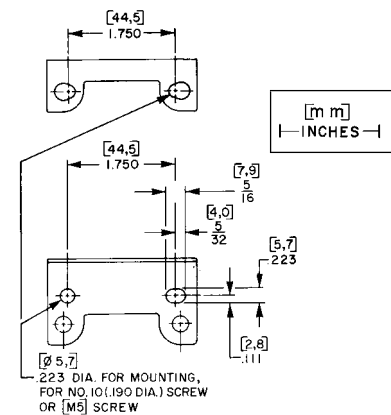


Figure 1. Optional Mounting Bracket

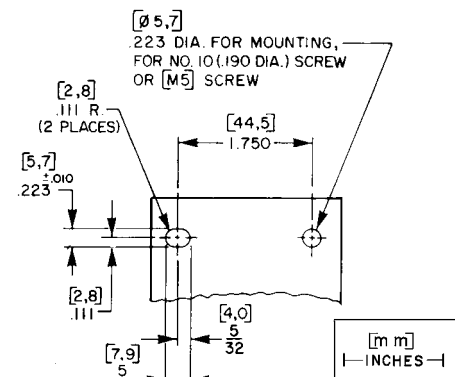


Figure 2. General Purpose Enclosure

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.

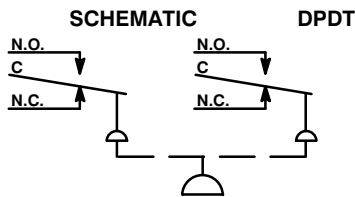
Wiring

Wiring must comply with local codes and the National Electrical Code. The general purpose switch enclosure is provided with a 7/8" diameter hole to accommodate 1/2" electrical hub or connector. The watertight switch enclosure has a 1/2" conduit hub. 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 supporting (mounting). Use No. 14 AWG copper wire rated for 60°C minimum. Electrical connections are .187" (3/16) spade type quick connect terminals. Snap switches accept MOLEX INCORPORATED's connector (Order No. 05-06-0304) and connector housing (Order No. 06-02-3031).

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.

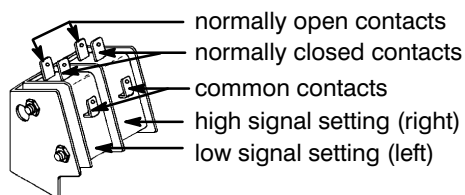
CAUTION: Do not exert excessive screw driver force on snap switch when making terminal connections. When connections are made, be sure there is no stress on the wire leads. Either condition may cause malfunction of switch.

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	2 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	10 Amps Res., 125/250 VAC 1/3 HP 125/250 VAC 1/2 Amp 125 125 VDC 1/4 Amp 250 VDC 125 VA PILOT DUTY 120/240 VAC



ELECTRICAL TERMINALS

Electrical terminals are .187" spades arranged as:



*DuPont's Registered Trademark

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 Two-Stage Fixed Deadband Switch

When facing switch in the upright position, the adjusting nut on the highest point controls the high signal setting. The adjusting nut at the lowest point controls low signal setting (Refer to Figure 3). To make adjustments, a 1/4" 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 ohmmeter may be used. Pressure or temperature range scales may be used for initial signal settings. These will be accurate within 5%. Adjust switch until pointer is in the middle of the solid red line below the desired range. For exact signal settings, proceed as follows:

Adjustment (Signal Setting) of Normally Closed or Normally Open Switch, Increasing Signal (Refer to Figure 3)

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. On general purpose and watertight constructions, remove switch cover.
3. Turn high signal adjusting nut until high signal setting indicator is fully up. Then turn low signal adjusting nut until low signal setting indicator is fully up. Use a 1/4" wrench for adjusting nuts.

CAUTION: Adjusting nut will turn easily until it hits a stop. Do not over torque. Over torquing may cause damage.

4. Follow the steps in the chart below to make signal settings. Test one snap switch at a time. Be sure to start with low signal side.

MAINTENANCE

Adjustment Procedures	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 signal adjusting nut until switch actuates.	NC	Off (Open Circuit)	NO	On (Closed Circuit)
3. Lower signal to check reactuation signal.	NC	On (Closed Circuit)	NO	Off (Open Circuit)

5. To adjust high signal setting, repeat steps of adjustment in chart above.
6. Cycle between actuation and reactuation signals and make minor adjustments to nuts as required to achieve the exact signal setting.
7. After settings have been made, make permanent electrical connections.

Adjustment (Signal Setting) of Normally Closed or Normally Open Switch, *Decreasing Signal* (Refer to Figure 3)

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. On general purpose and watertight constructions, remove switch cover.
3. Turn low signal adjusting nut until low signal setting indicator is fully down. Then turn high signal adjusting nut until high signal indicator is fully down. Use a 1/4" wrench for adjusting nuts.

CAUTION: Adjusting nut will turn easily until it hits a stop. Do not over torque. Over torquing may cause damage.

4. Follow the steps in the chart below to make signal settings. Test one snap switch at a time. Be sure to start with the high signal side.

Adjustment Procedures	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 signal.	NC	Off (Open Circuit)	NO	On (Closed Circuit)

5. To adjust low signal setting, repeat steps of adjustment in chart above.
6. Cycle between actuation and reactuation signals and make minor adjustments to nuts as required to achieve the exact signal setting.
7. After settings have been made, 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.

⚠ 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 switch is changing the setting of the adjusting nuts 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) at least 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 Adjustment:** Check adjustment nuts 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 ± 10 in-lbs [9.0 ± 1.1 Nm]. If bolts are tight and leakage is still evident, replace transducer. Refer to paragraph 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 Pressure:** Check pressure in system with suitable pressure gage. Pressure must be within range specified on nameplate.
- **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 switch cannot be corrected by the above means, the entire switch unit should be replaced or an authorized factory representative consulted.

FOR SERVICE, REPLACEMENT, OR NEW TRANSDUCER

Consult Factory, or Authorized Factory Representative or Distributors

ORDERING INFORMATION

For Two-Stage Fixed Deadband 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.

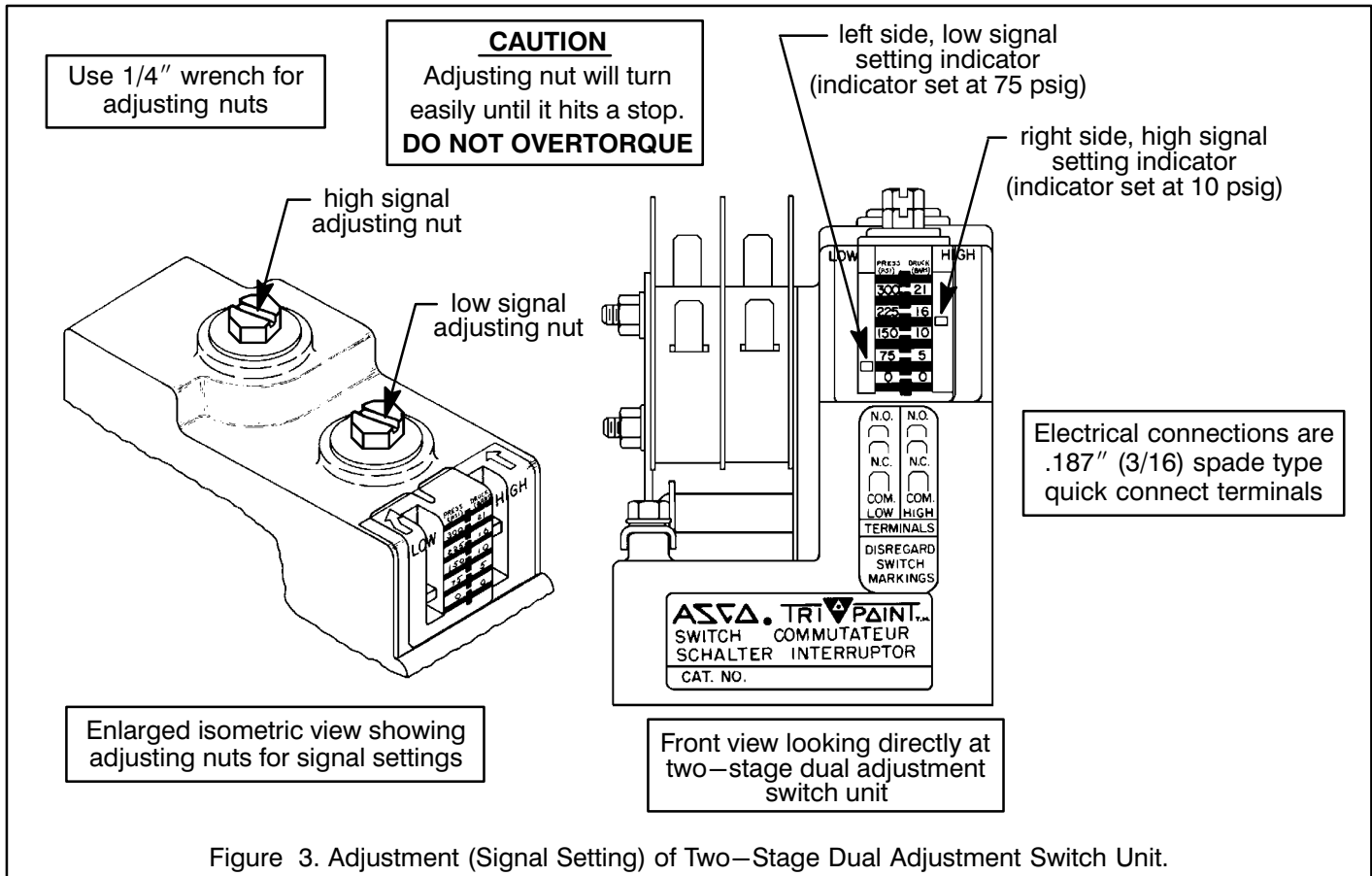


Figure 3. Adjustment (Signal Setting) of Two-Stage Dual Adjustment Switch Unit.

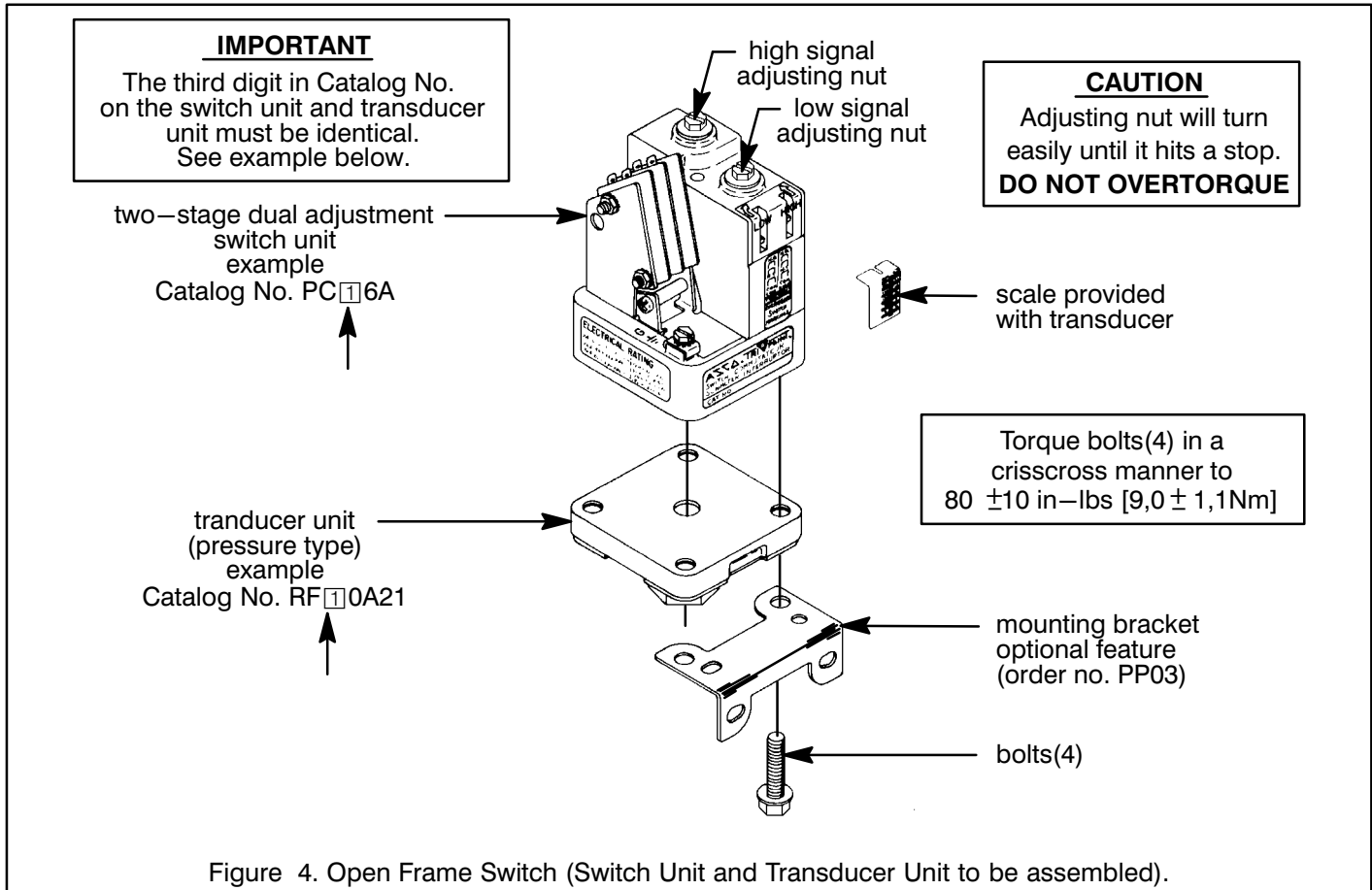


Figure 4. Open Frame Switch (Switch Unit and Transducer Unit to be assembled).