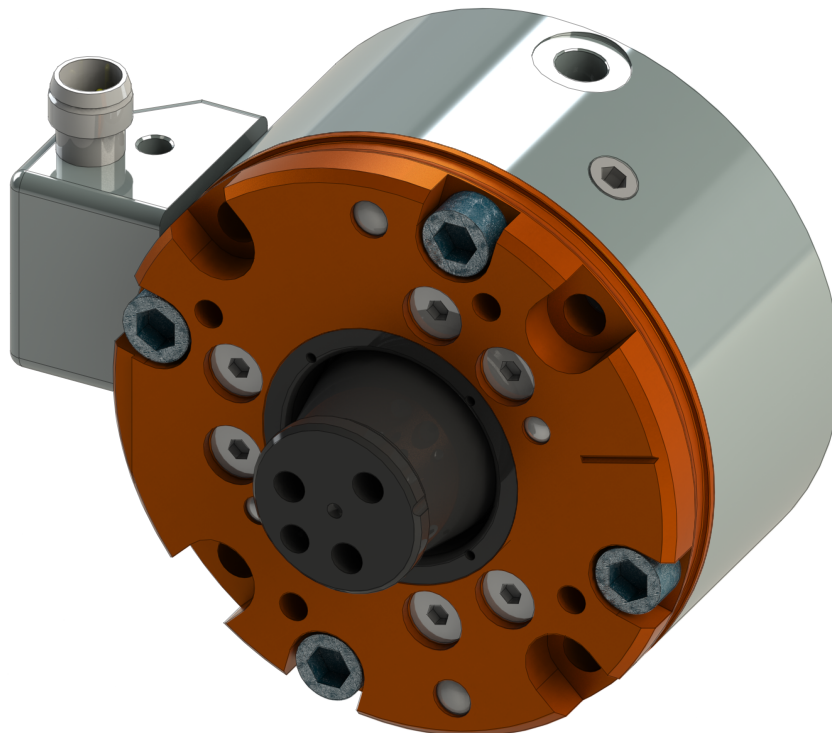




## Robotic Collision Sensor SR-61 Switch Replacement Manual

U.S. Patent Nos. 6069415 and 6690208



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## 1. Safety

The safety section describes general safety guidelines to be followed with this product, explanation of the notifications found in this manual, and safety precautions that apply to the product. More specific notifications are imbedded within the sections of the manual where they apply.

### 1.1 Explanation of Notifications

The notifications included here are specific to the product(s) covered by this manual. It is expected that the user heed all notifications from the robot manufacturer and/or the manufacturers of other components used in the installation.



**DANGER:** Notification of information or instructions that if not followed will result in death or serious injury. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.



**WARNING:** Notification of information or instructions that if not followed could result in death or serious injury. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.



**CAUTION:** Notification of information or instructions that if not followed could result in moderate injury or will cause damage to equipment. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.

**NOTICE:** Notification of specific information or instructions about maintenance, operation, installation, or setup of the product that if not followed could result in damage to equipment. The notification can emphasize specific grease types, good operating practices, or maintenance tips.

### 1.2 General Safety Guidelines

The Collision Sensor is not designed for, nor should it be used in, situations involving the safety of humans or animals. The Collision Sensor is designed as a safety device to protect industrial components and machinery from damage resulting from collisions and impacts. In all situations the user is responsible for insuring that applicable safety practices are followed as outlined by the manufacturer of the equipment on which the Collision Sensor is used.

The routing of electrical and pneumatic lines must minimize the possibility of stress, pullout, kinking, rupture, etc. Failure of critical electrical and/or pneumatic lines to function properly may result in injury to personnel and damage to equipment.



**CAUTION:** The customer should lock out and discharge all energy to the work cell prior to working on any Collision Sensor system. Failure to do so may result in damage to equipment or injury to personnel.

### 1.3 Safety Precautions



**WARNING:** Do not perform maintenance or repair on the Collision Sensor with air pressure applied, current supplied to the sensor, or the robot not in a safe condition. Injury or equipment damage can occur if this is not observed. Always ensure that air pressure has been vented from the unit, that electrical current is not supplied to the Collision Sensor's signal circuit, and that the robot is in a safe, locked-out condition consistent with local and national safety standards before performing maintenance or repair on the Collision Sensor.



**WARNING:** The Collision Sensor is only to be used for intended applications and applications approved by the manufacturer. Using the Collision Sensor in applications other than intended will result in damage to Collision Sensor or end-of-arm tooling and could cause injury to personnel.



**CAUTION:** Do not adjust or remove either of the (2) set screws installed in the wall of the body. Doing so may result in damage to the unit or failure of the switch to operate.

## 1.4 Electrical Connection

The Collision Sensor is connected to the user's control wiring as a normally-open PNP or NPN proximity switch. The following sketch details the connections between the internal switch and the pins in the connector block assembly. Optional mating cables, available from ATI, utilize the brown-black-blue color code indicated.


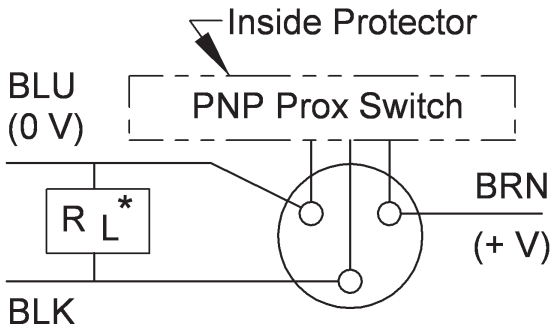
 **CAUTION:** The user is responsible for connecting the collision sensor to their controls and providing an "electrical load" in series with the collision sensing switch. The switch is rated for instrument level signals of 100mA (max.) at 10–30VDC.

Figure 1.1—Switch Wiring

### Standard PNP Switch

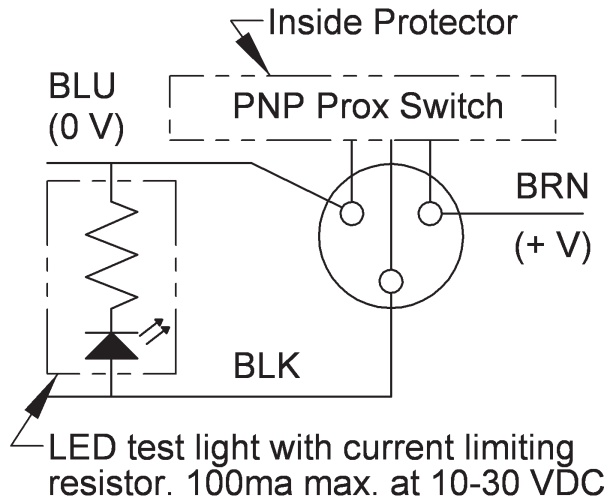
#### Switch Wiring:



SWITCH RATING: 100mA (Max.)  
 at 10-30 VDC

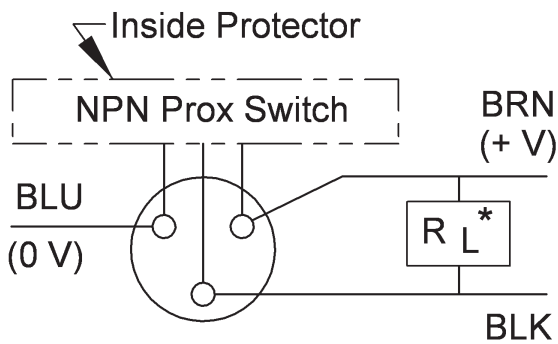
\* Provided by customer.

#### Switch Test Circuit:



### Optional NPN Switch

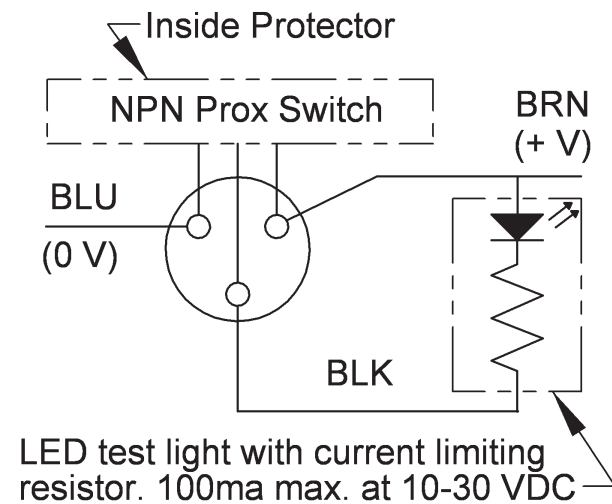
#### Switch Wiring:



SWITCH RATING: 100mA (Max.)  
 at 10-30 VDC

\* Provided by customer.

#### Switch Test Circuit:



NOTE: Pin orientations are facing exterior of male receptacle in collision sensor.

### 1.4.1 Test Switch Functionality

Once the Collision Sensor has been installed and connected as described in the preceding paragraphs, proper electrical operation of the unit may be confirmed.

Supply the Collision Sensor with approximately 15 psi (1 bar) and ensure that the unit is electrically connected to the user's control circuit or to a test box per *Figure 1.1*. The switch should appear closed.

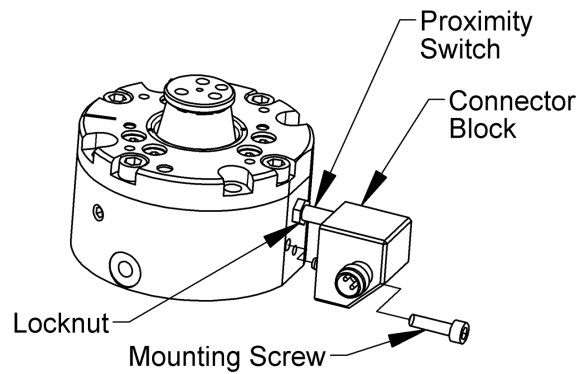
Manually push the Collision Sensor to simulate a collision while observing the switch output. When the collision occurs the switch will open and the test light will turn off.

Release the Collision Sensor and it will return to its working position. The test light will illuminate.

### 1.4.2 Replacement of Original Style Switch/Connector Block Assembly

1. Remove the mounting screw using a 2.5 mm hex key (see *Figure 1.2*).
2. Pull the connector block away from the Collision Sensor being careful not to strain the wires inside.
3. Loosen the locknut on the proximity switch.
4. Screw the proximity switch out of the body.
5. Discard the entire assembly.

**Figure 1.2—Removal of Switch/Connector Block Assembly from the Collision Sensor**

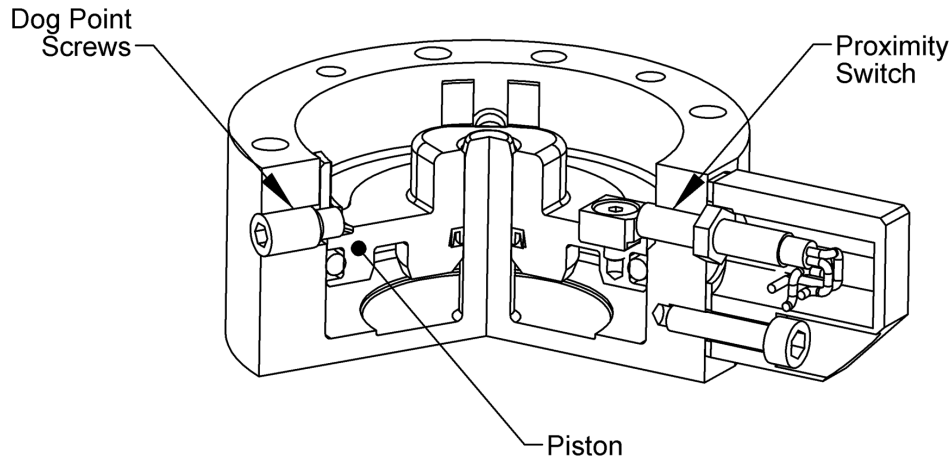


6. Provide 5 to 15 psi of air to the unit at the port marked "P" (unless the unit is equipped with preload springs).



**CAUTION:** If the piston is not up against the dog point screws while screwing in the proximity switch, applying air to the unit could damage the proximity switch. Make sure the Stem is locked into position indicating the piston is against the dog point screws.

**Figure 1.3—Piston Location During Proximity Switch Installation**

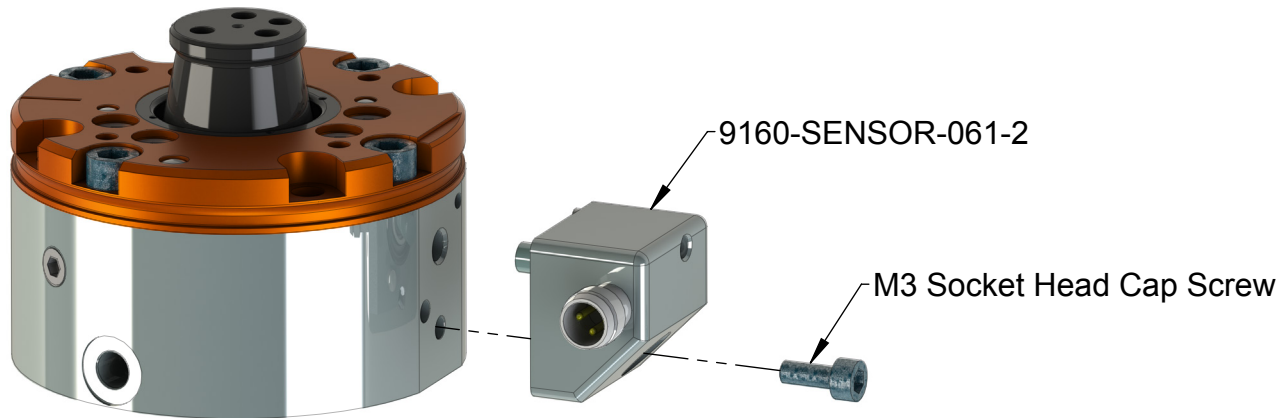


7. Screw the new proximity switch clockwise into the hole on the side of the body until it bottoms.
8. Rotate the connector block along with the proximity switch to prevent damage to the wires.
9. Screw the proximity switch out 1 turn (counterclockwise).
10. Perform switch adjustment per [Section 1.5.1—Original Style Switch Adjustment](#).
11. Press the connector block assembly firmly against the body of the Collision Sensor while tightening the screw. When tightened securely, the connector block assembly should rest parallel to its mounting surface.

### 1.4.3 Replacement of Current Style Switch/Connector Block Assembly

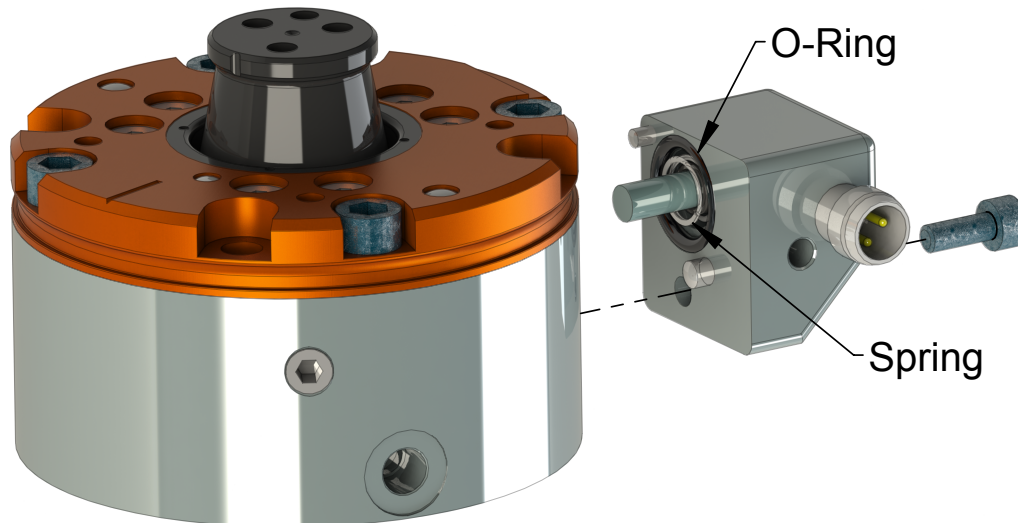
1. Remove the mounting screw using a 2.5 mm hex key (see [Figure 1.4](#)).
2. Pull the connector block away from the Collision Sensor.
3. Discard the entire assembly.

**Figure 1.4—Removal of Switch/Connector Block Assembly from the Collision Sensor**



4. Provide 5 to 15 psi of air to the unit at the port marked “P” (unless the unit is equipped with preload springs).
5. Make sure the spring is on the sensor and the O-ring is seated in the connector block. Press the connector block assembly firmly against the body of the Collision Sensor while tightening the screw to 64 in-ozs. When tightened securely, the connector block assembly should rest parallel to its mounting surface.

**Figure 1.5—Switch/Connector Block Assembly installation**



6. Perform switch adjustment per [Section 1.5.2—Current Style Switch Adjustment](#).



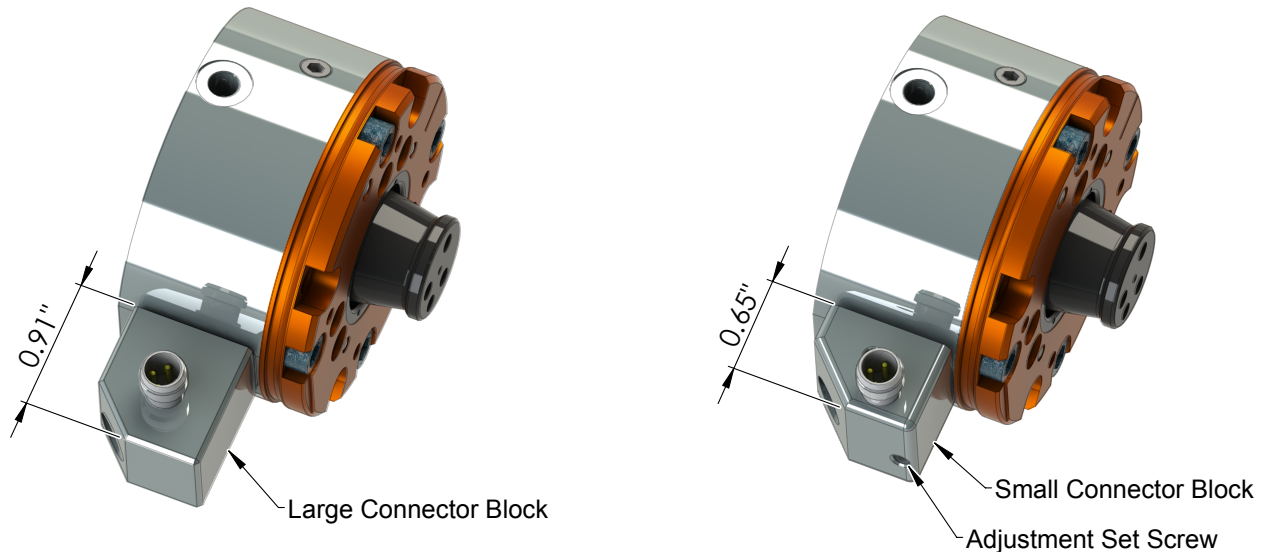
## 1.5 Switch Adjustment

There are (2) styles of switch/connector block assemblies for the SR-61 Collision Sensor. The original style has a larger connector body than the current style. The current style has an adjustment set screw in the side of the connector body, refer to [Figure 1.8](#).

**Figure 1.6—Determine the Switch/Connector Block Assemblies Style**

Original Style Switch/Connector Block

Current Style Switch/Connector Block



If adjusting an original style switch, refer to [Section 1.5.1—Original Style Switch Adjustment](#)

If adjusting a current style switch, refer to [Section 1.5.2—Current Style Switch Adjustment](#)

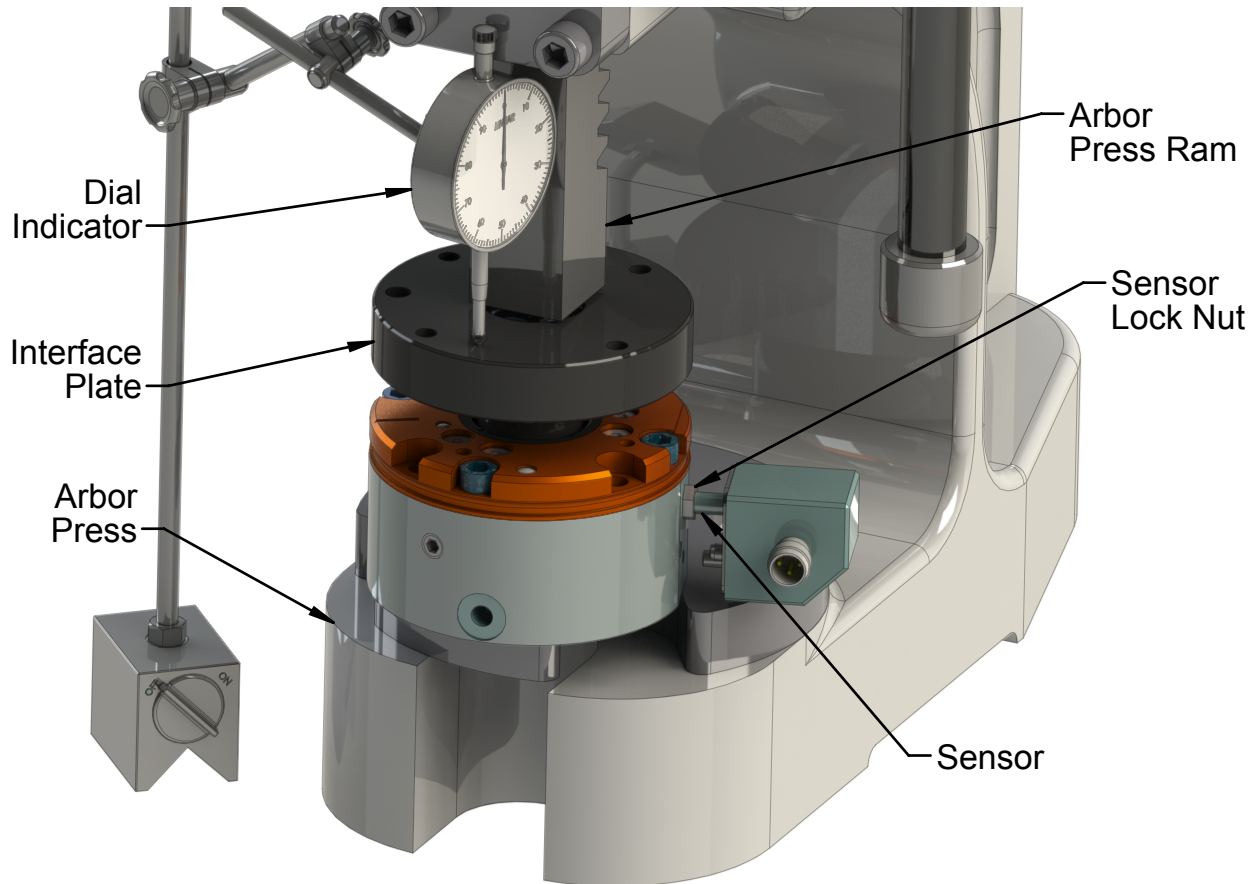
### 1.5.1 Original Style Switch Adjustment

Note: The switch is factory adjusted to open after the stem has traveled .025" in the axial direction. Adjustments should only be made if replacing the switch.

1. De-energize all electrical and pneumatic power supplied to the Collision Sensor. Drain all stored air and electric power in compliance with standard (OSHA) safety practices and standards.
2. Disconnect the air lines and signal wires connected to the Collision Sensor.
3. Remove the user-installed mounting hardware from the Collision Sensor and remove the unit. Take the unit to a test bench equipped with a clean working surface and compressed air.
4. Ensure that the Collision Sensor returns to its reset or working position with the stem fully extended and the alignment mark on the stem in line with the alignment mark on the cover plate (Temporarily supply approximately 60 psi (4 bars) to the unit.
5. Loosen and remove the screw holding the connector block in place (see [Figure 1.7](#)).
6. Taking care not to break the wires, pull the connector block away from the body. Loosen the locknut on the proximity switch.
7. Connect a test box per [Figure 1.1](#).
8. Attach an interface plate to the stem of the Collision Sensor.
9. Center the Collision Sensor under the press ram (see [Figure 1.7](#)).
10. Set a dial indicator in contact with the interface plate and adjust it so that the probe is vertical. Set the dial indicator height so that it can read at least .06" (1.5 mm) stroke. Set the dial ring to zero.

11. Push on the press handle until the switch circuit opens and check the distance traveled on the dial indicator.
12. If the distance traveled is greater than desired turn the proximity switch counterclockwise. If the distance traveled is less turn the proximity switch clockwise.
13. Repeat steps (11) and (12) as necessary to obtain the desired switch setting.

**Figure 1.7—Checking Switch Height Adjustment**



14. Tighten the locknut on the proximity sensor.
15. Slide the connector block over the proximity sensor carefully routing the wires into the slotted area under the proximity sensor. Line up the dowel pin with the hole in the body and the screw hole with the threaded hole in the body.
16. Apply Loctite 222MS to the M3 mounting screw and thread it into the body. Tighten the screw securely.
17. Re-install the Collision Sensor using the user-installed mounting hardware.



**CAUTION:** Before putting the Collision Sensor back into operation, confirm that the switch is functioning properly. See [Section 1.4.1—Test Switch Functionality](#).

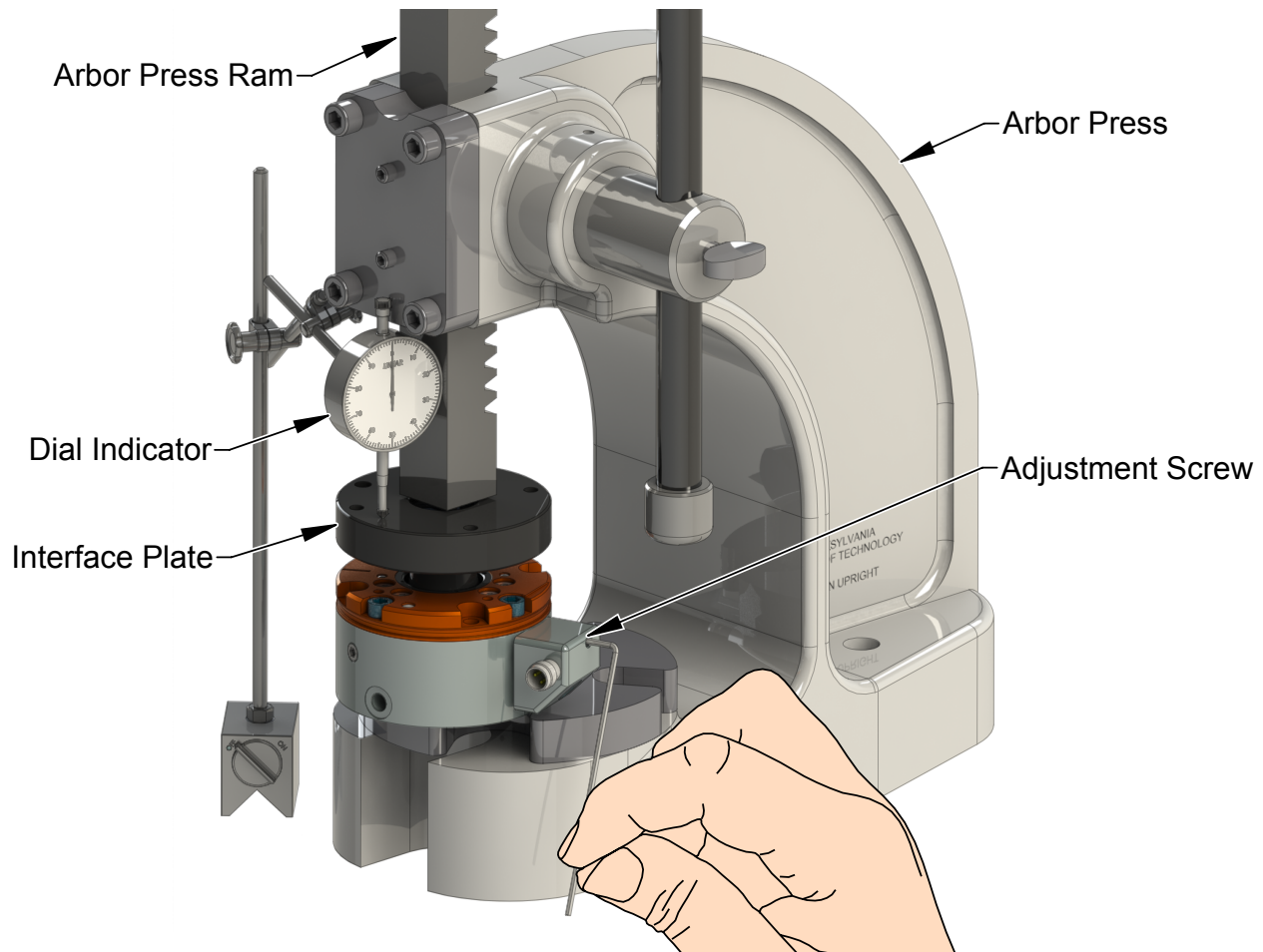
## 1.5.2 Current Style Switch Adjustment

Note: The switch is factory adjusted to open after the stem has traveled .025” in the axial direction. Adjustments should only be made if replacing the switch.

1. De-energize all electrical and pneumatic power supplied to the Collision Sensor. Drain all stored air and electric power in compliance with standard (OSHA) safety practices and standards.
2. Disconnect the air lines and signal wires connected to the Collision Sensor.

3. Remove the user-installed mounting hardware from the Collision Sensor and remove the unit. Take the unit to a test bench equipped with a clean working surface and compressed air.
4. Ensure that the Collision Sensor returns to its reset or working position with the stem fully extended and the alignment mark on the stem in line with the alignment mark on the cover plate (Temporarily supply approximately 60 psi (4 bars) to the unit).
5. Connect a test box per [Figure 1.1](#).
6. Attach an interface plate to the stem of the Collision Sensor.
7. Center the Collision Sensor under the press ram (see [Figure 1.8](#)).
8. Set a dial indicator in contact with the interface plate and adjust it so that the probe is vertical. Set the dial indicator height so that it can read at least .06" (1.5 mm) stroke. Set the dial ring to zero.
9. Push on the press handle until the switch circuit opens and check the distance traveled on the dial indicator.
10. If the distance traveled is greater than desired turn the adjustment screw counterclockwise. If the distance traveled is less turn the adjustment screw clockwise.
11. Repeat steps (9) and (10) as necessary to obtain the desired switch setting.

**Figure 1.8—Checking Switch Height Adjustment**



12. Re-install the Collision Sensor using the user-installed mounting hardware.



**CAUTION:** Before putting the Collision Sensor back into operation, confirm that the switch is functioning properly. See [Section 1.4.1—Test Switch Functionality](#).