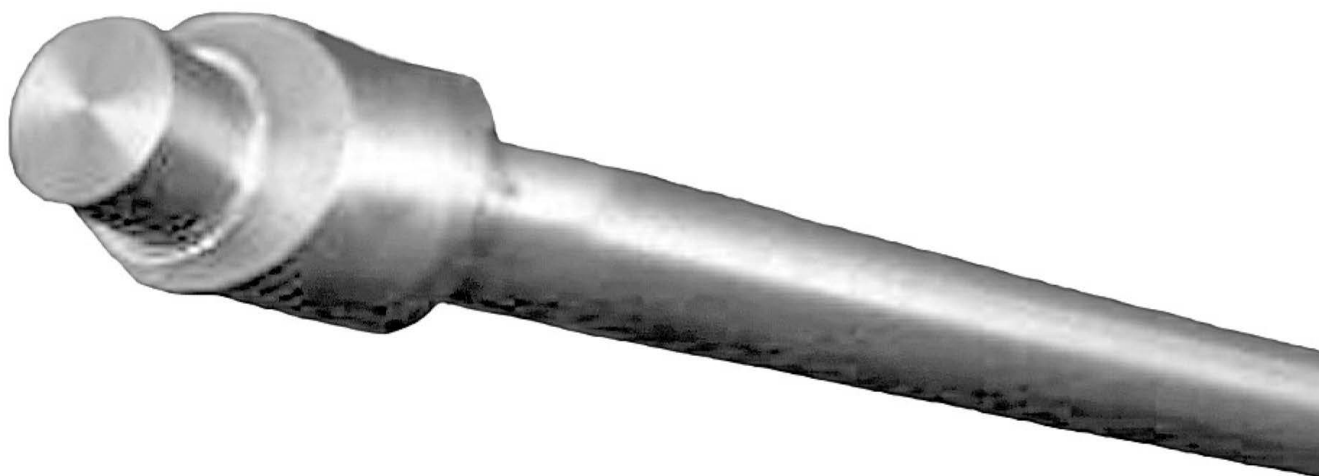


# Model T8

## Ultrasonic Flow Transducer Installation Guide





# Model T8

*Ultrasonic flow transducer*

## Installation guide

BH046C21 Rev. E  
Sep 2023

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## Services



Panametrics provides customers with an experienced staff of customer support personnel ready to respond to technical inquiries, as well as other remote and on-site support needs. To complement our broad portfolio of industry-leading solutions, we offer several types of flexible and scalable support services including: Training, Product Repairs, Service Agreements and more.

Please visit <https://www.bakerhughes.com/panametrics/panametrics-services> for more details.

## Typographical Conventions

**Note:** *These paragraphs provide information that provides a deeper understanding of the situation, but is not essential to the proper completion of the instructions.*

**IMPORTANT:** These paragraphs provide information that emphasizes instructions that are essential to proper setup of the equipment. Failure to follow these instructions carefully may cause unreliable performance.



**CAUTION!** This symbol indicates a risk of potential minor personal injury and/or severe damage to the equipment, unless these instructions are followed carefully.



**WARNING!** This symbol indicates a risk of potential serious personal injury, unless these instructions are followed carefully.

## Safety Issues



**WARNING!** It is the responsibility of the user to make sure all local, county, state and national codes, regulations, rules and laws related to safety and safe operating conditions are met for each installation.



**Attention European Customers!** To meet CE Mark requirements for all units intended for use in the EU, all electrical cables must be installed as described in this manual.

## Auxiliary Equipment

### Local Safety Standards

The user must make sure that he operates all auxiliary equipment in accordance with local codes, standards, regulations, or laws applicable to safety.

## Working Area



**WARNING!** Auxiliary equipment may have both manual and automatic modes of operation. As equipment can move suddenly and without warning, do not enter the work cell of this equipment during automatic operation, and do not enter the work envelope of this equipment during manual operation. If you do, serious injury can result.



**WARNING!** Make sure that power to the auxiliary equipment is turned OFF and locked out before you perform maintenance procedures on this equipment.

## Qualification of Personnel

Make sure that all personnel have manufacturer-approved training applicable to the auxiliary equipment.

## Personal Safety Equipment

Make sure that operators and maintenance personnel have all safety equipment applicable to the auxiliary equipment. Examples include safety glasses, protective headgear, safety shoes, etc.

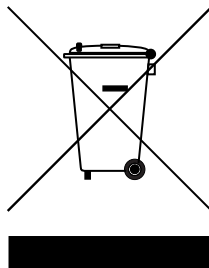
## Unauthorized Operation

Make sure that unauthorized personnel cannot gain access to the operation of the equipment.

## Environmental Compliance

### Waste Electrical and Electronic Equipment (WEEE) Directive

Panametrics is an active participant in Europe's *Waste Electrical and Electronic Equipment (WEEE)* take-back initiative, directive 2012/19/EU.



The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end of life equipment in a sound way.

The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

## EU Declaration of Conformity

The EU Declaration of Conformity (EU DoC) and other compliant documents can be downloaded from the Product Support Portal.

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## Chapter 1. Installation

### 1.1 Introduction

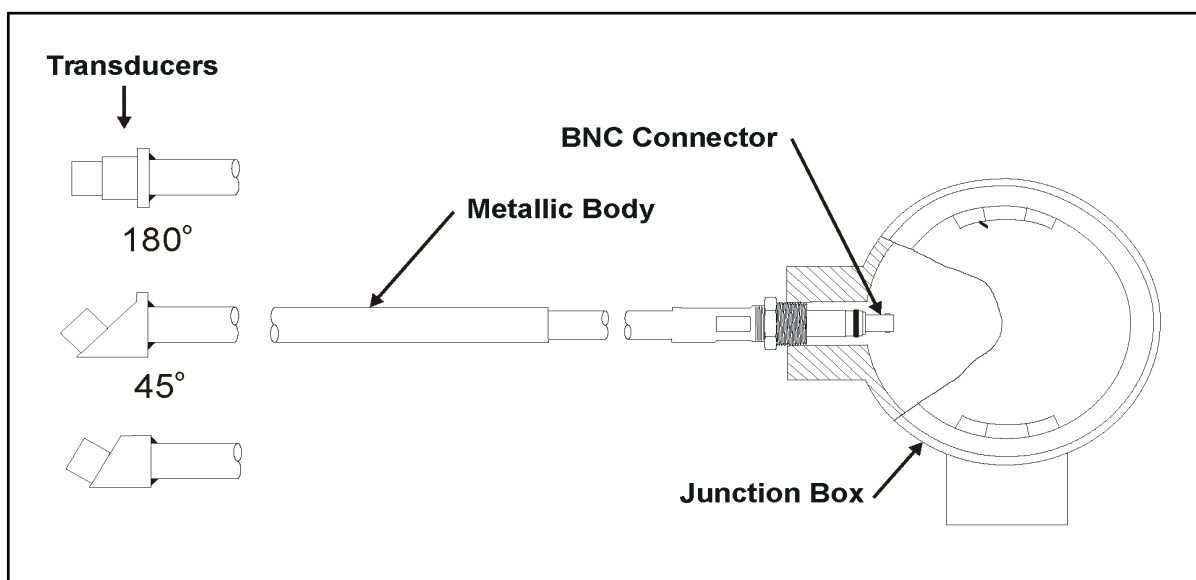
The T8 Ultrasonic Flow Transducer is used exclusively with the Panametrics line of ultrasonic flowmeters. These transducers measure the flow rate of sonically-conductive gases through pipes having diameters from 4 in. (100 mm) to 36 in. (90 cm). Such measurements are typically independent of the pipe material.

### 1.2 Transducer construction

Each T8 transducer assembly (see Figure 1 below) consists of the following:

- A metallic body with a 1/2" NPT male thread for attaching an electrical junction box
- A body flange that is welded or machined to the transducer body
- A transducer with a piezoelectric element mounted on a wedge and wired to a BNC style electrical connector
- A BNC style electrical connector for use in connecting the transducer to the flowmeter

The T8 is available in various lengths from 12 in. (30 cm) to 72 in. (180 cm).



**Figure 1: T8 Transducer assembly**

## 1.3 Installing T8 transducers

The pressure mechanism is a piston-driven hydraulic pump used for inserting T8 transducers into pressurized pipelines. To perform this procedure safely, you must follow all the instructions in this chapter very carefully.

### 1.3.1 Equipment needed

To properly install the T8 transducers, you must provide the following items:

- Pipe marker
- Spiral-wound gaskets (6)
- Adjustable torque wrench with a 3.75–19 ft-lb (5–20 N-m) range and a socket drive
- Standard and deep sockets
- Hot-tapping mechanism (for use by qualified personnel only)
- Open-end wrench
- Oscilloscope

### 1.3.2 Locating and welding the transducer ports

To locate and weld the transducer ports, complete the following steps:

1. The variable  $H$  equals the distance between the center lines of the transducer ports (see Figure 2 on page 3). To calculate the distance  $H$ , use the following equation:

$$H = 2[(ID + 0.325) \cdot \tan \theta + U]$$

where: **ID** = pipe inside diameter

**$\tan \theta$**  = tangent of transducer head angle

**U** = transducer centerline offset (0.155 for  $\theta = 30^\circ$  or 0.067 for  $\theta = 45^\circ$ )

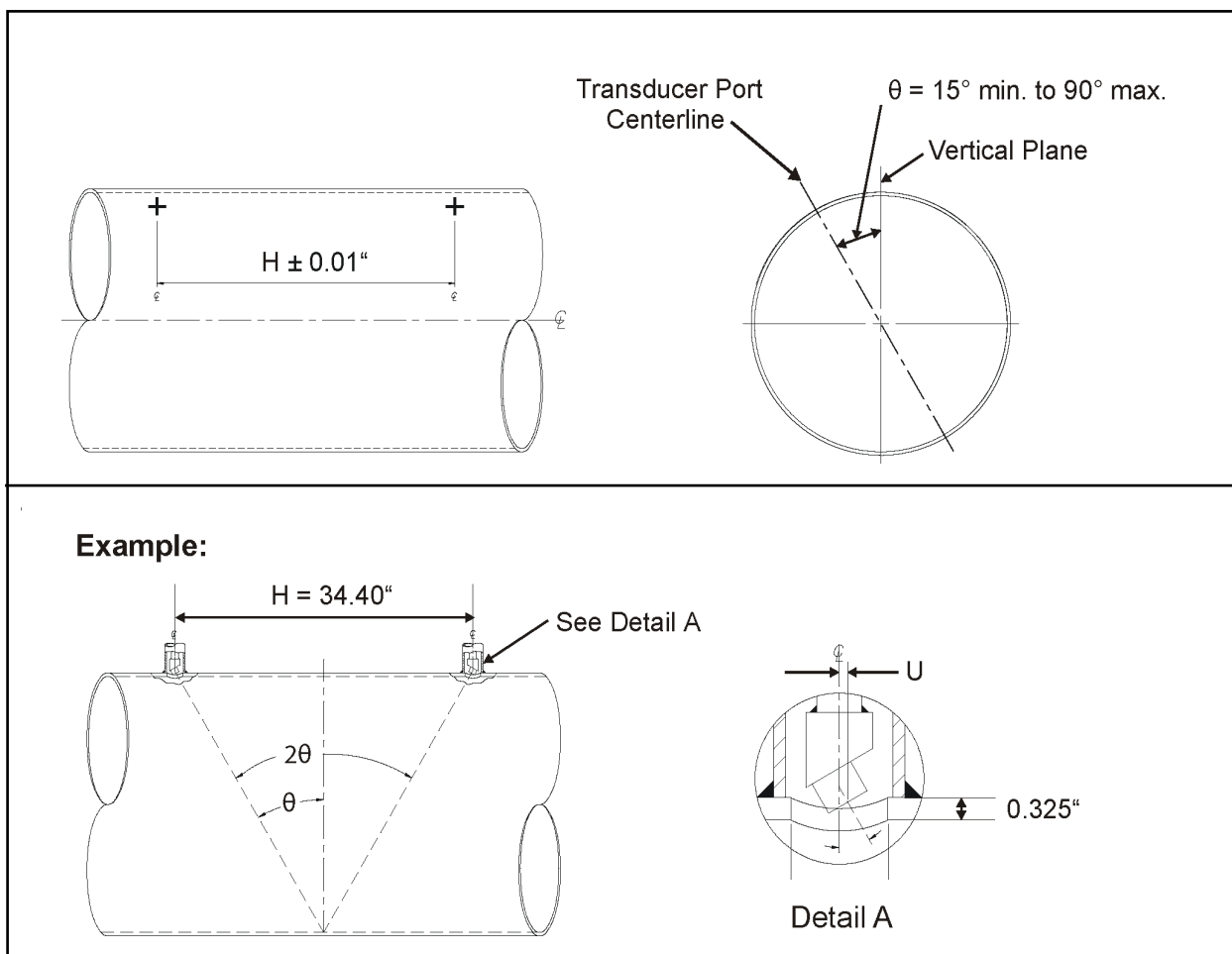
**Example:** To calculate the transducer port locations on a 30 in. (75 cm) pipe with a 0.40 in. (1 mm) wall thickness, using a T8 transducer with a  $30^\circ$  head angle:

$$H = 2 * [(29,2 + 0,325) * \tan 30^\circ + 0,155] = 34.40 \text{ in.}$$

2. For optimum performance, select a port location that has at least 20 pipe diameters of straight, undisturbed flow upstream and 10 pipe diameters of straight, undisturbed flow downstream from the point of measurement. Undisturbed flow means avoiding sources of turbulence such as valves, flanges, elbows; avoiding swirl; and avoiding irregular flow profiles.

3. Using the calculated H value, mark two crosshairs on the pipe where you intend to weld the transducer ports, so that the distance between the two marks equals the H value (see Figure 2 below).

**IMPORTANT:** Port locations should **NOT** be located directly on the top or bottom of the pipe. Place the ports at between 15 degrees and 90 degrees from the vertical plane of the pipe.

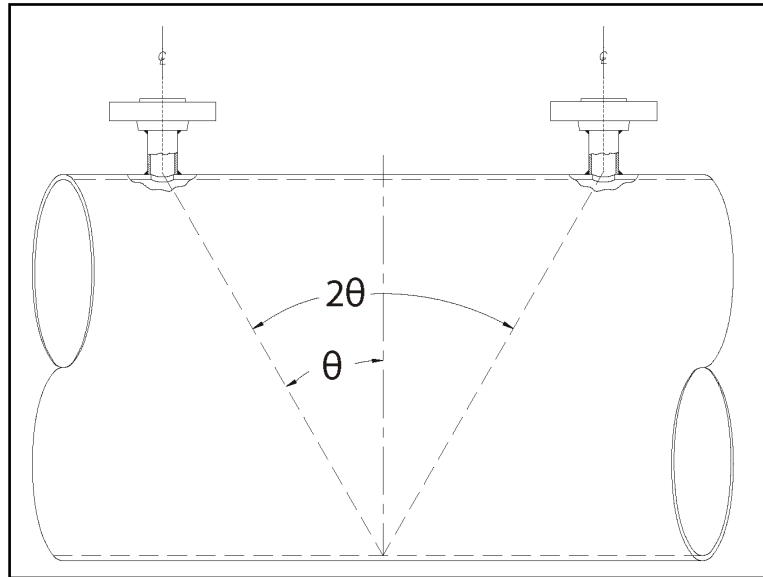


**Figure 2: Locating the transducer ports**



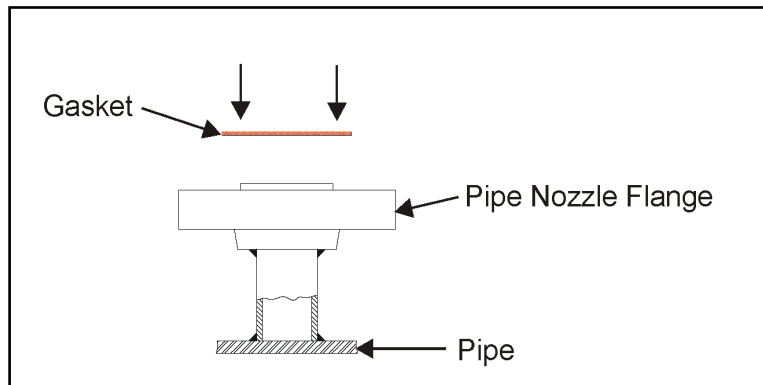
**WARNING!** Only qualified personnel should weld bosses and nozzles, using a suitable ASME IX qualified welding procedure.

4. Weld the 2 in., schedule 80 nozzles with pipe flanges to the two marked locations on the pipe. Be careful to maintain perpendicularity and parallelism as shown in Figure 3 below.



**Figure 3: Welding the nozzles with flanges to the pipe**

5. Inspect the flange gaskets. They must not be previously used, warped, pitted or scratched.
6. Place one gasket on the top of each pipe nozzle flange, as shown in Figure 4 below.



**Figure 4: Placing a gasket on a pipe nozzle flange**

7. Bolt a 2 in. flanged, full-port, ball valve to each nozzle (see Figure 5 below). Be sure to use a new flange gasket for each valve.

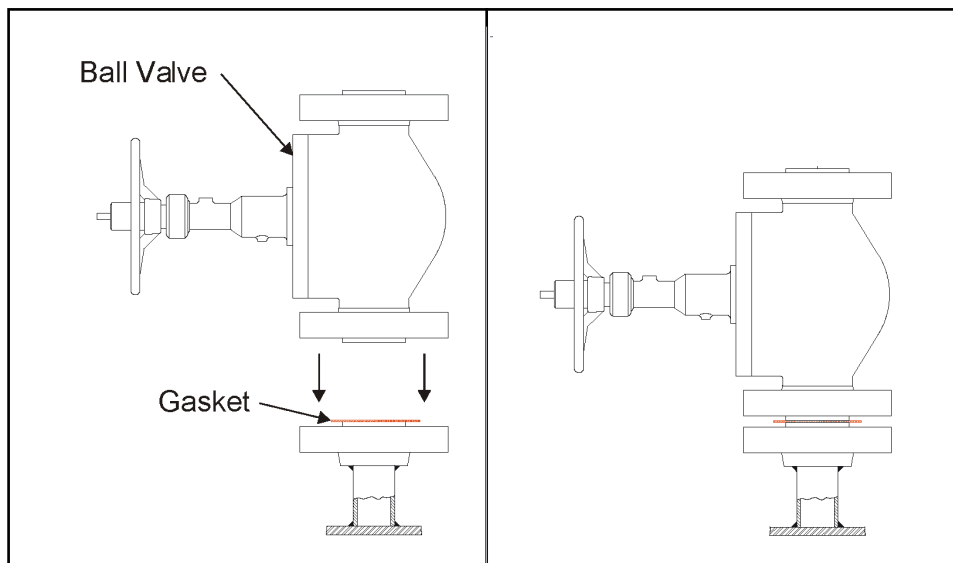


Figure 5: Mounting a Ball Valve onto the Flange

### 1.3.3 Hot tapping the ports



**WARNING!** Only qualified personnel should weld bosses and nozzles, using a suitable ASME IX qualified welding procedure.



**WARNING!** Please follow all applicable site, local, and regional safety measures when conducting tapping of nozzles to pipe. Great care should be taken to ensure activity is not being conducted in a flammable environment without proper mitigation strategies.

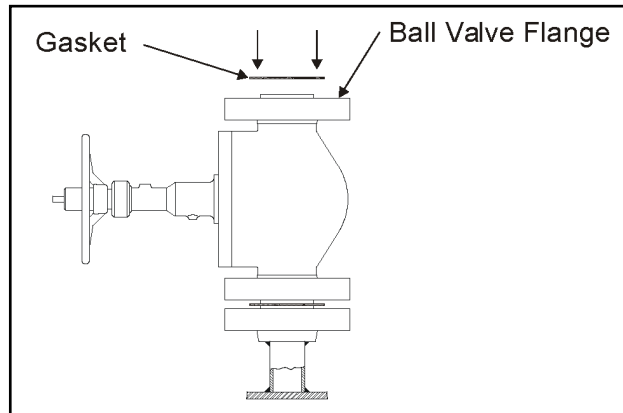


**WARNING!** Any deviation from this prescribed procedure can result in accidental release of process gas that may be dangerous or hazardous due to its pressure, flammability, or composition. Safe work practices should be followed and periodic review of this procedure is highly recommended before conducting this work.

**IMPORTANT:** Hot tapping should only be performed by qualified personnel. Follow all applicable code and safety practices during these procedures.

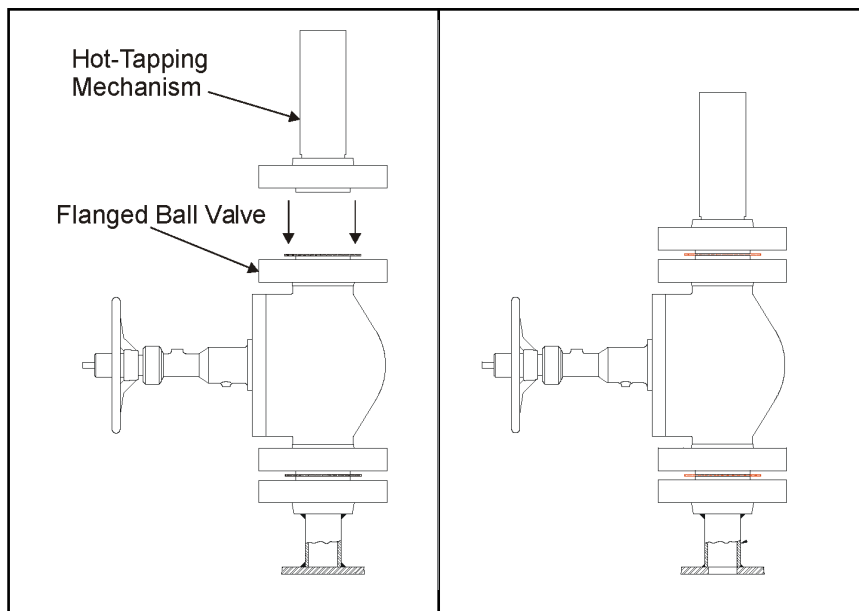
1. Inspect the flange gaskets. They must not be previously used, warped, pitted or scratched.

2. Place a new gasket on the top of the ball valve flange, as shown in Figure 6 below.



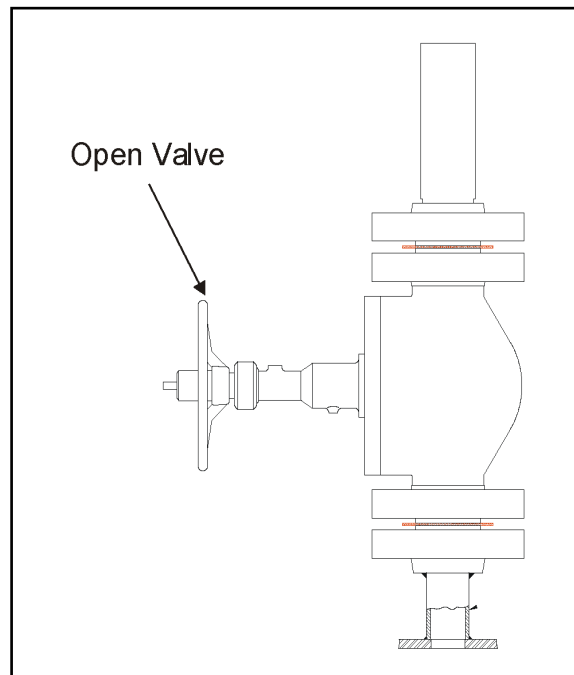
**Figure 6: Placing a gasket on the ball valve flange**

3. Bolt the hot-tapping mechanism to the 2 in. flanged ball valve, as shown in Figure 7 below.



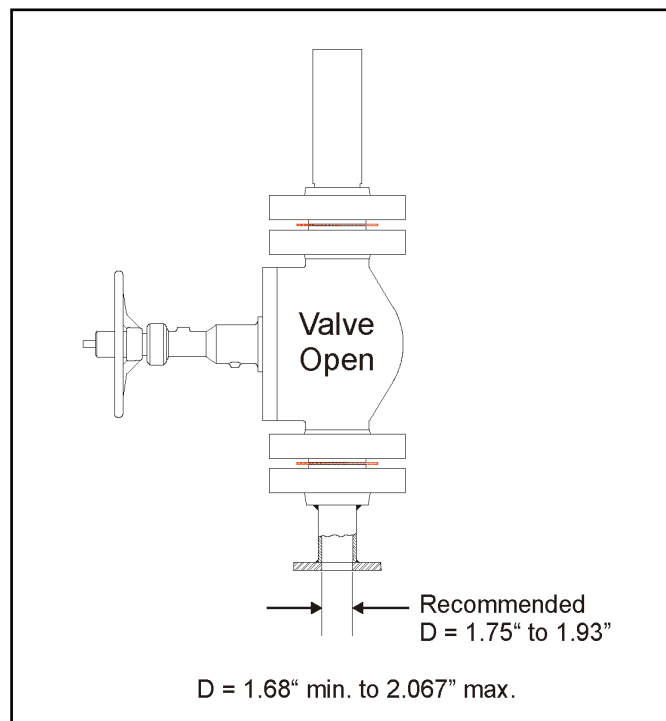
**Figure 7: Securing the hot-tapping mechanism**

4. Make sure the ball valve is fully “open” (see Figure 8 below).



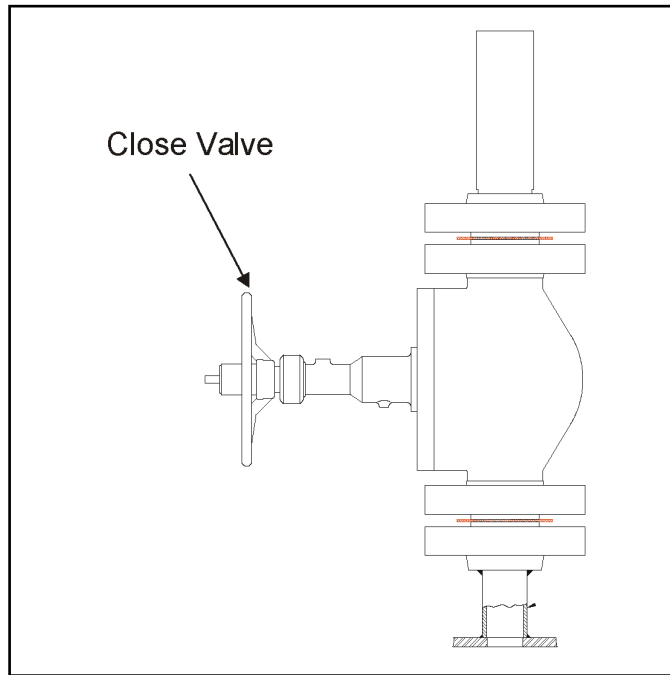
**Figure 8: Checking the open valve**

5. Drill a 1.75 in. diameter hole through the pipe wall, as shown in Figure 9 below.



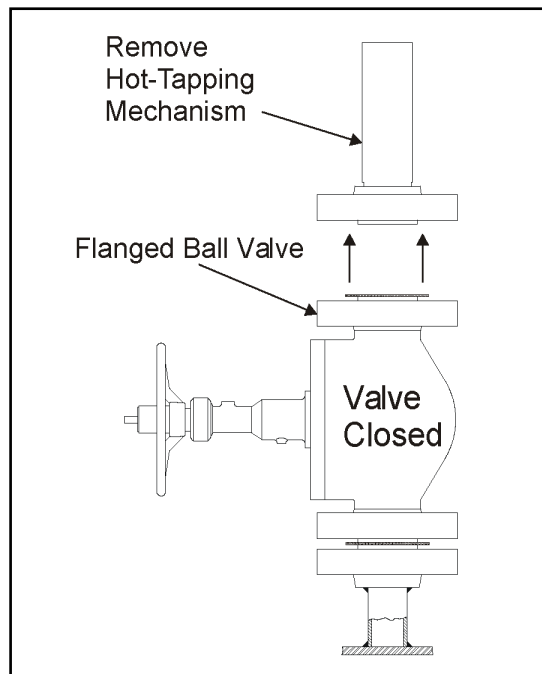
**Figure 9: Drilling a hole through the pipe wall**

6. Retract the drill bit of the hot-tapping mechanism and “close” the ball valve (see Figure 10 below).



**Figure 10: Closing the ball valve**

7. Unbolt the hot-tapping mechanism from the ball valve and remove the mechanism from the port (see Figure 11 below).



**Figure 11: Removing the mechanism from the port**

8. Repeat steps 1 through 7 to hot tap the other port.

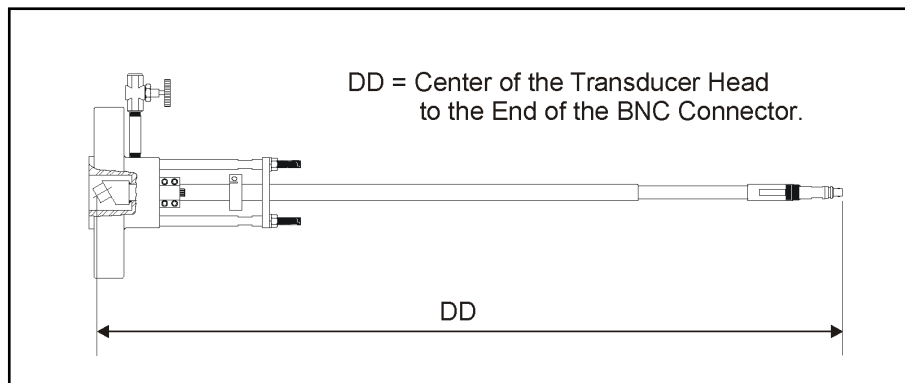


### 1.3.4 Positioning the transducer

Complete the steps in this section to position the T8 transducer in the hot-tapped port.

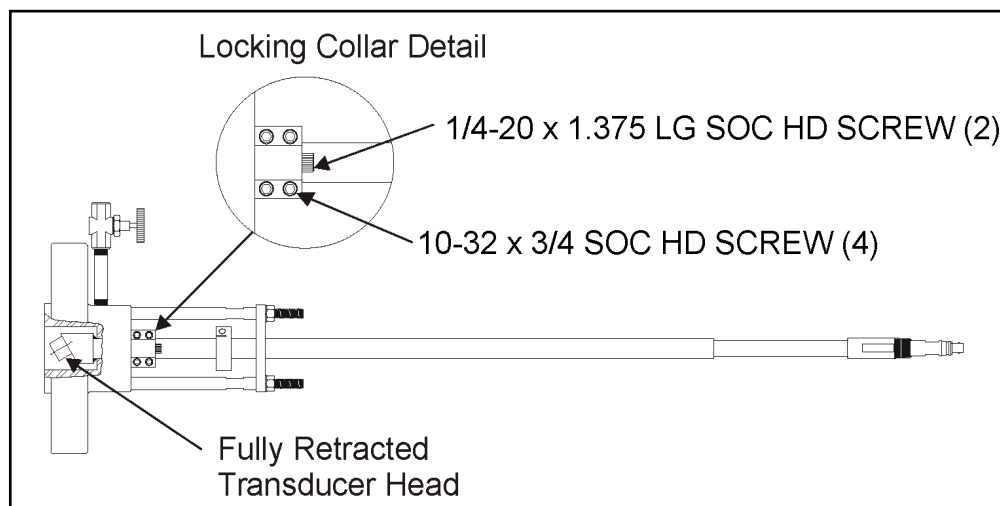
**Note:** Keep the cover for the safety collar loosely around the transducer to allow for proper alignment.

1. Measure the transducer length (“DD”) from the center of the transducer head to the end of the BNC connector.



**Figure 12: Measuring the transducer length**

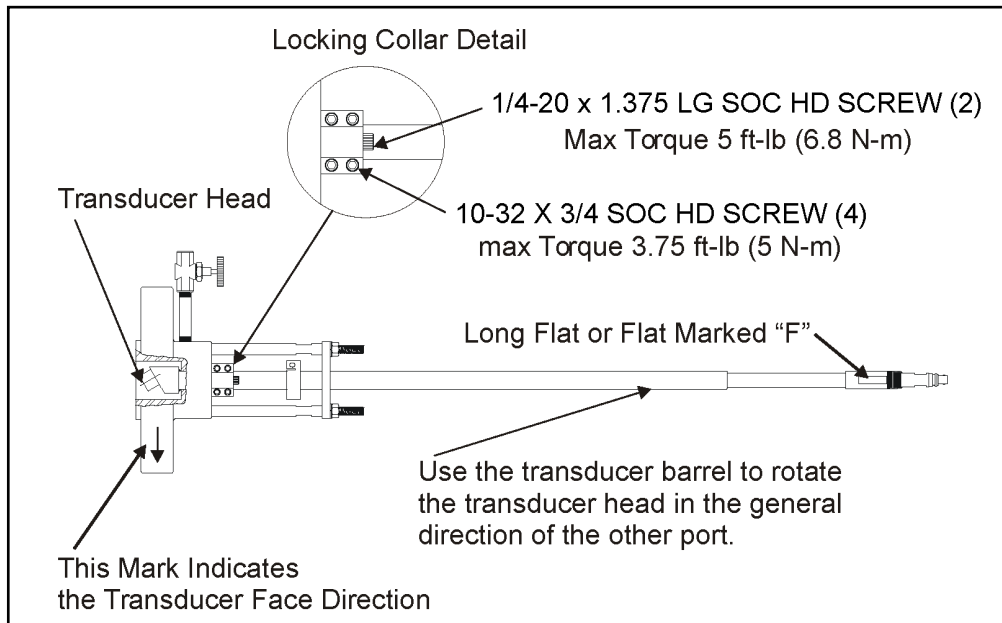
2. Make sure the transducer head is fully retracted into the Low Pressure Assembly (LPA). If the transducer is not fully retracted, loosen all the screws of the locking collar and manually retract the transducer into the LPA (see Figure 13 below).



**Figure 13: Transducer head fully retracted**

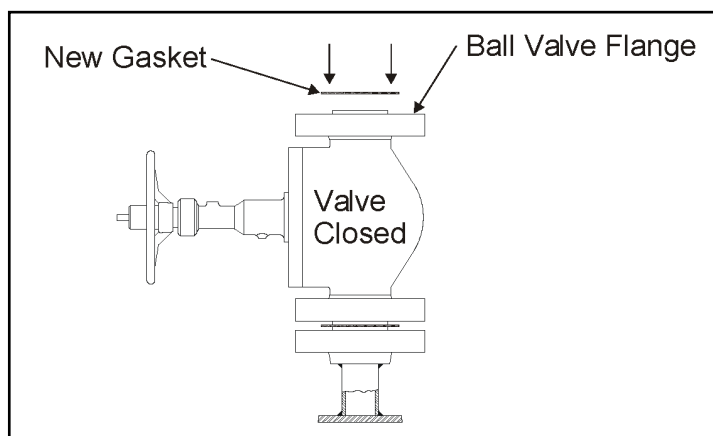
3. Rotate the transducer barrel until the transducer face points in the general direction of the other port. Then, tighten the locking collar screws with a torque wrench to fasten the transducer in place. Use the maximum torque shown in Figure 14 below, but do not overtighten the screws. Alternate the tightening sequence of the six screws to properly “seat” the locking collar.

**IMPORTANT:** The long flat or the flat marked “F” is in line with the transducer face (see Figure 14 below). To aid the installation, make a mark on the flange indicating the direction of the transducer face.



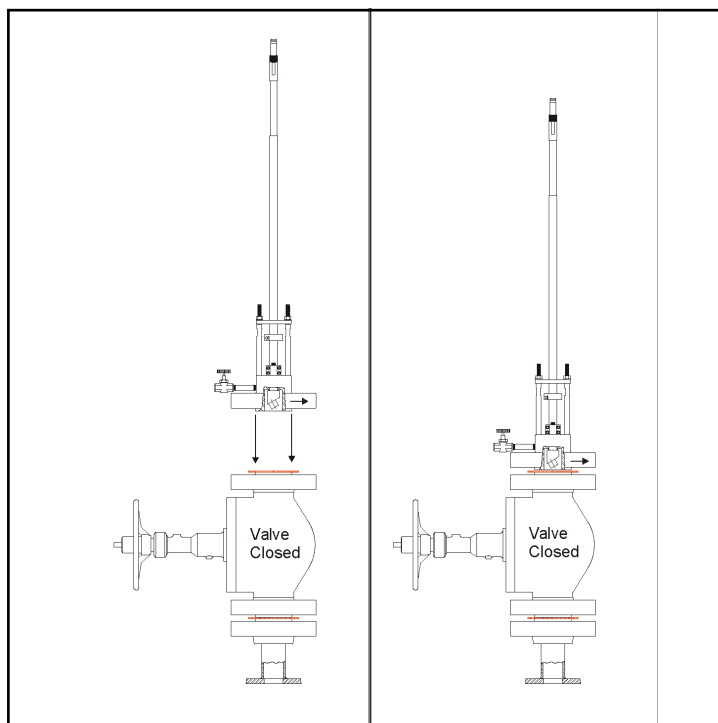
**Figure 14: Rotating the transducer barrel**

4. Inspect the flange gaskets. They must not be previously used, warped, pitted or scratched.
5. Place a new gasket on the top of the ball valve flange (see Figure 15 below).



**Figure 15: Placing a new gasket on the flange**

6. Bolt the LPA mechanism to the 2 in. flanged ball valve, as shown in Figure 16 below.



**Figure 16: Bolting the LPA mechanism to the ball valve**

7. Measure the “A” dimension, which is the distance from the outside surface of the pipe wall to the end of the BNC connector on the transducer (see Figure 17 below). Then, calculate the insertion distance (“I”) by using the following equation:

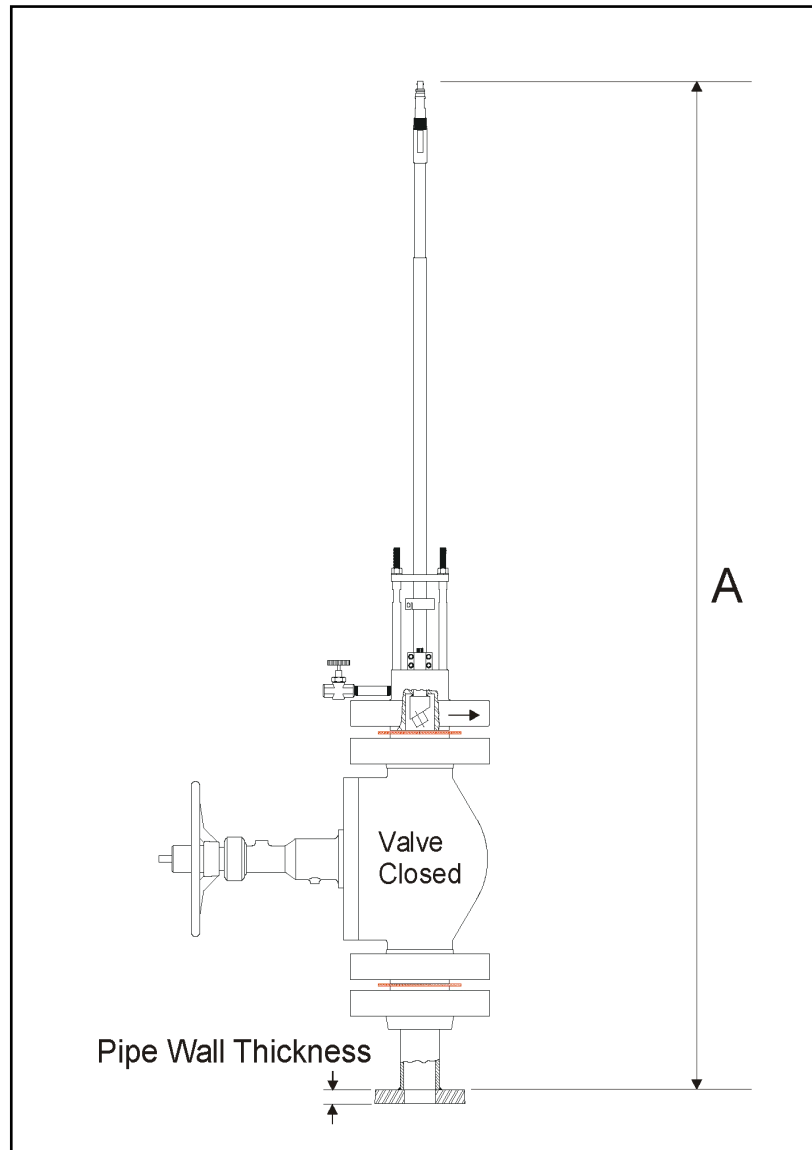
$$I = A + W - (C + DD)$$

where: **A** = distance from the pipe wall to the end of the BNC connector on the transducer.

**W** = pipe wall thickness

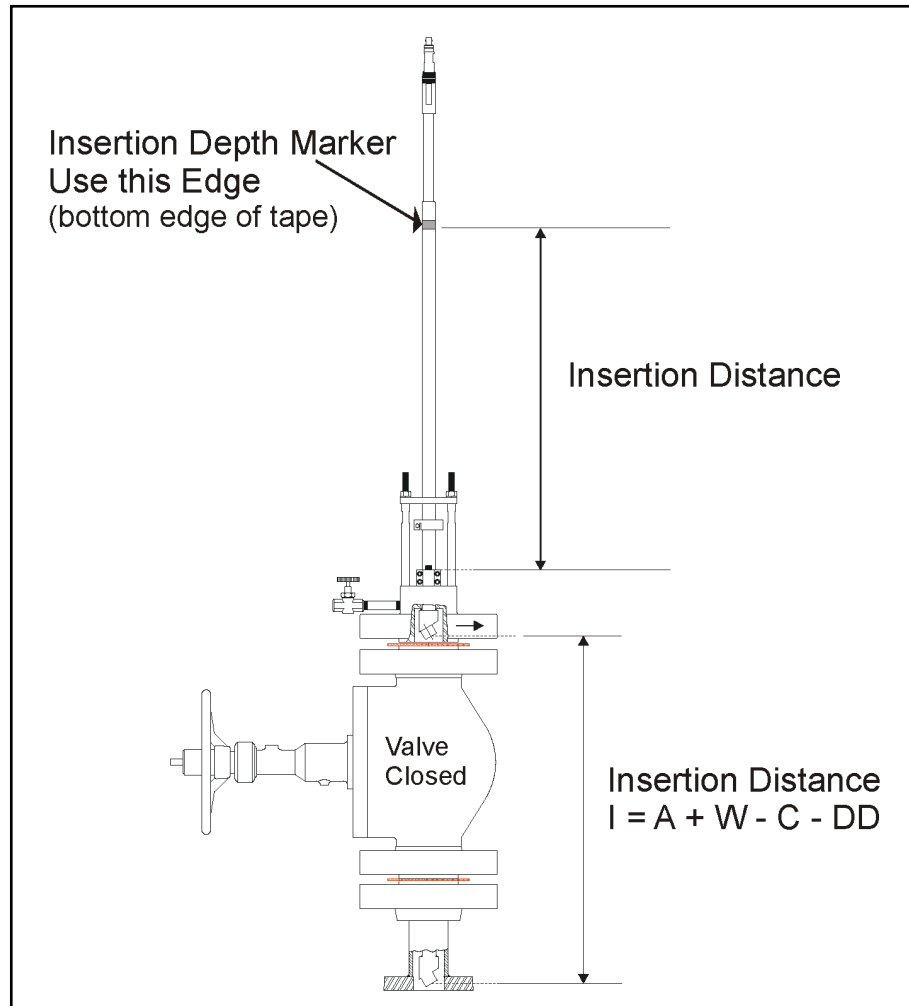
**C** = 0.325 in. (a constant)

**DD** = distance from the center of the transducer head to the end of the BNC connector, as measured in step 1.



**Figure 17: Measuring the “A” dimension**

8. Mark the insertion distance on the shaft of the transducer, using one layer of colored electrical tape around the circumference so that the ends overlap (see Figure 18 below). Alternatively, apply any mark that is waterproof and easily identifiable.



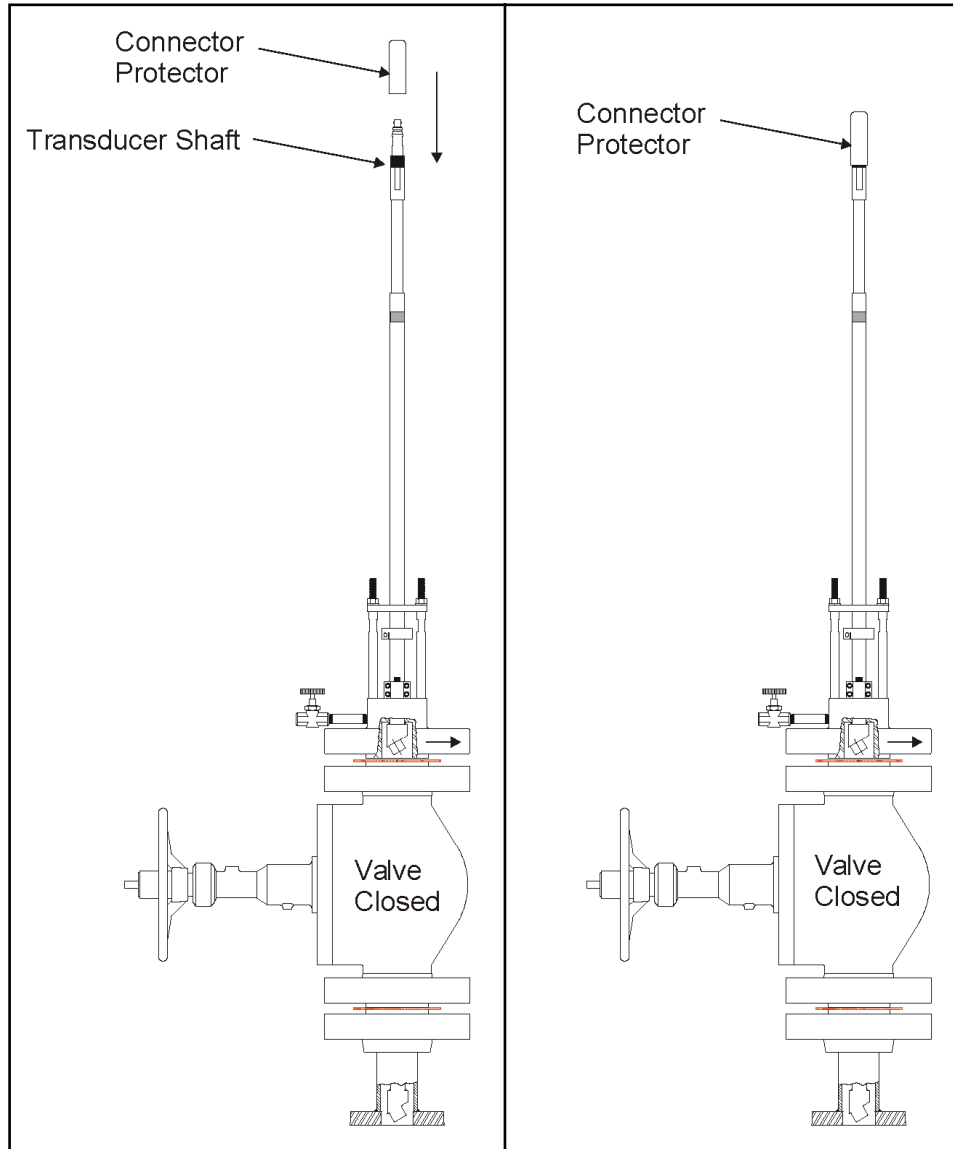
**Figure 18: Marking the insertion distance**

9. Repeat steps 1 through 8 to position the other transducer in the other port.

### 1.3.5 Attaching the hydraulic cylinder

The next step in the transducer installation process is to attach the hydraulic cylinder to one of the transducer ports.

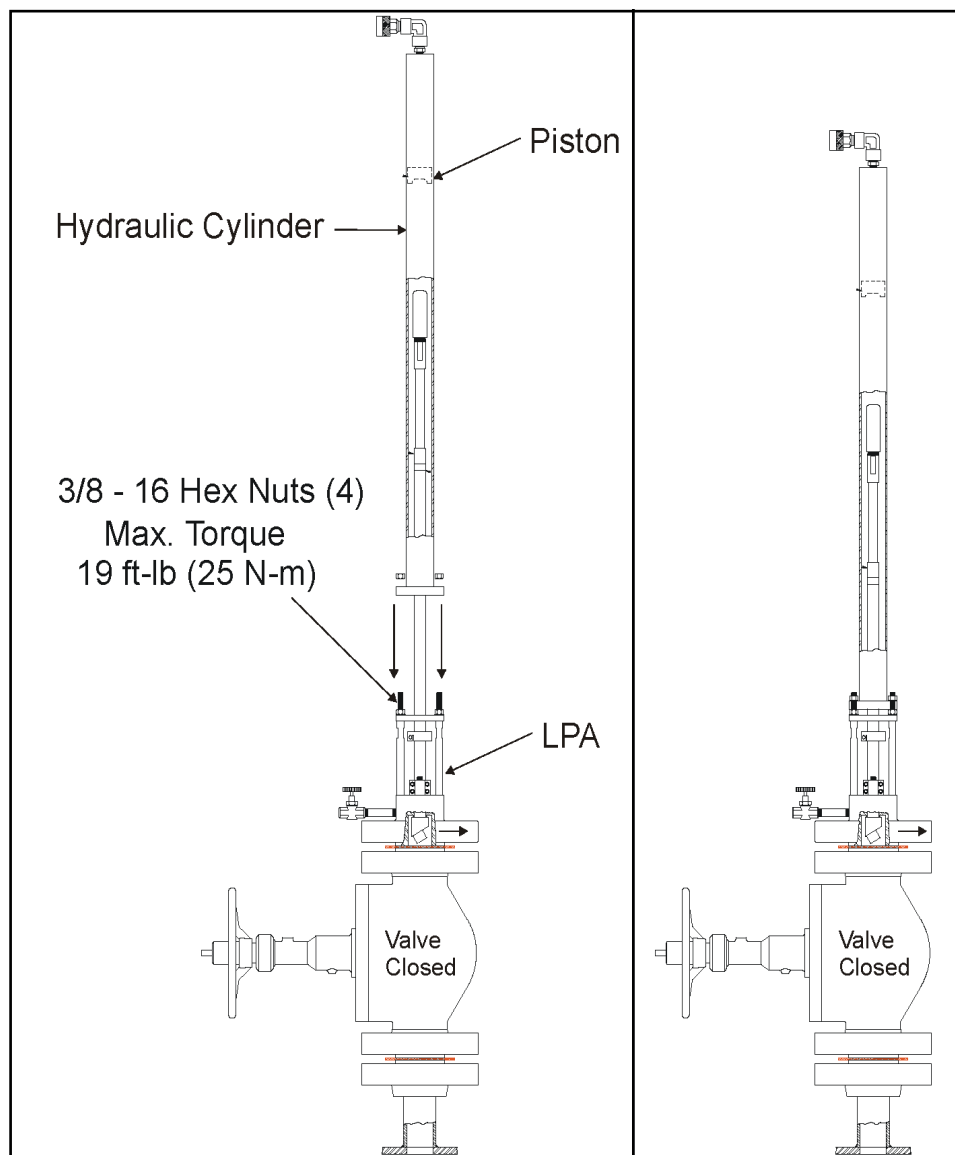
1. Install the connector protector on the 1/2" NPT thread of the transducer shaft until it is finger-tight (see Figure 19 below).



**Figure 19: Installing the connector protector**

- Refer to Figure 20 below and attach the hydraulic cylinder to the four studs of the LPA with four 3/8-16 hex nuts. Tighten the nuts to a maximum torque of 19 ft-lb (25 N-m).

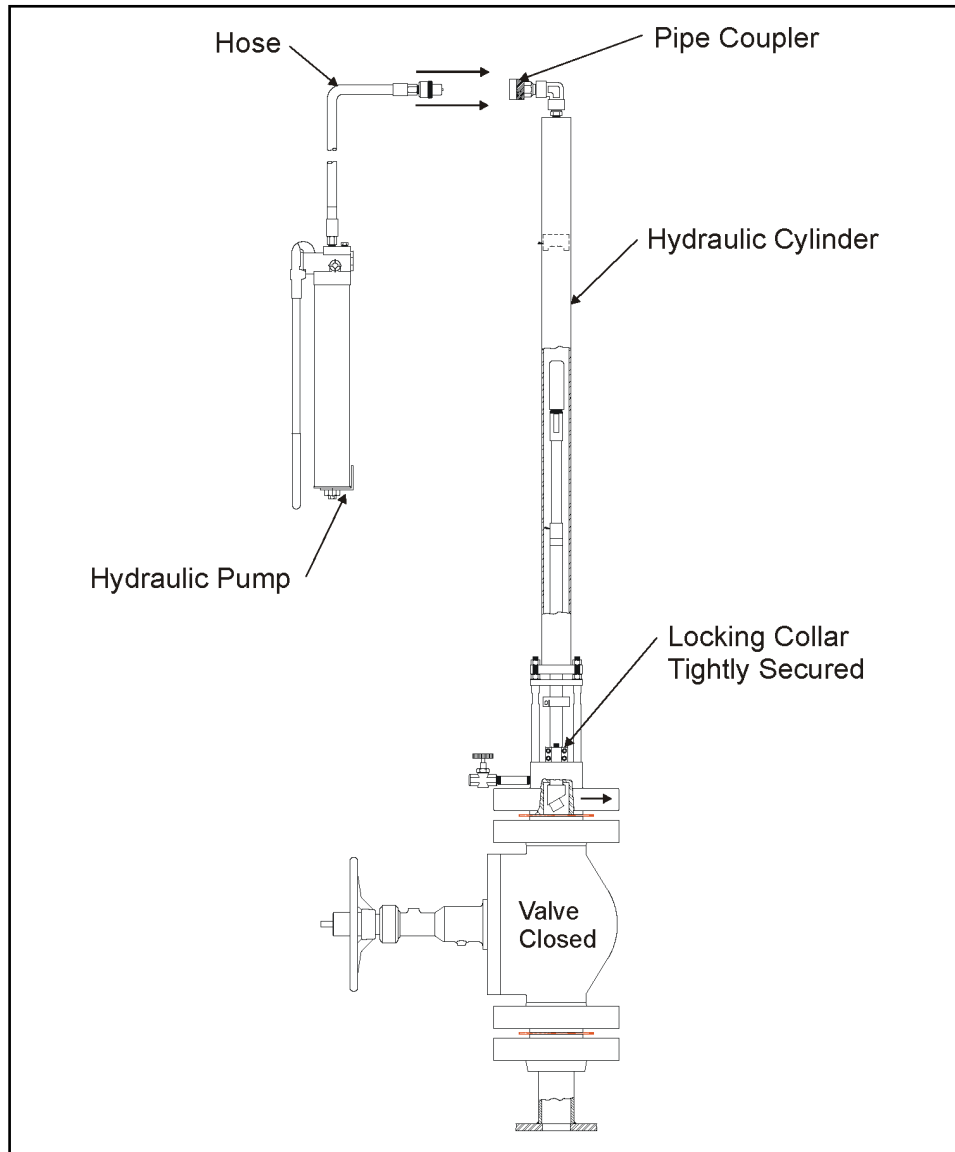
**IMPORTANT:** If the piston of the hydraulic cylinder touches the connector protector before the hydraulic cylinder can seat properly onto the studs, remove the hydraulic cylinder from the LPA. Connect the hydraulic pump to the hydraulic cylinder, and refer to “Resetting or Storing the Hydraulic Cylinder” on page 24 to move the piston to the appropriate position.



**Figure 20: Attaching the hydraulic cylinder**

3. Refer to Figure 21 below and attach the hose of the hydraulic pump to the hydraulic cylinder at the pipe coupler.

**Note:** The 2 in. ball valve should be closed and the locking collar should be tightly secured to the transducer shaft.



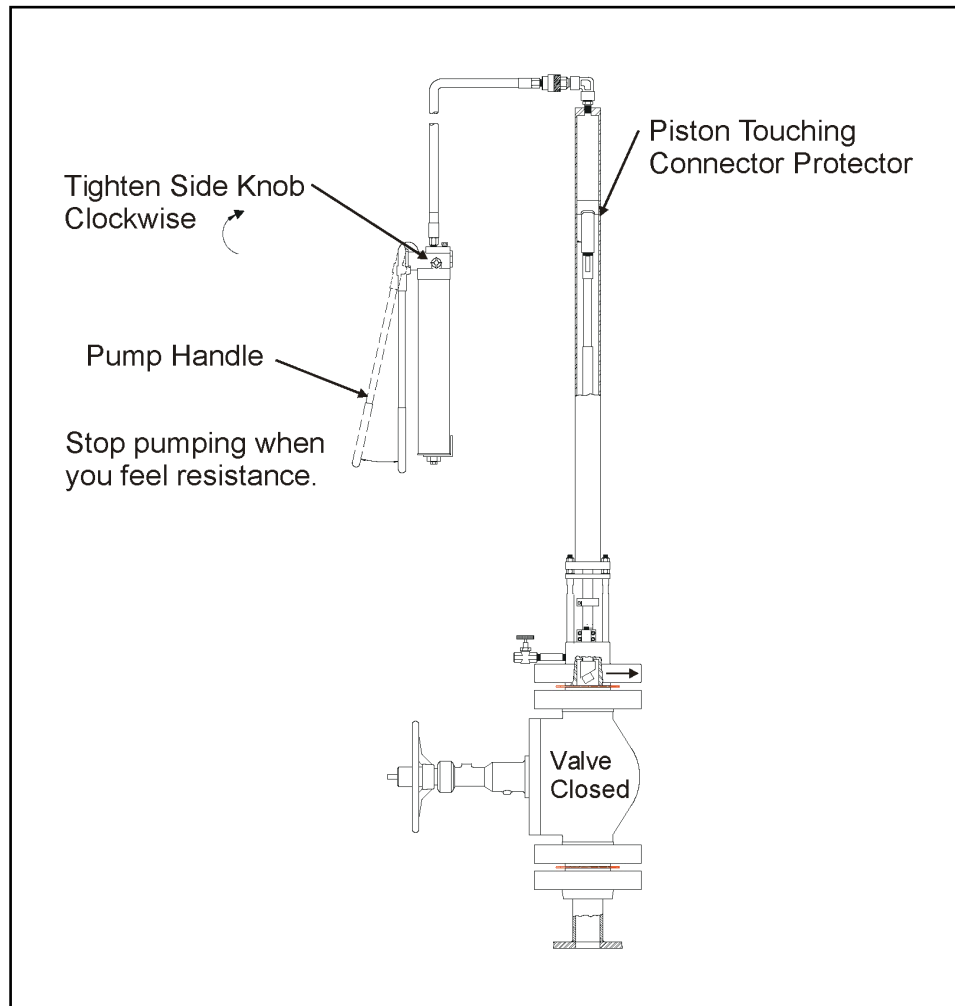
**Figure 21: Attaching the hydraulic cylinder**



### 1.3.6 Inserting the transducer

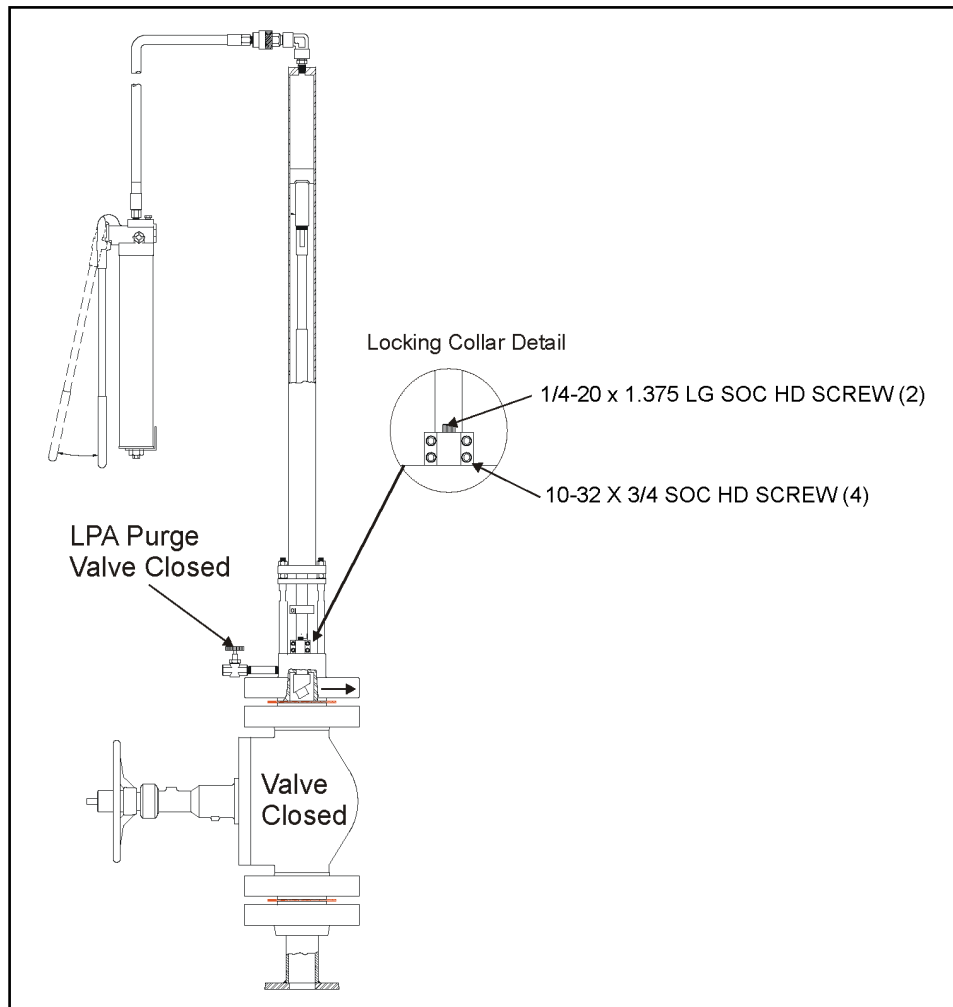
After attaching the hydraulic cylinder, you are now ready to insert the T8 transducer.

1. To prepare for pumping, rotate the side knob of the hydraulic pump clockwise to tighten it (see Figure 22 below).
2. Slowly pump the handle of the pump until you feel resistance, then stop pumping. The resistance indicates that the piston is applying pressure to the transducer.



**Figure 22: Tightening the hydraulic pump side knob**

3. There are four 10-32 x 3/4 socket head screws and two 1/4-20 x 1 3/8 socket head screws on the locking collar (see Figure 23 below). Evenly loosen these screws, just enough so that the transducer can move freely.



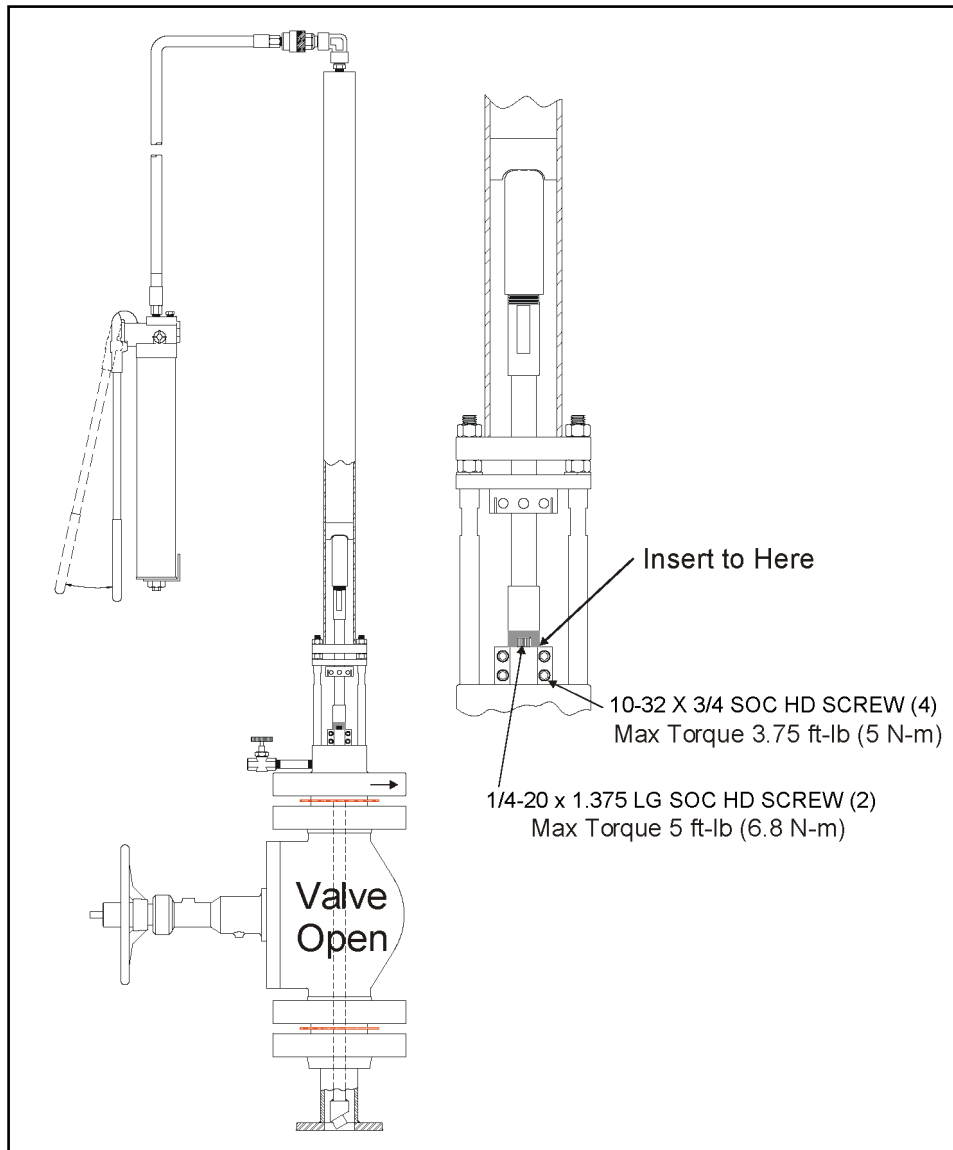
**Figure 23: Loosening the socket head screws**

4. Before opening the ball valve do the following:
- Make sure the LPA purge valve (see Figure 23 above) is in the "Closed" position.
  - Verify that the hydraulics are engaged and the transducer shaft has pressure applied (there should be resistance when the pump handle is pumped).



**WARNING!** Make sure you perform the above checks before opening the ball valve, otherwise personal injury or damage to the equipment may occur.

5. Slowly open the 2 in. ball valve and check for gas leaks:
  - If you discover any leaks, close the ball valve and fix the leaks.
  - If you do not detect any leaks, proceed to the next step.
6. See Figure 24 below and slowly pump the hydraulic pump handle until the transducer moves to the pre-marked insertion depth, as indicated by the edge of the electrical tape touching the edge of the locking collar. You will feel resistance on the hydraulic pump handle as you insert the transducer against the line pressure.



**Figure 24: Pumping the hydraulic pump handle**

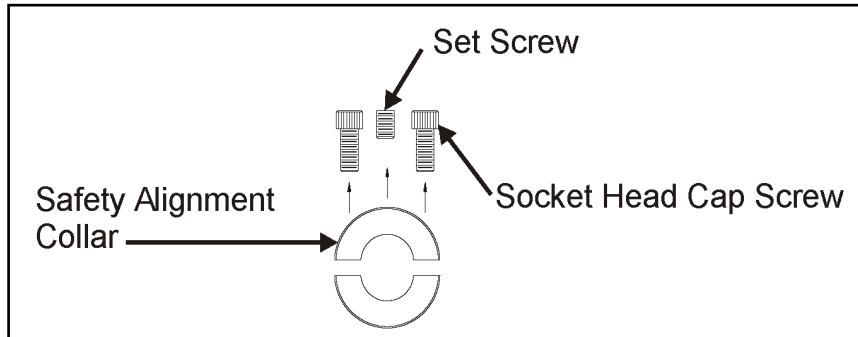
7. Tighten the locking collar screws with a torque wrench to fasten the transducer in place. Use the maximum torque listed in Figure 24 above, but do not overtighten the screws.

**Note:** Alternate the tightening sequence of the six screws to properly “seat” the locking collar.

### 1.3.7 Adjusting the safety alignment collar

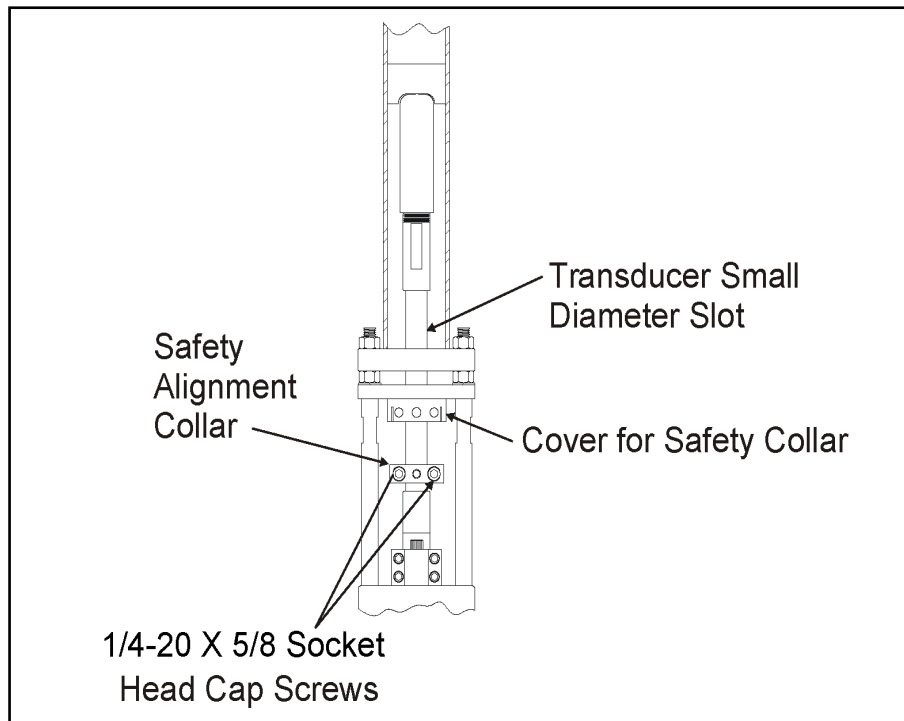
The next step in the transducer installation procedure is to adjust the safety alignment collar.

1. Locate the safety alignment collar that was shipped with the T8 transducer.
2. Use an Allen wrench to remove the two socket head cap screws and the set screw from the safety alignment collar (see Figure 25 below).



**Figure 25: Preparing the safety alignment collar for installation**

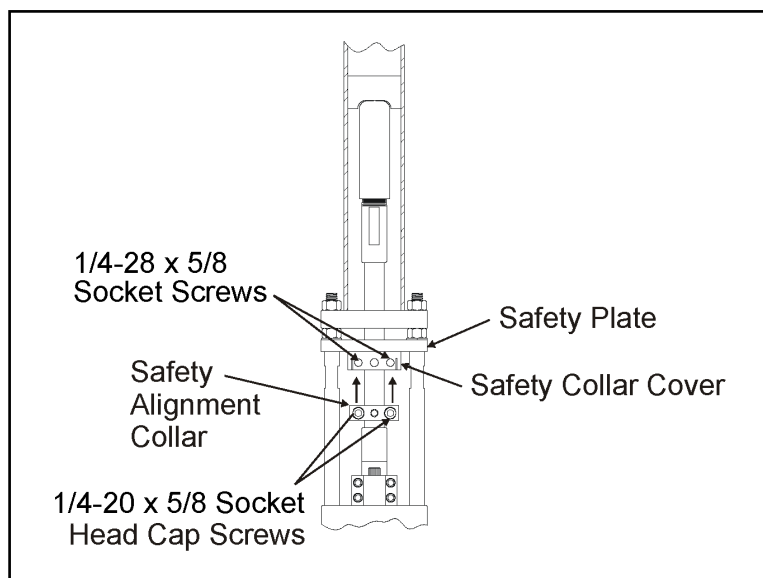
3. Using the socket head cap screws, loosely attach the safety alignment collar to the barrel of the transducer (see Figure 26 below).



**Figure 26: Attaching the collar to the transducer barrel**

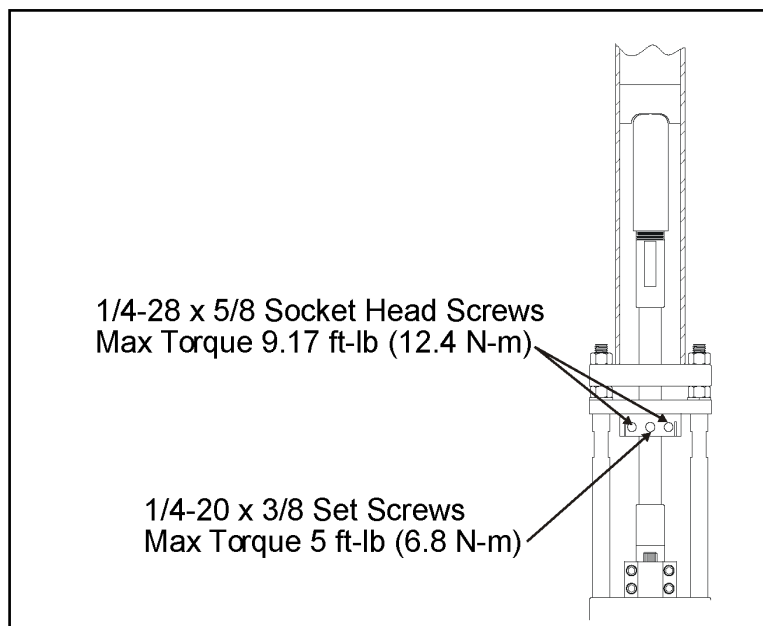
4. Slide the safety alignment collar into the safety collar cover and position both collars so that they are touching the safety plate (see Figure 27 below).

**Note:** If necessary, adjust the height of both screws on the safety collar cover to allow the safety alignment collar to fit into it.



**Figure 27: Positioning the safety alignment collar**

5. Using the socket head cap screws, loosely attach the safety alignment collar to the barrel of the transducer (see Figure 26 below).

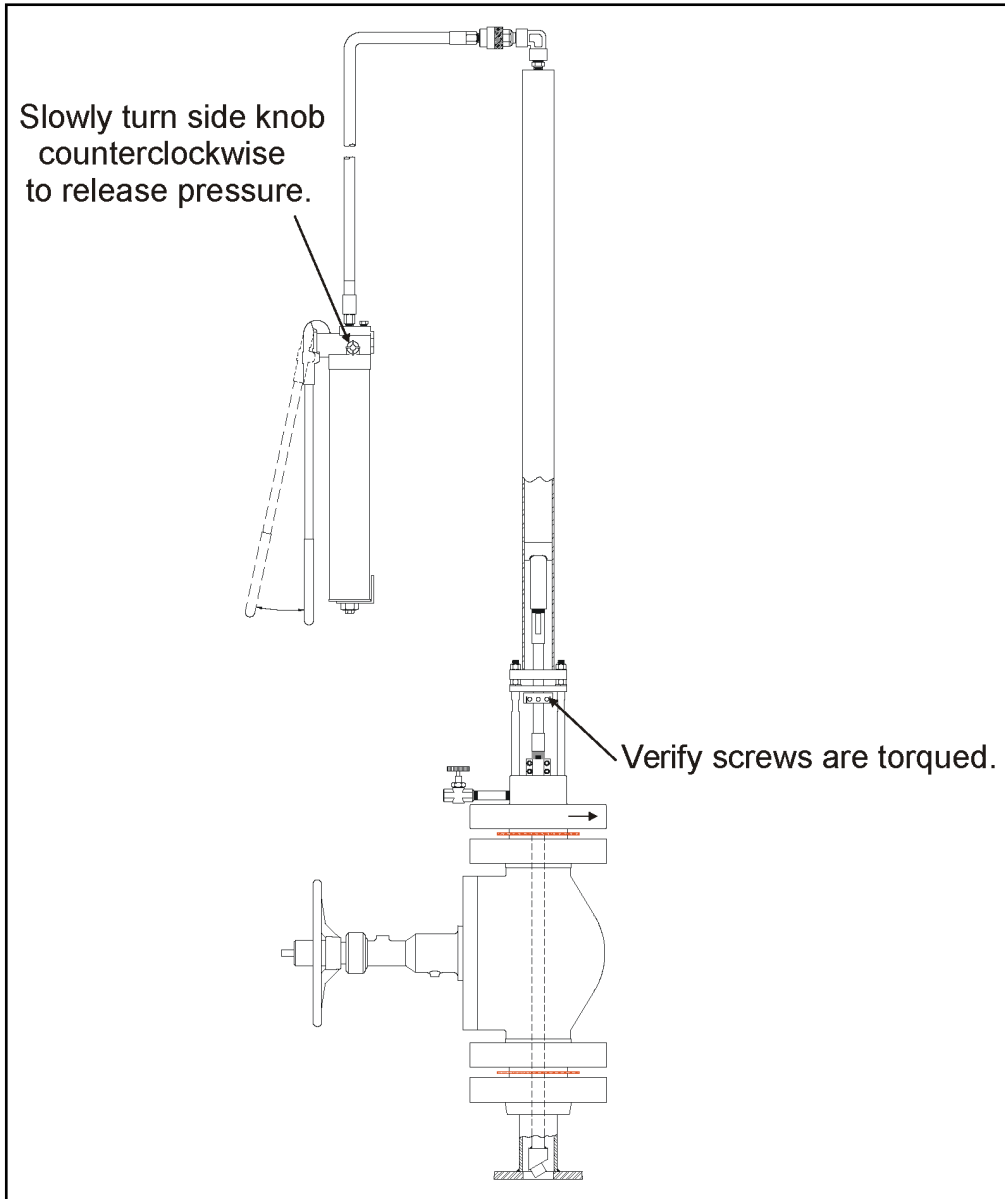


**Figure 28: Securing the safety alignment collar**

### 1.3.8 Removing the hydraulic cylinder

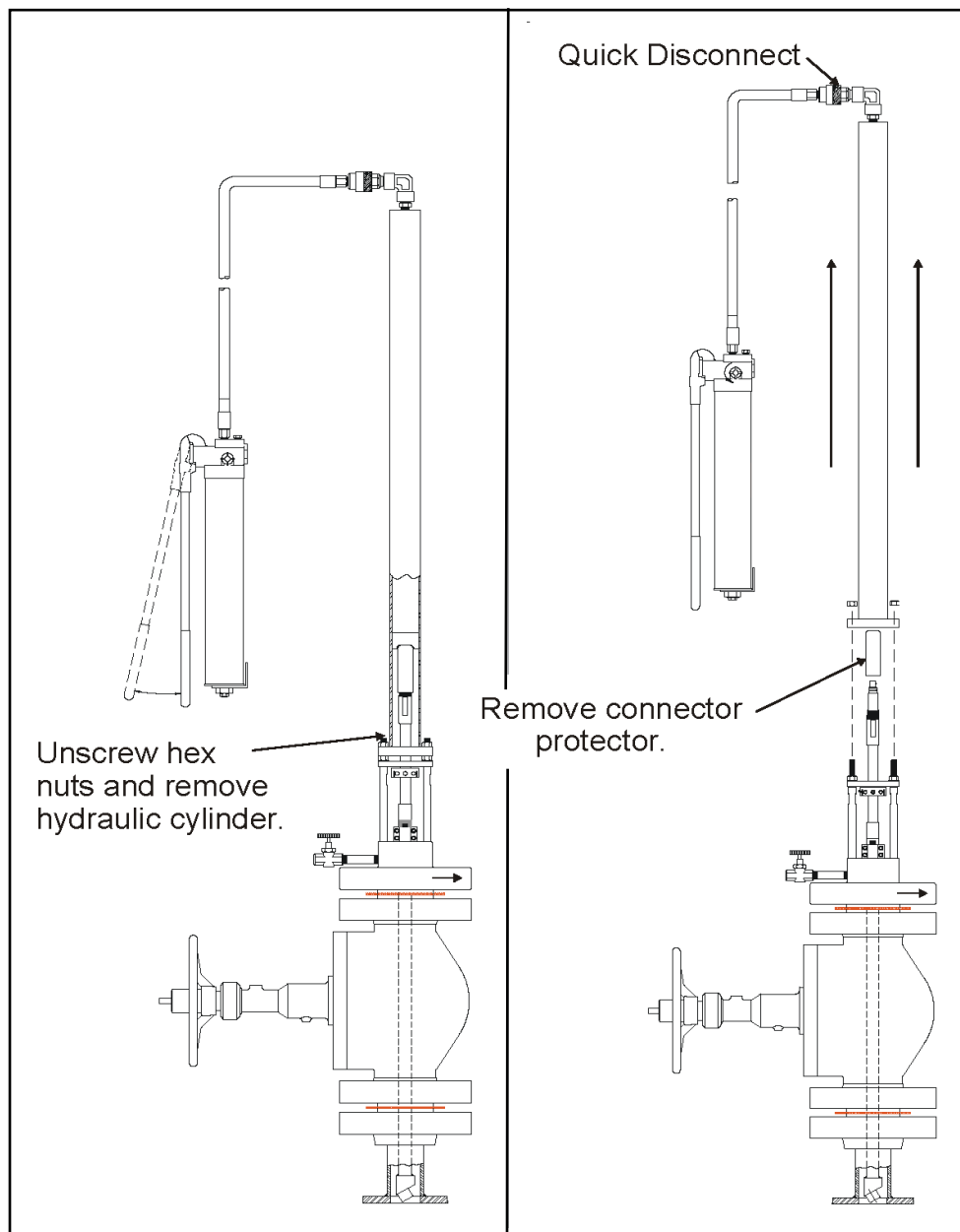
The final step in the T8 transducer installation process is the removal of the hydraulic cylinder from the port.

1. Verify that the screws on the locking and safety alignment collars are tightened to the appropriate torque. Then, very slowly turn the side knob of the hydraulic pump counterclockwise to release the pressure of the hydraulic cylinder on the transducer shaft (see Figure 29 below).



**Figure 29: Releasing the hydraulic cylinder pressure**

2. See Figure 30 below and remove the hydraulic cylinder by unscrewing the four 3/8-16 stainless steel hex nuts.

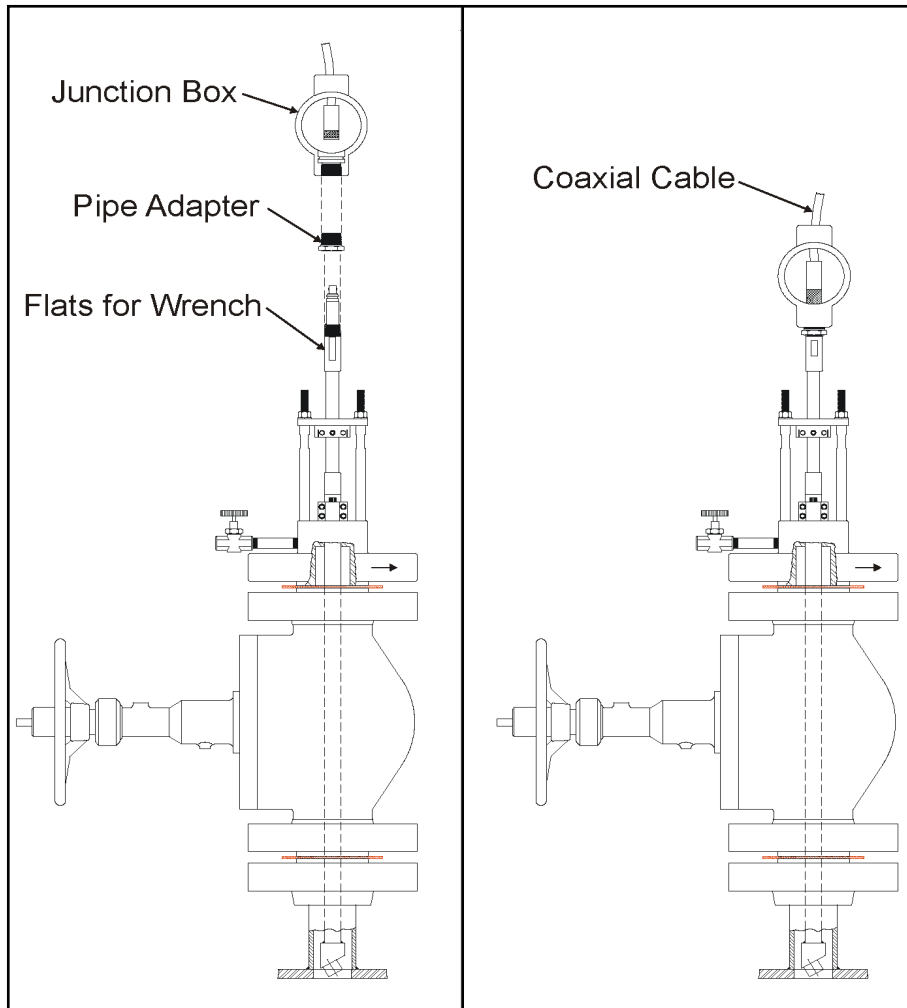


**Figure 30: Removing the hydraulic cylinder**

3. Unscrew and remove the connector protector (see Figure 30 above).

**Note:** Disconnecting the hydraulic pump at the quick-disconnect pipe coupler simplifies the hydraulic cylinder removal.

- Attach the pipe adapter to the 1/2" NPT thread of the transducer, and then attach the junction box to the pipe adapter. Use a wrench on the flats of the transducer body to prevent transducer rotation when installing the junction box (see Figure 31 below).



**Figure 31: Installing the junction box and transducer cable**

- Connect a coaxial cable to the transducer to complete the installation for this port (see Figure 31 above).

**Note:** Use a junction box with a straight-through hub when submersible/waterproof cable is connected to the transducer.

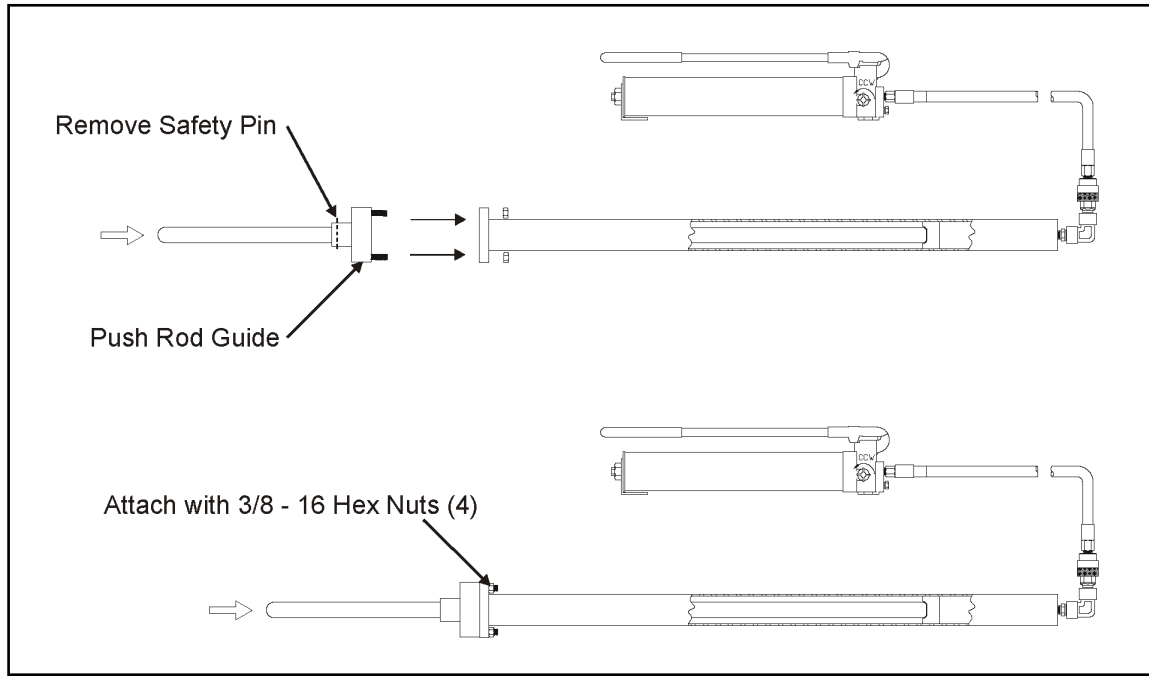
- Connect the transducer to your flowmeter electronics console, as described in the flowmeter User's Manual. Repeat the procedures described in this chapter to install the second T8 transducer. After both transducers have been installed, proceed to the next section.



## 1.4 Resetting or storing the hydraulic cylinder

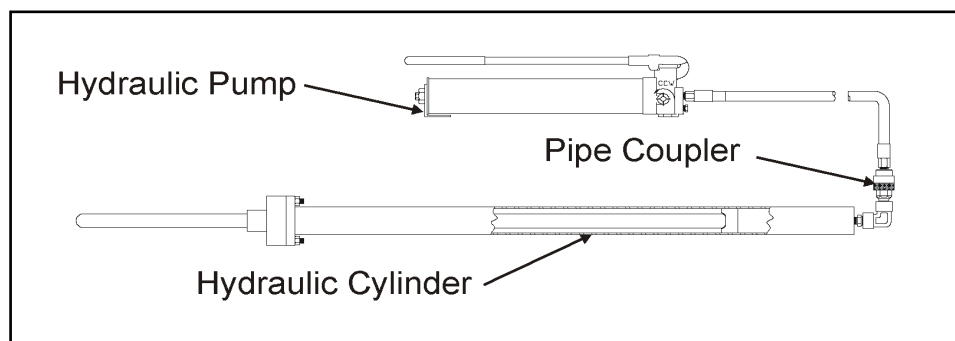
To prepare the hydraulic cylinder for its next use or for storage, you must retract the piston.

1. Remove the safety pin and attach the guide for the push rod to the hydraulic cylinder with four 3/8-16 hex nuts (see Figure 32 below). Save the safety pin for future use.



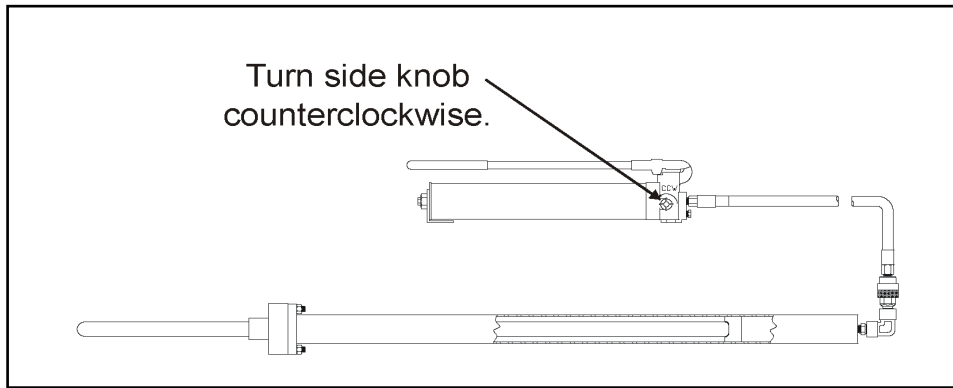
**Figure 32: Retracting the piston**

2. If it was previously removed, re-attach the hydraulic pump to the hydraulic cylinder at the pipe coupler (see Figure 33 below).



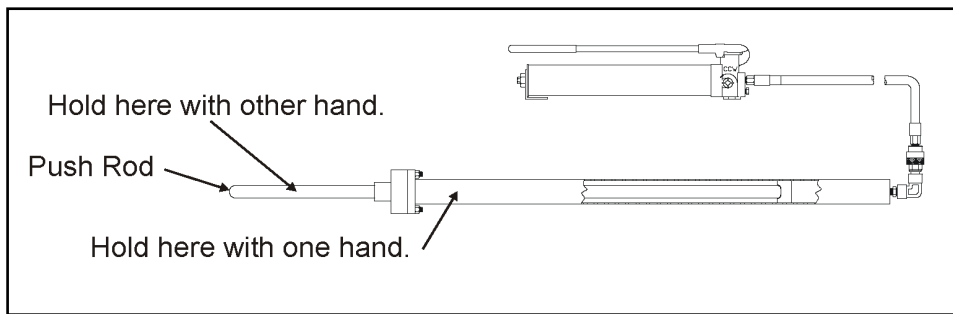
**Figure 33: Reattaching the hydraulic pump**

3. Turn the side knob of the hydraulic pump counterclockwise to release the oil pressure (see Figure 34 below).



**Figure 34: Releasing the oil pressure**

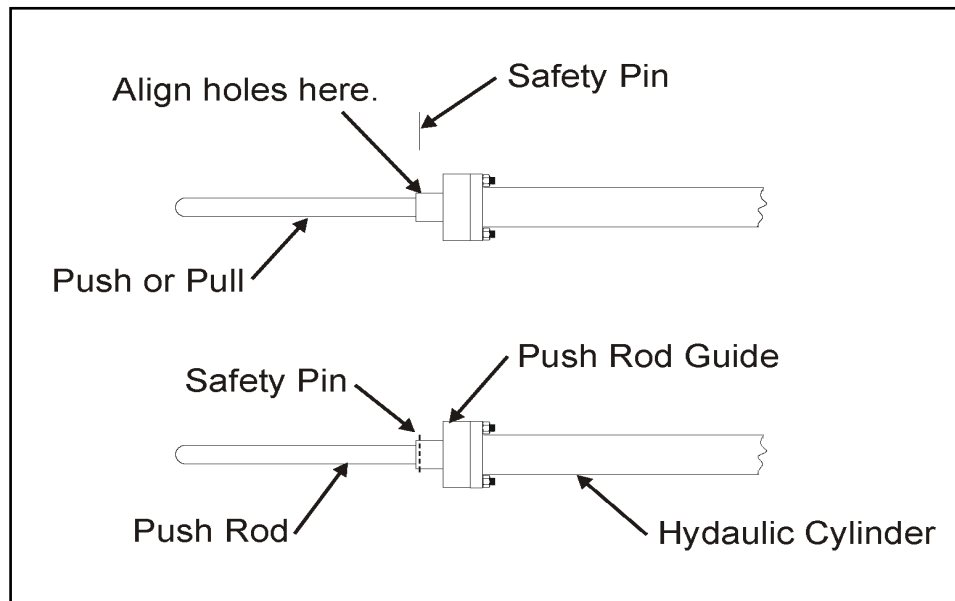
4. Hold the cylinder with one hand, and push the rod with the other hand until the piston bottoms out inside the cylinder (see Figure 35 below).



**Figure 35: Pushing the rod into the cylinder**

5. Do one of the following:
  - If you are ready to insert a transducer into a port, proceed to the appropriate section of this chapter.
  - If you have already installed both transducers, proceed to step 6 on the next page.

6. Position the 0.28 in. diameter hole of the push rod to align with the 0.28 in. diameter hole of the push rod guide. Then, push the safety pin through the holes to secure the cylinder, push rod and push rod guide assembly (see Figure 36 below).



**Figure 36: Aligning the push rod and guide**

After both transducers are installed and the hydraulic cylinder has been stored, proceed to the next chapter to align your T8 transducers.

[no content intended for this page]

## Chapter 2. Aligning the transducers

### 2.1 Introduction

After you finish installing the T8 transducers, as described in the previous chapter, you must fine tune the transducer alignment using the procedures in this chapter.

**IMPORTANT:** Alignment is not necessary for the T8 transducer with a 180° head. Skip this chapter.

### 2.2 Preparing for transducer alignment

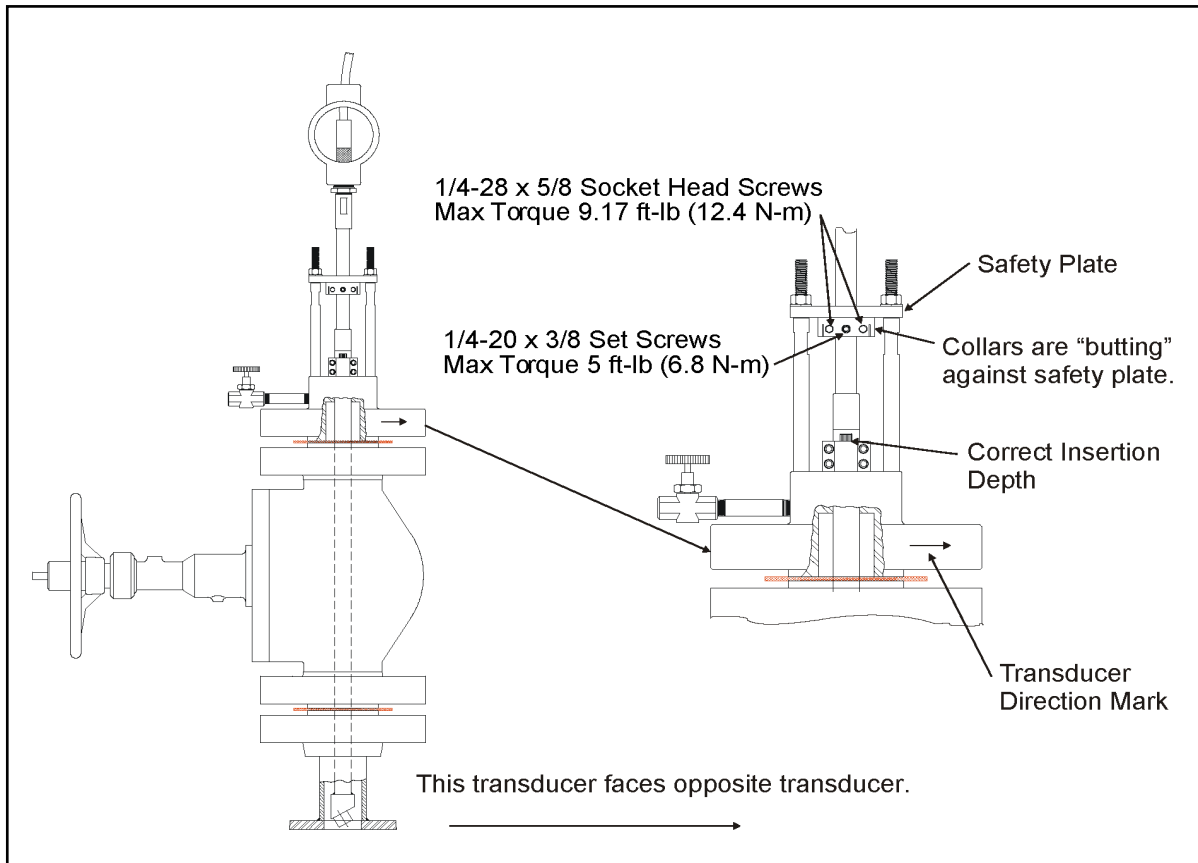
To prepare for alignment of the T8 transducers, complete the following steps:

1. Make sure the flowmeter electronics console is powered ON and that the transducers are properly connected to the flowmeter.
2. From the Diagnostic menu on the flowmeter, display the transducer signal strength on the electronics console. If necessary, refer to your flowmeter Service Manual for instructions.
3. As described in your flowmeter Service Manual, connect an oscilloscope to the transducer terminals.
4. Find the signal strength, quality and amplitude limits in the troubleshooting/diagnostics section of the flowmeter Service Manual. You will need to know these limits to complete the alignment procedure.

## 2.3 Aligning the transducers

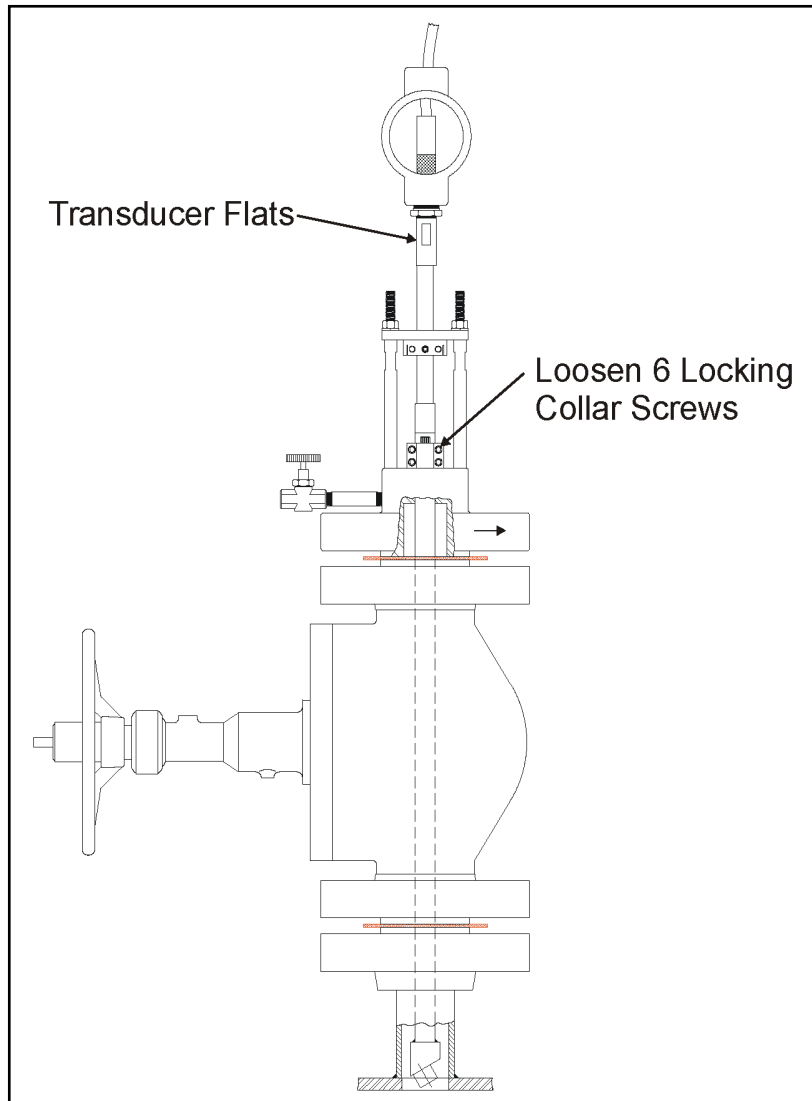
To align the T8 transducers, complete the following steps:

1. At each transducer installation point, refer to Figure 37 below and verify that:
  - The safety alignment collar and the cover for the safety collar are firmly against the safety plate
  - The screws on the safety alignment collar are tightened to the appropriate torque
  - Each transducer is positioned at the correct insertion depth
  - The transducer face points directly toward the other transducer (check the flat and the flange mark)



**Figure 37: Aligning the transducers**

- At each transducer port, evenly loosen the two 1/4-20 screws and the four 10-32 screws just enough to free the locking collar from the transducer shaft (see Figure 38 below). If the locking collar will not come loose, remove the 1/4-20 screws completely.

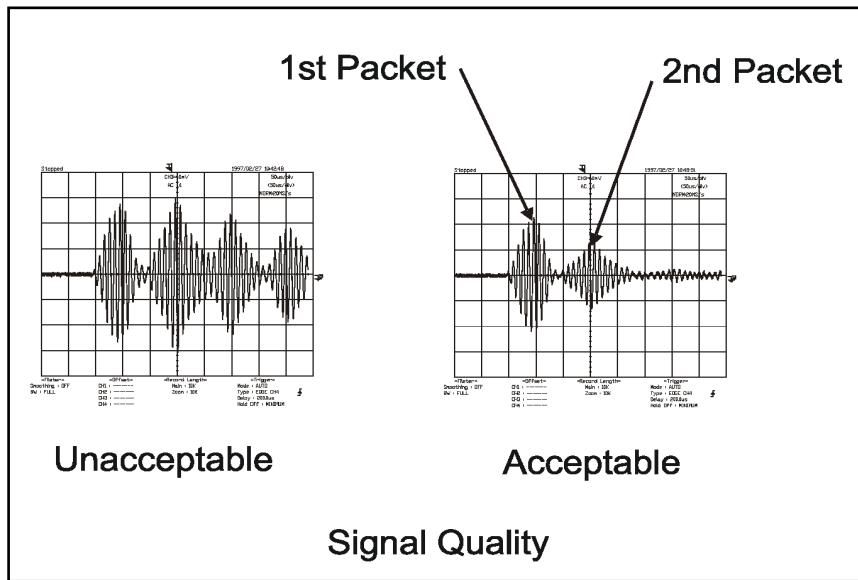


**Figure 38: Freeing the locking collar**

Refer to Figure 39 below and continue the alignment procedure as follows:

3. Position a wrench on the transducer flats (see Figure 38 on page 31) and rotate the transducer about one degree clockwise or counterclockwise. Observe the signal strength displayed on the flowmeter console for at least two or three readings or observe the receive signal on the oscilloscope.
4. Rotate the other transducer about one degree clockwise or counterclockwise. Observe the signal strength displayed on the flowmeter console for at least two or three readings or observe the receive signal on the oscilloscope.
5. Alternately rotate the two transducers until the signal strength, signal amplitude and the signal quality are optimized.

**IMPORTANT:** You can only observe the signal quality with an oscilloscope. If you do not have an oscilloscope, adjust the transducers to obtain the highest signal strength.



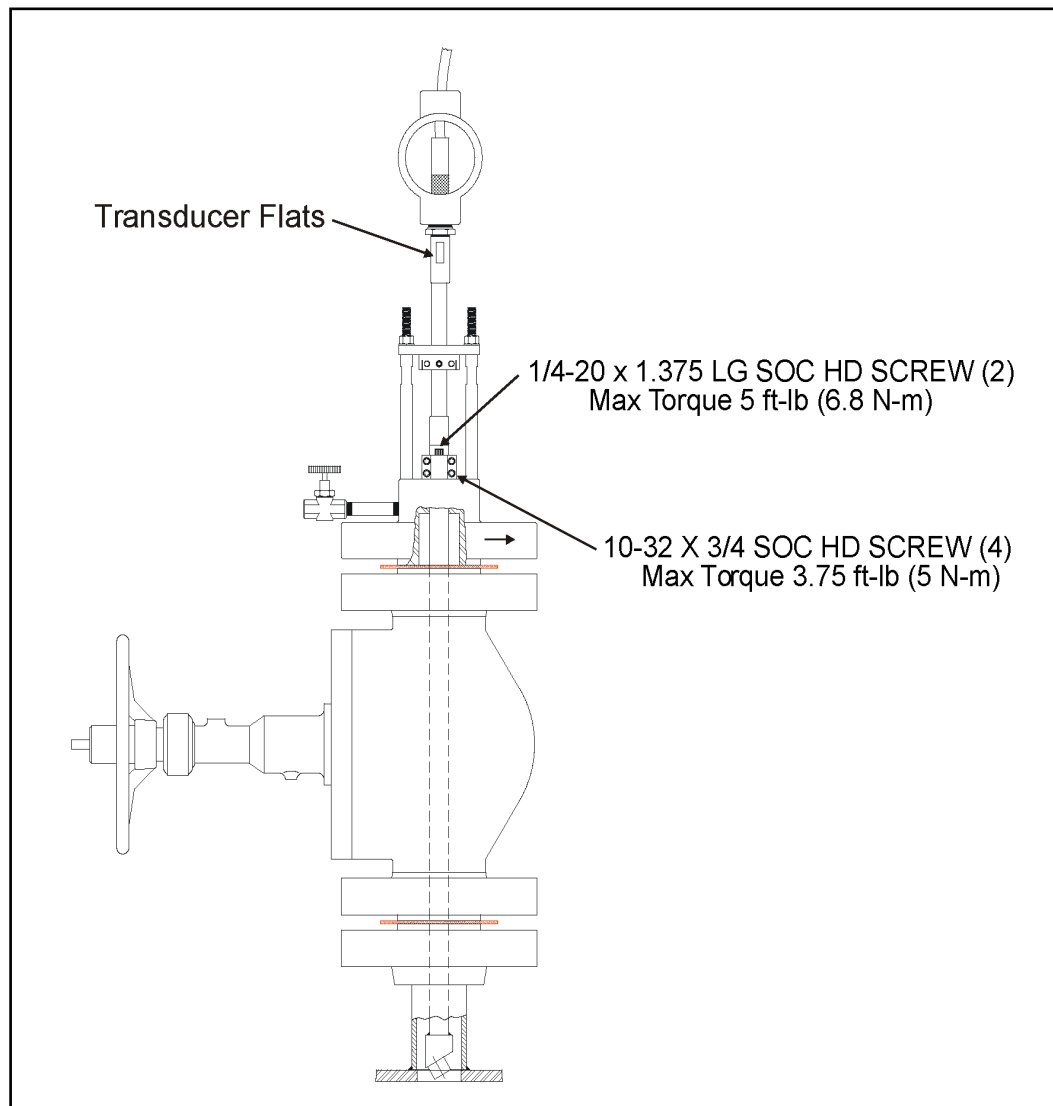
**Figure 39: Observing the signal strength**



Refer to Figure 40 below and continue the alignment procedure as follows:

6. After adjusting the transducers for the highest signal strength and the best signal quality, reinstall the two 1/4-20 screws at each transducer port and secure the locking collar by tightening the screws with a torque wrench. Use a maximum torque of 3.75 ft-lb (5 N-m) on the four 10-32 screws and 5 ft-lb (6.8 N-m) on the two 1/4-20 screws. Alternate the tightening sequence of the six screws to properly "seat" the locking collar.
7. If necessary, re-tighten the junction box to the pipe adapter. Be sure to use a wrench on the transducer flats to prevent the transducer from rotating during re-tightening of the junction box.

You have now completed the transducer alignment procedure.



**Figure 40: Completing the transducer alignment procedure**

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## Chapter 3. Removing the transducers

### 3.1 Introduction

To safely remove the T8 transducers from the process line, you must follow the instructions in this chapter very carefully.

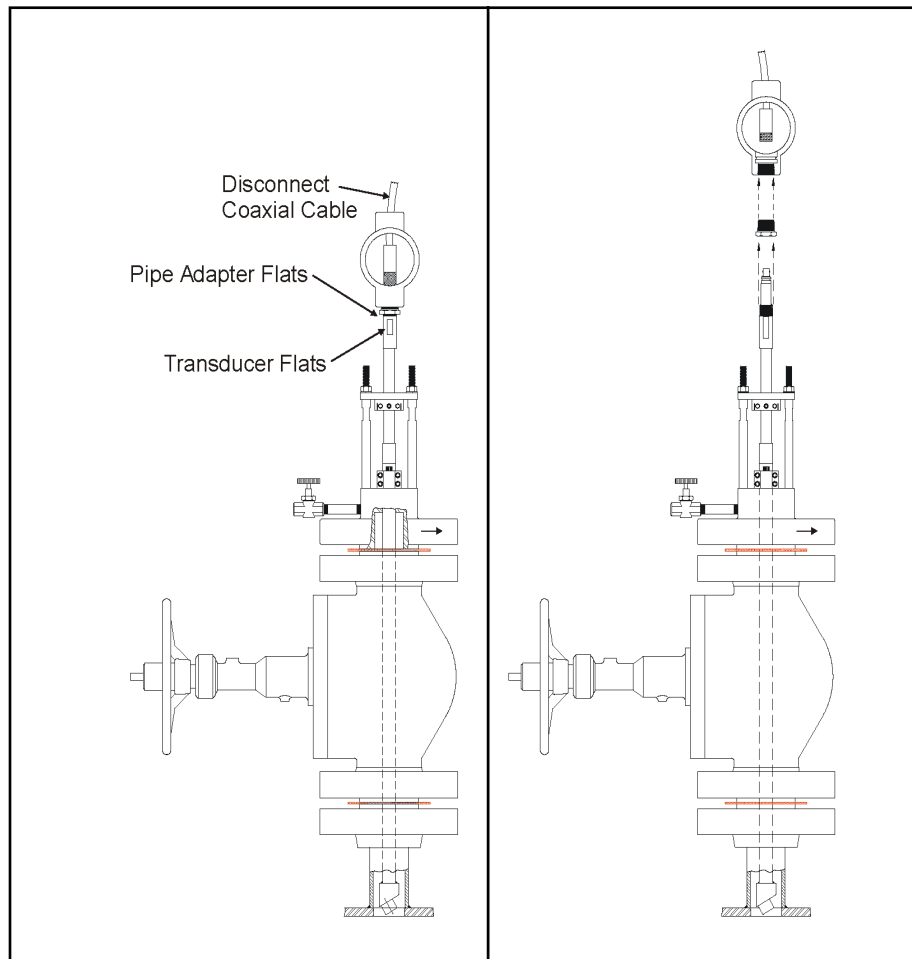


**WARNING!** Make sure the flowmeter power is disconnected before performing the procedures in this chapter.

### 3.2 Attaching the hydraulic cylinder

Begin the transducer removal process by referring to Figure 41 below and completing the following steps:

1. Disconnect the coaxial cable from the transducer.
2. Use a wrench on the flats of the pipe adapter to prevent it from rotating, and remove the junction box from the pipe adapter.

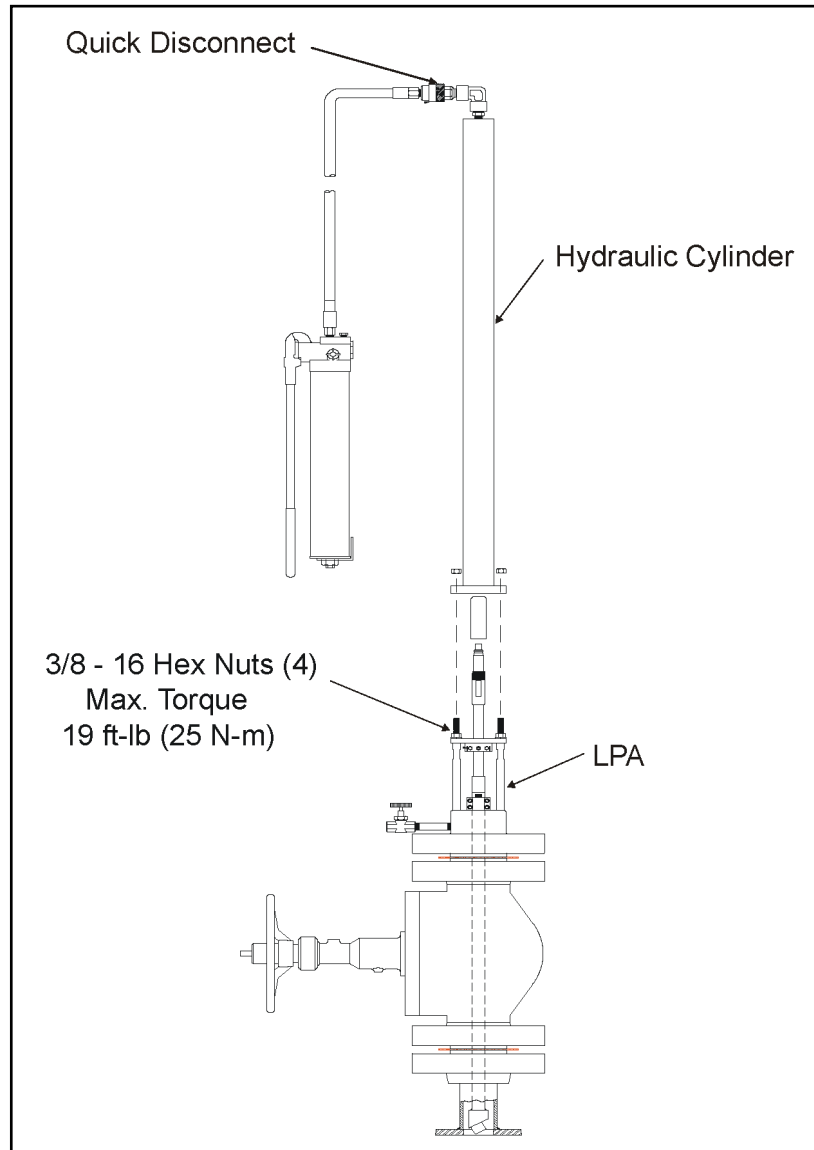


**Figure 41: Preparing to remove a transducer**

3. Use a wrench on the flats of the transducer body to prevent the transducer from rotating, and disconnect the pipe adapter.
4. Place the connector protector onto the 1/2" NPT thread of the transducer shaft and finger-tighten it.

5. Attach the hydraulic cylinder to the four studs on the LPA, using four 3/8-16 stainless steel nuts (see Figure 42 below). Tighten the four 3/8-16 stainless steel hex nuts to a maximum torque of 19 ft-lb (25 N-m).

**Note:** Disconnecting the hydraulic pump at the “quick disconnect” will simplify attaching the hydraulic cylinder.

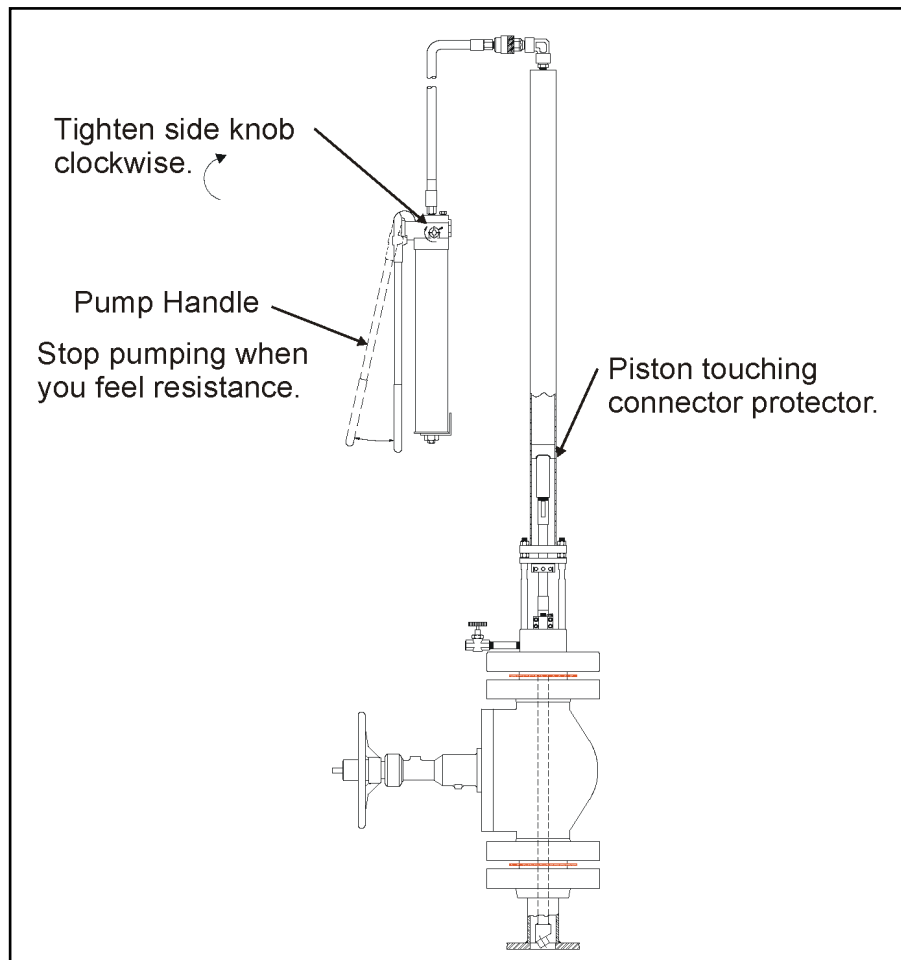


**Figure 42: Attaching the hydraulic cylinder**

### 3.3 Removing the transducer

After attaching the hydraulic cylinder, refer to Figure 43 below and complete the following steps:

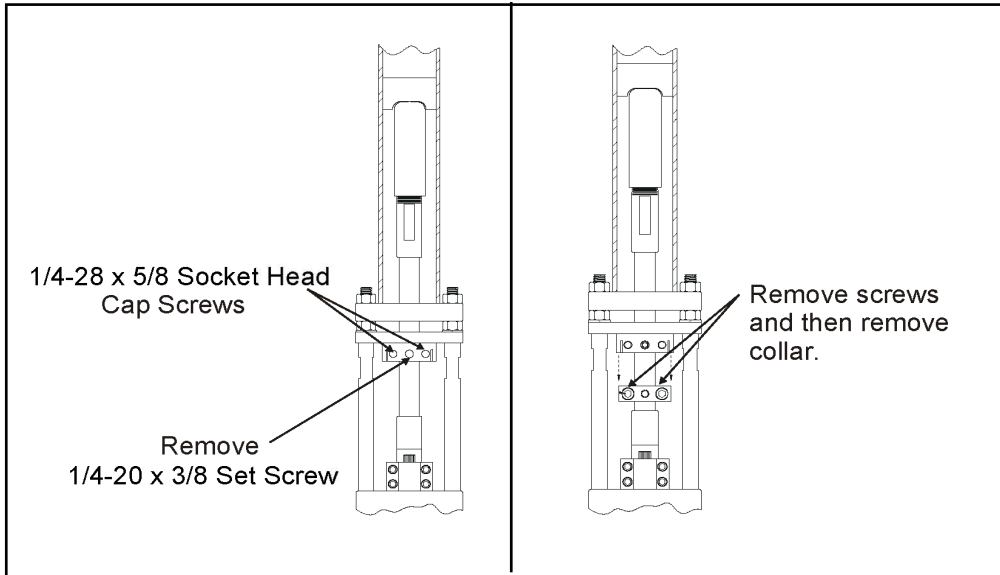
1. To prepare for pumping, rotate the side knob of the hydraulic pump clockwise to tighten it.
2. Slowly pump the handle of the pump to bring the piston into contact with the connector protector. When you feel resistance, stop pumping the handle. The resistance indicates that the piston is touching the connector protector.
3. Verify that the hydraulics are engaged and that the transducer shaft has pressure applied, as indicated by a feeling of resistance when the pump handle is pumped).



**Figure 43: Pumping to move the piston**

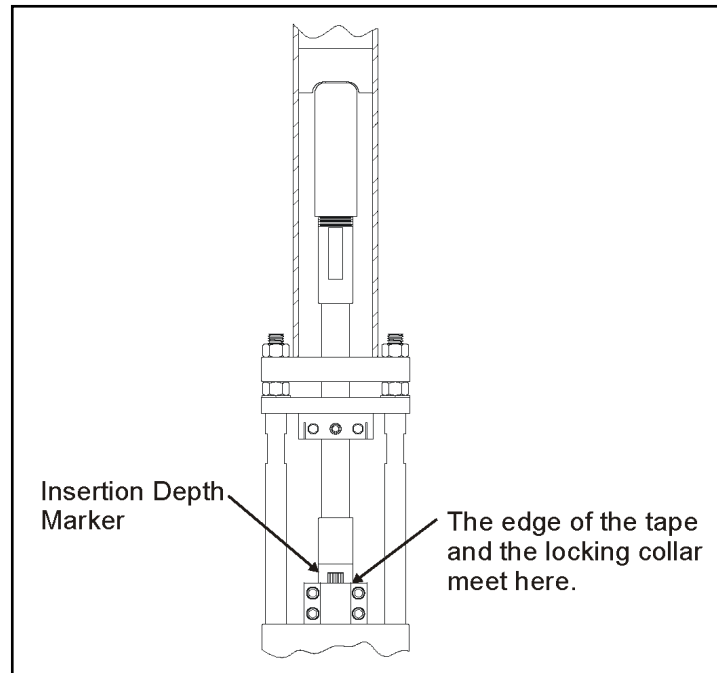
Refer to Figure 44 below and continue as follows:

4. Use an Allen wrench to remove the set screw from the safety alignment collar.
5. Evenly loosen the two 1/4-28 x 5/8 socket head cap screws with an Allen wrench just enough to slide the safety alignment collar out of the cover.
6. Remove the alignment collar from the transducer by removing the two 1/4-28 x 5/8 socket head cap screws.



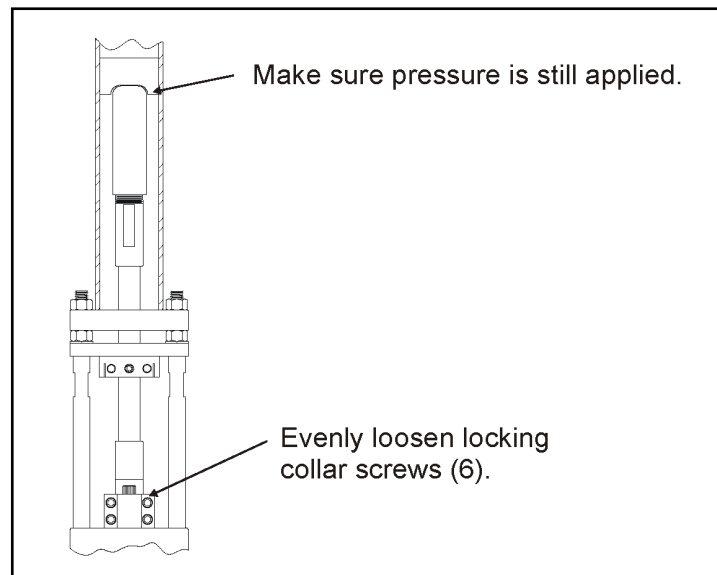
**Figure 44: Removing the alignment collar**

7. Refer to Figure 45 below and check the condition of the insertion depth marker. If it was erased or otherwise damaged, replace the marker with one layer of colored electrical tape around the transducer circumference until the ends overlap. Place the edge of the tape against the edge of the locking collar.



**Figure 45: Checking the Insertion Depth Marker**

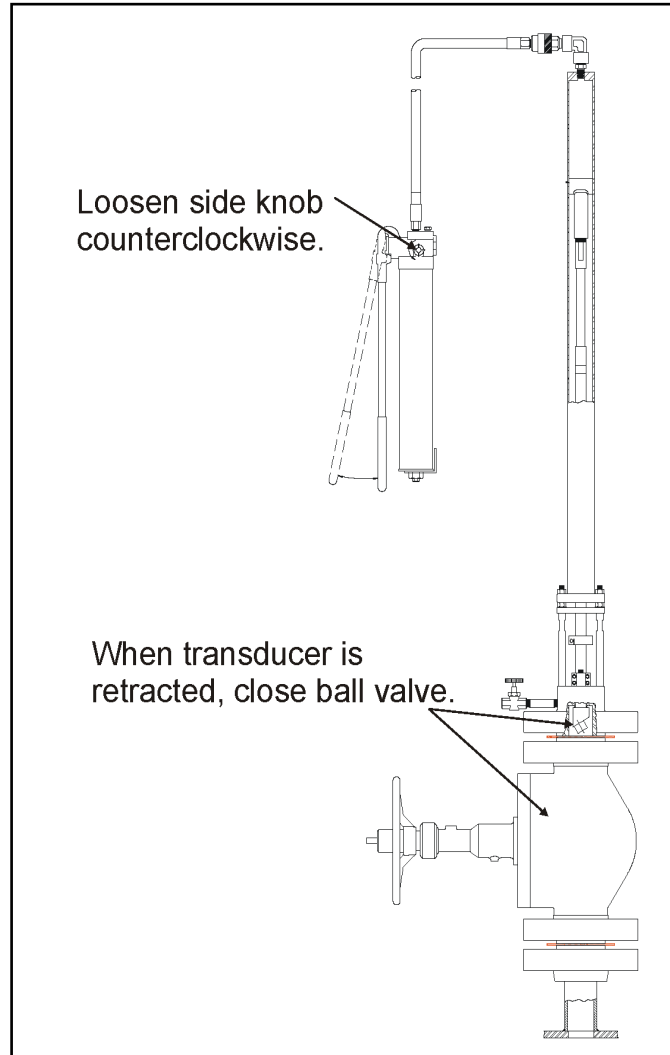
8. Make sure the piston of the hydraulic cylinder is still applying positive pressure to the connector protector (see Figure 46 below). Then, evenly loosen the screws in the locking collar just enough to free the collar from the transducer shaft.



**Figure 46: Loosening locking collar screws**

Refer to Figure 47 below and continue as follows:

9. After the locking collar is loose, very slowly turn the side knob of the hydraulic pump counterclockwise to release the pressure and allow the transducer to slowly slide out of the flange.
10. After the transducer head is completely retracted inside the LPA, turn the 2 in. flanged ball valve to its closed position.



**Figure 47: Releasing the pressure**



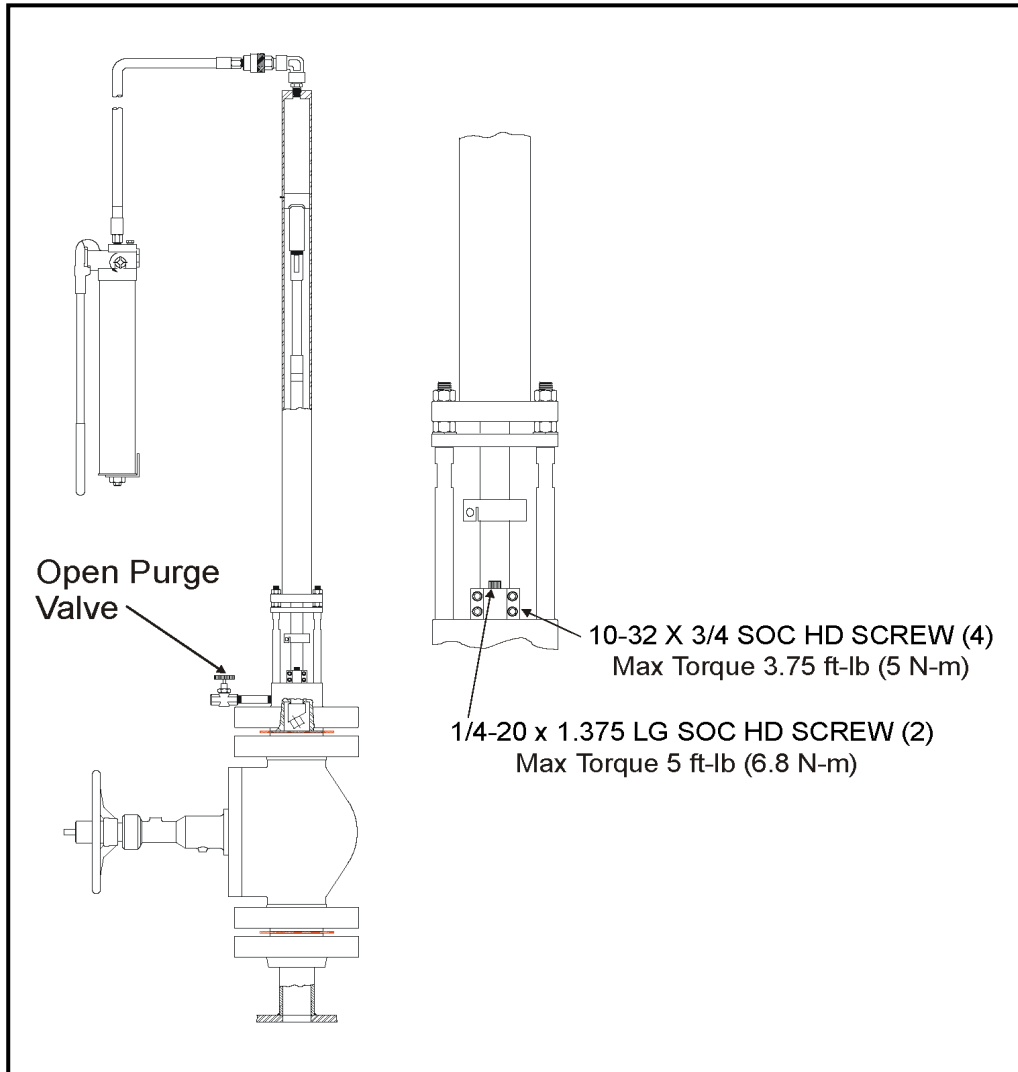
### 3.4 Disconnecting the hydraulic cylinder

To remove the hydraulic cylinder, refer to Figure 48 below and complete the following steps:

1. Tighten the locking collar screws with a torque wrench to secure the transducer in place. Use the maximum torque listed in Figure 48 above, but do not overtighten the screws.

**IMPORTANT:** Alternate the tightening sequence of the six screws to properly “seat” the locking collar.

2. Open the purge valve to vent and release the gas pressure trapped inside the LPA.

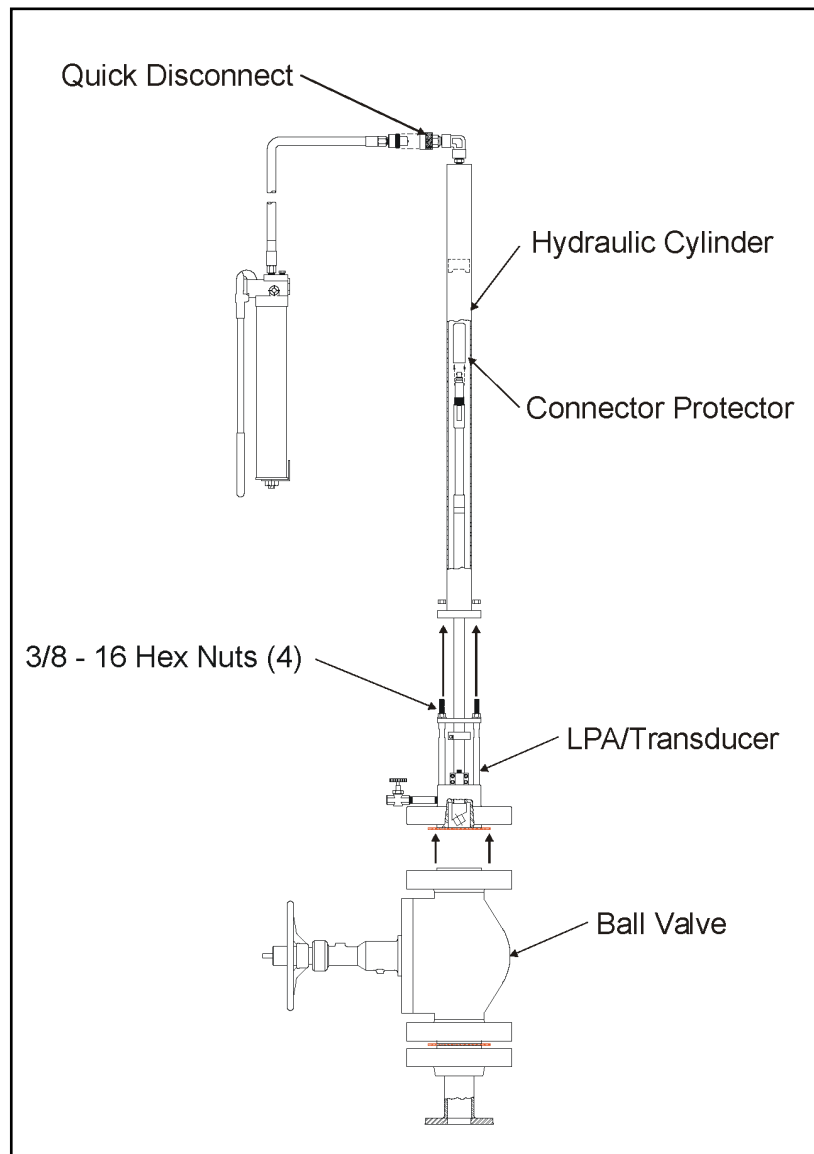


**Figure 48: Preparing to remove the hydraulic cylinder**

Refer to Figure 49 below and continue as follows:

1. Disconnect the hydraulic cylinder from the hydraulic pump at the quick disconnect.
2. Remove the four 3/8-16 hex nuts to detach the hydraulic cylinder from the four studs of the LPA.
3. Unbolt and remove the LPA/transducer assembly from the 2" flanged ball valve.
4. Unscrew and remove the connector protector.

You have completed the removal procedure for this transducer. If necessary, repeat the process to remove the other transducer. After both transducers have been removed, properly store the hydraulic cylinder for future use.







**Figure 49: Removing the hydraulic cylinder**

## Chapter 4. Specifications

### 4.1 T8 transducer physical specifications

<b>Applications:</b>	High-Pressure Applications with an Insertion Retraction Mechanism, Natural Gas
<b>Installation Type:</b>	Wetted
<b>Material:</b>	Titanium
<b>Field Mounting:</b>	Flowcell, Hot or Cold Tap
<b>Process Connection:</b>	Flanged, 2 in. (50 mm)
<b>Holder Type:</b>	High-Pressure Insertion Mechanism
<b>Holder Ratings:</b>	150#, 300#, 600#, 900#
<b>Operating Frequency:</b>	100 kHz
<b>Pressure Range:</b>	0 to 2700 psig 0 to 1500 psig for USA/Canada Certified Products
<b>Electrical Rating:</b>	200 V peak-to-peak, 5 mA
<b>Ambient Temperature Range:</b>	-40°F to +140°F (-40°C to +60°C)
<b>Process Temperature Range:</b>	-58°F to +302°F (-50°C to +150°C)

### 4.2 T8 transducer Certifications

<b>North American - Explosion proof:</b>		Class I, Division 1, Group C, D
<b>European/International - Flameproof:</b>		II 2 G Ex db IIC T6...T3 Gb Tamb -40°C to +60°C IECEX SIR 20.0006X Sira 20ATEX1001X
<b>North American - Weatherproof:</b>		IP66, TYPE 4X, 200Vpp, 5mA
<b>European/International - Weatherproof:</b>	IP 66 	

### 4.3 Specific conditions of use

Consult the manufacturer if dimensional information on the flameproof joints is necessary.

It is end-user's responsibility to ensure that the ambient around the T8 assembly does not exceed the permitted ambient of -40°C to +60°C, regardless of process temperature.

The T8 transducers made of titanium (where ff = Ti) are potential ignitions sources when subjected to impact or friction, which shall be taken into consideration during installation.

The T8 have non-conducting coating which may generate an ignition-capable level of electrostatic charge under certain extreme conditions. The user shall take the necessary precautions to minimise the risk from electrostatic discharge. For example, controlling the environmental humidity where installed in order to minimize generation of static electricity, with the equipment protected from direct airflow which could cause a transfer of charge to the surface of the equipment. Cleaning should be done only with a damp cloth.

The temperature classification rating of the T8 assemblies is dependent upon the maximum process temperature (see table below).

**Table 1: The temperature classification rating of the T8**

Model T8	Process temperature	T-Class
T8-bb-cc-dd-NT-ff-gg-hh-ii-jj-zz	-50°C to +85°C	T6
	+86°C to +100°C	T5
	+101°C to +135°C	T4
	+136°C to +150°C	T3

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## Warranty

Each instrument manufactured by Panametrics Sensing is warranted to be free from defects in material and workmanship. Liability under this warranty is limited to restoring the instrument to normal operation or replacing the instrument, at the sole discretion of Panametrics Sensing. Fuses and batteries are specifically excluded from any liability. This warranty is effective from the date of delivery to the original purchaser. If Panametrics Sensing determines that the equipment was defective, the warranty period is:

- one year from delivery for electronic or mechanical failures
- one year from delivery for sensor shelf life

If Panametrics Sensing determines that the equipment was damaged by misuse, improper installation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified by Panametrics Sensing, the repairs are not covered under this warranty.

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**The warranties set forth herein are exclusive and are in lieu of all other warranties whether statutory, express or implied (including warranties or merchantability and fitness for a particular purpose, and warranties arising from course of dealing or usage or trade).**

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## Return Policy

If a Panametrics Sensing instrument malfunctions within the warranty period, the following procedure must be completed:

1. Notify Panametrics Sensing, giving full details of the problem, and provide the model number and serial number of the instrument. If the nature of the problem indicates the need for factory service, Panametrics Sensing will issue a RETURN AUTHORIZATION NUMBER (RAN), and shipping instructions for the return of the instrument to a service center will be provided.
2. If Panametrics Sensing instructs you to send your instrument to a service center, it must be shipped prepaid to the authorized repair station indicated in the shipping instructions.
3. Upon receipt, Panametrics Sensing will evaluate the instrument to determine the cause of the malfunction.

Then, one of the following courses of action will then be taken:

- If the damage is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.
- If Panametrics Sensing determines that the damage is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs at standard rates will be provided. Upon receipt of the owner's approval to proceed, the instrument will be repaired and returned.

[no content intended for this page]



## Customer Support Centers

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