

Sensor Insertion (Ball Valve) Mounting¹

Introduction

The sensor insertion assembly allows the insertion and extraction of a sensor from a pressurized process line without stopping flow in the pipe. Install as follows:

1. Remove the cable strain relief cap and split rubber grommet. See [Figure 2](#).
2. Loosen the allen head/phillips head cap screws on the retaining clamp and unscrew the retaining cap. See [Figure 1](#).
3. Unscrew the lock ring to remove the insert/extract shaft assembly from the assembled insertion hardware. See [Figure 1](#).
4. Route the sensor cable through the shaft assembly and out the body of the strain relief.
5. Place the split rubber sealing grommet over the sensor cable. Slide the grommet along the sensor cable and into the strain relief body. Route the sensor cable through the top of the strain relief. Slide the top of the strain relief along the sensor cable and loosely screw it onto the strain relief body. See [Figure 2](#).
6. Apply Teflon tape to the sensor threads at the cable end to avoid leaks (pipe sealant with Teflon®, Locktite No. 59321 or equivalent, may not provide adequate sealing at higher solution temperatures). Fasten the sensor onto the shaft assembly. See [Figure 3](#).
7. Pull any excess cable through the strain relief and tighten.
8. Connect the sensor cable to the controller. See the analyzer operation manual for additional information on connecting the sensor to the controller.

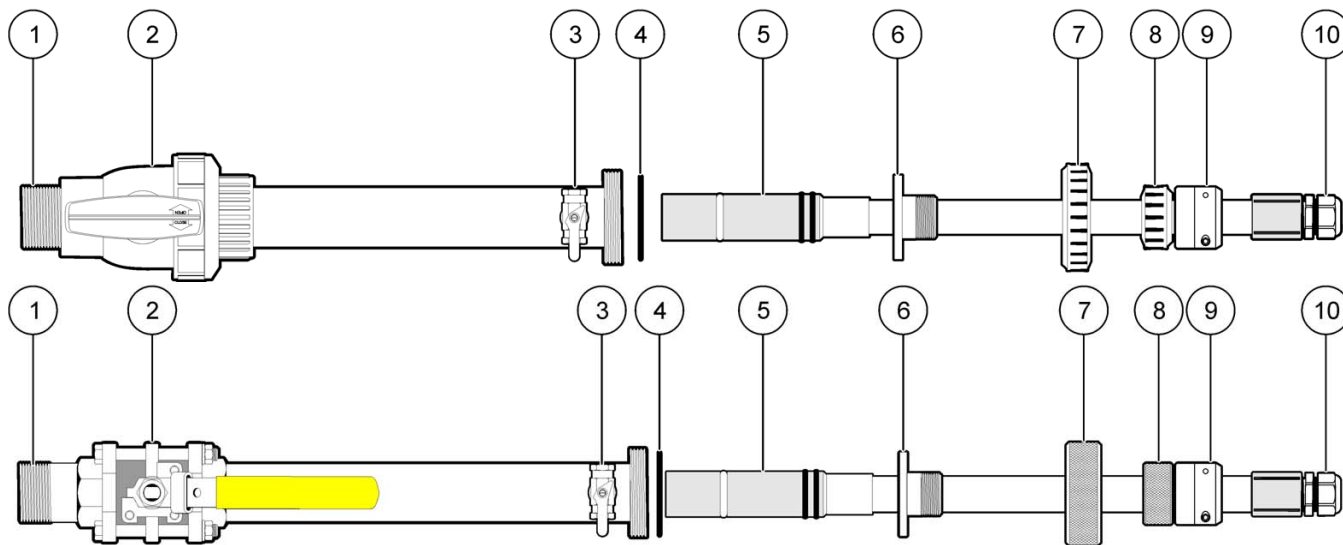


Figure 1 CPVC and Stainless Steel Insertion Mounting Hardware

1	Nipple, 1-½ inch NPT	6	Sealing hub
2	Ball valve, 1-½ inch NPT	7	Lock ring
3	Air-assist, control valve, brass	8	Cap, retaining
4	O-Ring	9	Clamp, retaining
5	Shaft assembly	10	Strain relief, cable

¹ Works with multiple parameter sensors

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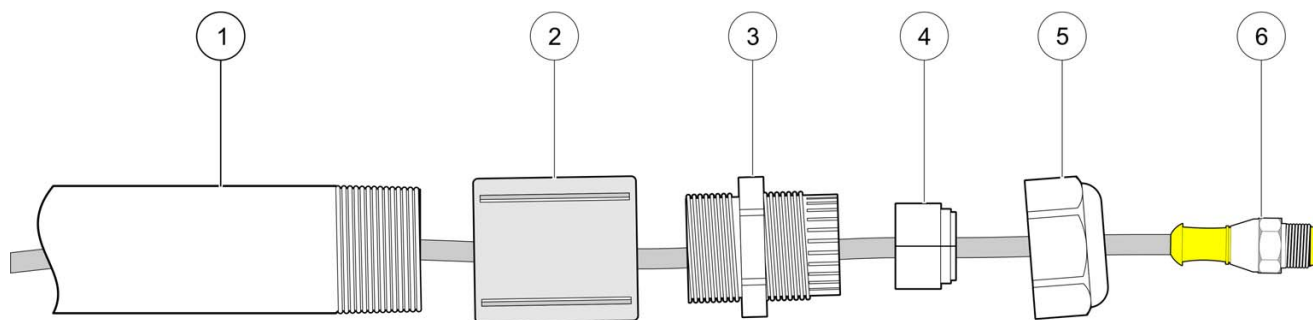


Figure 2 Assembling the Strain Relief and Coupling

1	Shaft assembly	4	Grommet, split rubber
2	Coupling	5	Strain relief
3	Strain relief body	6	Connector, sensor, digital

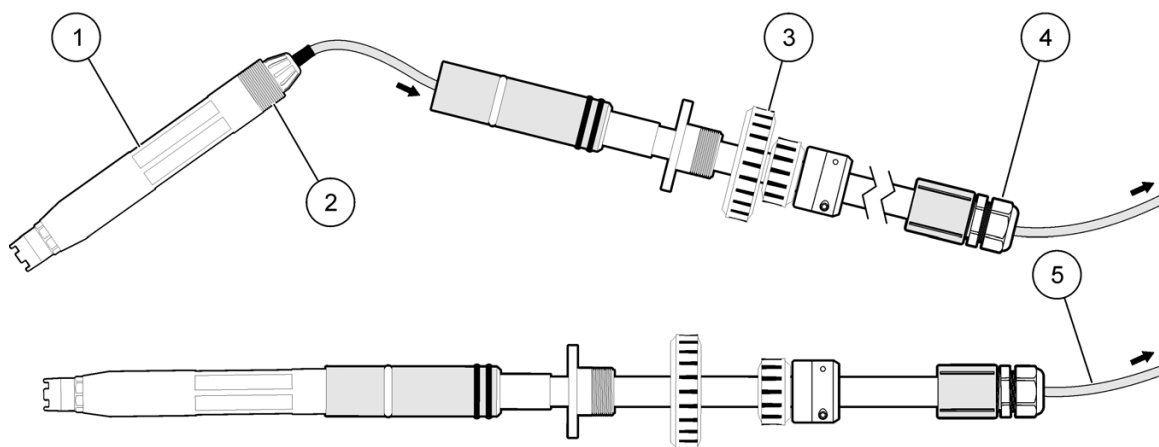


Figure 3 Attaching sensor to shaft assembly

1	Sensor (may look different depending on the sensor)	4	Strain relief
2	Apply teflon tape to threads. Insert sensor as shown.	5	Pull excess cable and tighten strain relief
3	Lock ring		

Specifications

Specifications are subject to change without notice.

Table 1 CPVC insertion fittings for analog and digital pH (5646300 and 5646400)

Specification	Details
Insertion fitting material	CPVC
Sealings	Viton O-ring (3x) Nitrile O-ring (1x)
Maximum process temperature	80 °C (176 °F)
Maximum process pressure at minimum process temperature	50 PSIG

Table 2 Stainless steel insertion fittings for analog and digital pH (5646350 and 5646450)

Specification	Details
Insertion fitting material	316 stainless steel
Sealings	Viton O-ring (3x) Nitrile O-ring (1x)
Maximum process temperature	100 °C (212 °F)
Maximum process pressure at minimum process temperature	100 PSIG

Setting the Sensor Insertion Depth

The sensor insertion depth is the distance that the sensor salt bridge extends beyond the threaded nipple of the ball valve assembly (see [Figure 4](#)). The maximum insertion depth is 114 mm (4.5 inches). If this insertion depth is acceptable for the application, disregard the following procedure and mount the ball valve assembly in the non-pressurized process pipe/vessel. To reduce the insertion depth, complete the following procedure:

1. Loosen the screws on the retaining clamp and unscrew the retaining cap. See [Figure 4](#).
2. Adjust the insertion depth of the sensor by sliding the shaft assembly in the retaining clamp to the appropriate depth.
3. Tighten the retaining clamp screws. Lightly score the shaft assembly pipe just above the clamp for future insertion depth reference.

Note: Do not reduce the insertion depth to less than 25 mm (1 inch). Optimum sensor performance depends upon the sensor electrode and salt bridge being fully immersed in the process.

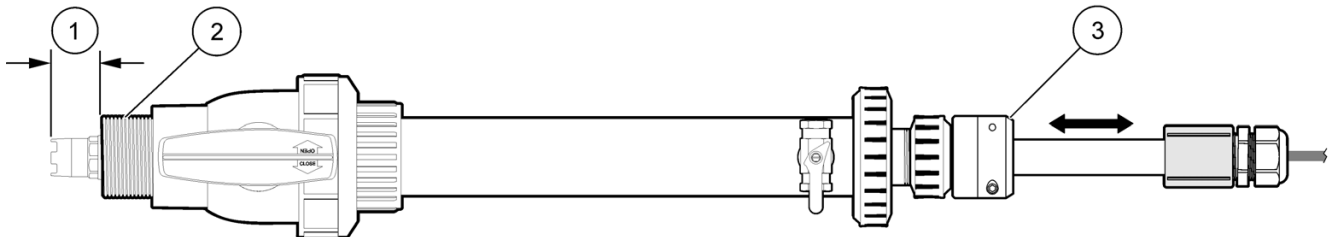


Figure 4 Sensor Insertion Depth

1	Sensor insertion depth	2	Nipple, 1-½ inch NPT	3	Clamp, retaining
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Mounting the Ball Valve in a Non-pressurized Pipe/Vessel

With the shaft assembly removed, mount the ball valve hardware in a portion of the process pipe or vessel where air cannot be trapped and contact the sensor electrode.

Note: Allow 10 pipe diameters upstream and 5 pipe diameters downstream to minimize turbulence effects at the sensor.

1. Apply Teflon tape to the 1-½ inch NPT nipple to avoid leaks (see [Figure 1](#)).
Note: Pipe sealant with Teflon, Loctite No. 59321 or equivalent, may not provide adequate sealing at higher solution temperatures.
2. Fasten the 1-½ inch ball valve into the non-pressurized pipe or vessel at the desired location. The mounting hardware must be at least 15° above horizontal.
3. Turn the ball valve to its full OPEN position.

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4. Connect a ¼-inch air or water-assist line to the ¼-inch NPT fitting of the brass control valve on the ball valve hardware. Turn this control valve to its center OFF position (see [Figure 5](#)).

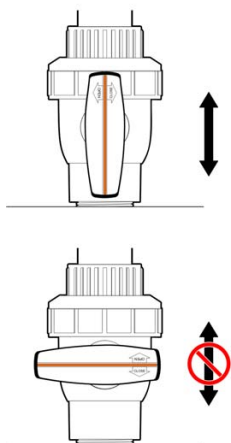
CAUTION

The air or water line pressure must be greater than the process pressure, but cannot exceed 120 psi.

5. Connect a drain line to the fitting on the other side of the control valve (see [Figure 5](#)).

Installing Sensor into a Non-pressurized Ball Valve Hardware

After connecting the sensor cable to the analyzer, setting the insertion depth (if needed), and mounting the ball valve, install the sensor into the non-pressurized process pipe or vessel.



1. Remove the protective cap from the sensor. Retain the cap to protect the electrode and sensor when the sensor is temporarily removed from service.
2. Before installing the sensor, calibrate the system as described in the analyzer operation manual.
3. After calibration, apply a small amount of silicone grease to the two small, brown O-rings on the shaft assembly located behind the sensor.
4. With the ball valve open, fully insert the sensor into the ball valve hardware by pushing it in the shaft assembly to its limit.
5. With the Viton O-ring properly seated in its groove, tighten the lock ring to secure the shaft assembly to the ball valve hardware.
6. Tighten the retaining cap onto the flanged bushing.
7. Pull the shaft assembly outward to its limit to fully extract the sensor from the ball valve hardware.
8. Turn the ball valve to its CLOSED position. The process pipe or vessel can now be pressurized.

Inserting the Sensor into a Pressurized Pipe or Vessel

DANGER

Inserting a sensor into a pressurized process pipe or vessel may be dangerous. Do not stand directly behind the assembly when opening the ball valve. Depending on the process pressure, the shaft assembly may rapidly travel outward until it is stopped by the lock ring.

After installing the sensor into the ball valve hardware, the sensor can be inserted into a pressurized process pipe or vessel.

1. Slowly turn the ball valve to its full OPEN position (see [Figure 5](#)).
2. With the air or water-assist line at a pressure higher than the process but not exceeding 120 psi, slowly turn the brass control valve to its full INSERTION position. The sensor will begin moving into the process pipe or vessel.
3. When the sensor reaches the preset insertion depth as identified by the score mark on the shaft, turn the brass control valve to OFF.

4. Tighten the screws on the retaining clamp.

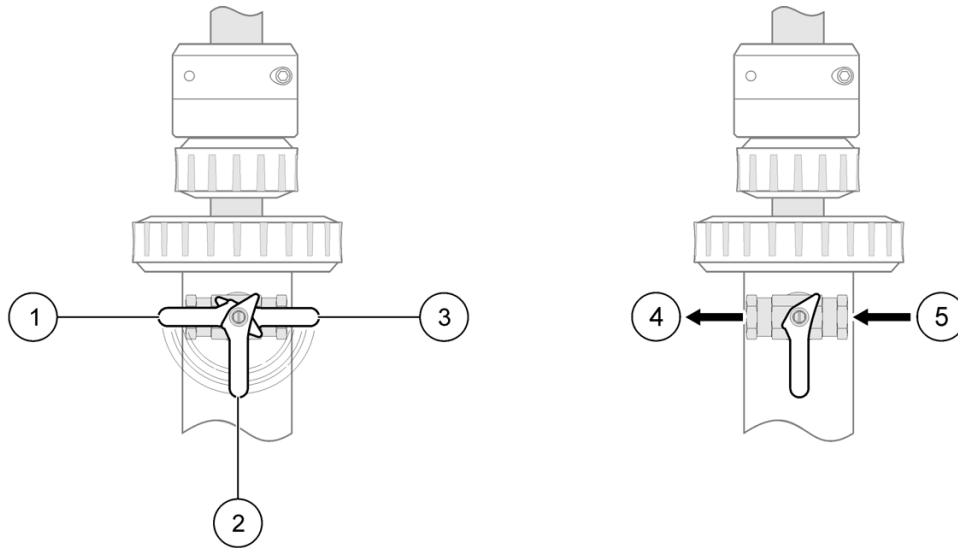


Figure 5 Inserting the Sensor into a Pressurized Pipe/Vessel

1	Position one, sensor EXTRACTION.	4	Air or water assist supply, OUT (drain)
2	Position two, OFF.	5	Air or water assist supply, IN
3	Position three, sensor INSERTION.		

Extracting the Sensor from a Pressurized Pipe or Vessel

DANGER

Extracting a sensor from a pressurized process pipe or vessel may be dangerous. Do not stand directly behind the insertion assembly when removing the retaining cap. Reduce the process pressure to below 10 psi before extracting the sensor. If this is not possible, use extreme caution. At higher pressures, the shaft assembly may travel rapidly to its maximum outward position and injure anyone in its path.

With air or water pressure supplied to the insertion hardware assembly, use the brass control valve to extract the sensor from the process.

1. Loosen the screws on the retaining clamp.
2. Slowly turn the brass control valve to its full EXTRACTION position. See [Figure 5](#). Permit the shaft assembly to move to its maximum outward travel. This ensures that the sensor electrode has cleared the ball valve opening.
3. With the shaft assembly fully extended, place the brass control valve to the OFF position, and immediately turn the ball valve to the full CLOSED position.

To remove the sensor for routine maintenance and calibration:

1. Loosen and remove the lock ring from the ball valve hardware.
2. Pull to extract the shaft assembly from the ball valve hardware.

Replacement Parts

Description	Quantity	Catalog Number
Cap, retaining, for PVC assemblies	1	5977100
Cap, retaining, for stainless steel assemblies	1	5977600
Clamp, retaining, half, for analog PVC assemblies	1	9108900
Clamp, retaining, half, for analog stainless steel assemblies	1	9108700
Clamp, retaining, half, for digital PVC assemblies	1	9108800
Clamp, retaining, half, for digital stainless steel assemblies	1	9108600
Coupling, for analog PVC assemblies	1	3P2120-103
Coupling, for analog stainless steel assemblies	1	2P2220-103
Coupling, for digital assemblies	1	6138600
Hex nut, for PVC assemblies	1	9109200
Lock ring, for PVC assemblies	1	60F1020-101
Lock ring, for stainless steel assemblies	1	60B3F1020-102
O-ring, Viton	1	5H1233
Sealing hub, for analog PVC assemblies	1	60F1022-103
Sealing hub, for analog stainless steel assemblies	1	60B3F1020-102
Sealing hub, for digital PVC assemblies	1	6138200
Sealing hub, for digital stainless steel assemblies	1	6138300
Screw, retaining clamp, Phillips head	1	9109100
Screw, retaining clamp, Allen head	1	9109000
Strain relief, digital cable assemblies	1	6128701
Strain relief, analog cable assemblies	1	3H1091

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Edition 4, November 2009

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