

Installation & Calibration Equipment

Sensor & Instrument Mounting, Accessories, Systems and More



Visualize > Analyze > Optimize

ROSEMOUNT[®]
Analytical


EMERSON[™]
Process Management

INSTALLATION & CALIBRATION EQUIPMENT

Emerson Process Management offers a variety of Rosemount Analytical accessories to fit many requirements. This brochure includes mounting tees, ball valve kits, and other configurations used for mounting conductivity, pH, ORP and amperometric (dissolved oxygen, chlorine, and ozone) sensors and instruments. Please note that each mounting accessory is only valid for the stated sensor(s). Also included is information on instrument mounting, cables, junction boxes and various chemicals. The accessories in this brochure can be used in a wide variety of applications commonly found in the following industries:

- > Chemical
- > Food and Beverage
- > Water and Wastewater Treatment
- > Power
- > Water Treatment
- > Utilities
- > Pulp and Paper
- > Metals and Mining
- > Hydrocarbon Processing
- > Textile
- > Pharmaceutical

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CHOOSING THE RIGHT MOUNTING SOLUTION



Figure 1. The 3900 general purpose pH sensor is offered with 1 inch MNPT threads in two locations: one on the process end and one on the cable end. It also has a 3/4" MNPT process end thread.

Understanding sensor process connections:

Rosemount Analytical sensors are offered with a wide variety of threaded process connections.

The sensor shown above is a 3900 pH sensor. All sensors use similar terminology for process connection threads. Note that not all sensors are offered with front and back end threads. Below are examples of sensors using other types of sensor-to-process connection threads.

The sensors shown in Figures 2 and 3 are much different than the sensor shown in Figure 1. Figure 2 is a 228 Toroidal sensor with 3/4" MNPT threads and is also available with 5/8" UNC threads. Figure 3 shows a non-threaded 3300HT pH sensor which is used with a

process connector (sold separately) to allow variable insertion depths for the sensor and easy sensor removal without twisting the cable.

Ordering Information

All sensors used with the accessories mentioned in this catalog must be purchased separately. Also, please note that additional accessory items must be purchased along with the stated mounting accessories in order for the complete mounting to be accomplished. Please consult your local representative for more information about sensors or consult the factory at 1-800-854-8257 (in the U.S.) or 1-949-757-8500 (outside of the U.S.). You can also visit us at RosemountAnalytical.com.



Figure 2. The 228 Toroidal Conductivity Sensor is offered with back end process threads only.

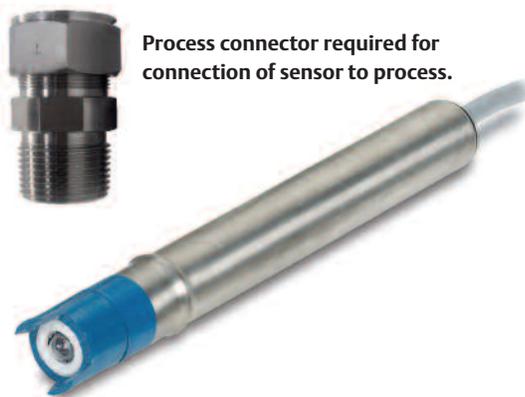


Figure 3. The 3300HT sensor is offered without process threads. A compression fit, process connector is used on the sensor body and gives the user flexibility for insertion. Retractable sensors (a longer version of what is shown above) are also offered without process threads. This is so the sensor can be mounted through a ball valve.

MOUNTING RECOMMENDATIONS FOR SENSORS

Sensors mounted in tees and flow cells:

- > To prevent leakage, wrap the sensor threads with pipe tape before inserting into its mounting.
- > Do not over tighten the sensor when installing. Hand tighten the sensor, and then tighten with a wrench.
- > The electrodes must be completely submerged in the process liquid to measure properly

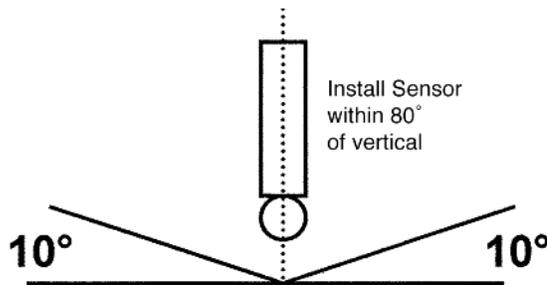


Figure 4. pH sensor recommended mounting orientation. pH sensors should be mounted at least 10° from the horizontal to ensure correct measurement. Sensors can also be mounted vertically.

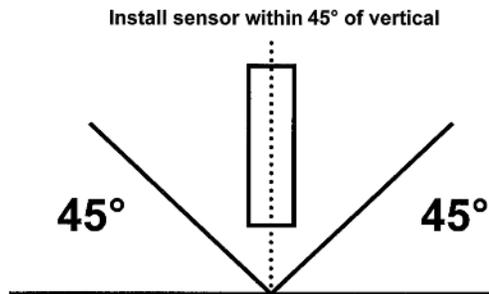


Figure 5. Chlorine, dissolved oxygen, and ozone sensor recommended mounting orientation. Chlorine, dissolved oxygen, ozone sensors should be mounted vertically or within 45° of the horizontal position. Also, these sensors have recommended flow rates that should be observed. Check instruction manual for more information on recommended flow rates.

- > Air bubbles accumulating on sensors will cause erroneous or erratic readings.
- > To control air bubble formation, apply a small amount of back pressure to the flow cell or pipe.
- > All sensor cables should be run through a conduit to protect the back end from moisture intrusion.

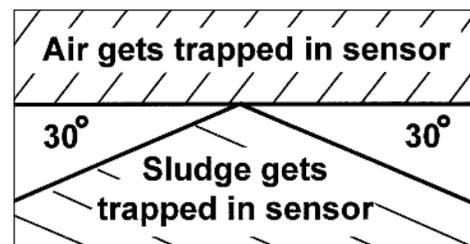
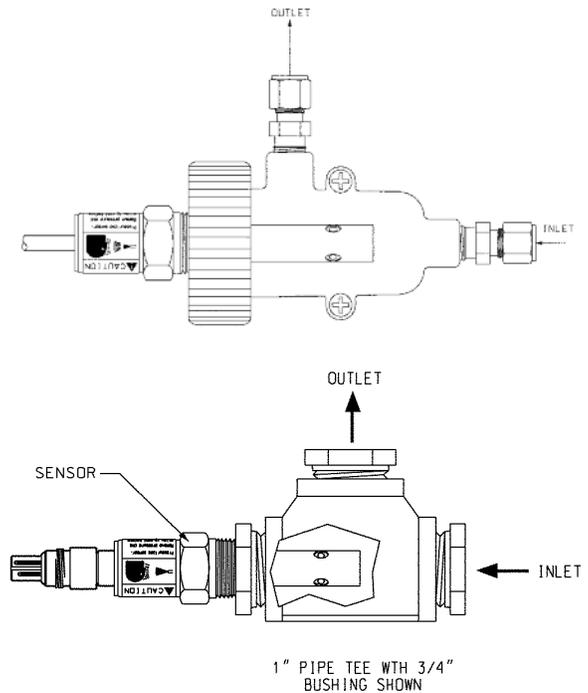


Figure 6. Conductivity (contacting) sensors should have at least 1/4 in. (0.6 cm) clearance between electrodes and piping (as shown in both illustrations above). The recommended sensor orientation is either horizontal or no more than 30° below horizontal. It is best that the inlet flow is facing the sensor to ensure full pipe and minimal air bubbles.

MOUNTING RECOMMENDATIONS FOR SENSORS

Conductivity (toroidal) sensors should be kept at a far enough distance between sensor and pipe wall to ensure the pipe wall does not interfere with the reading. If clearance is too small, the sensor should be calibrated

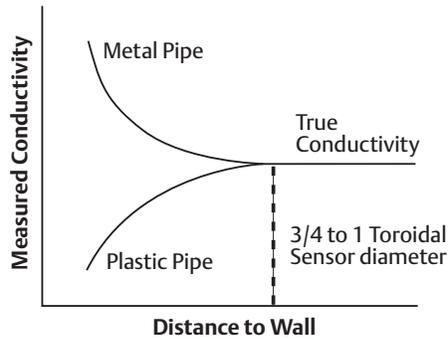


Figure 7. The measured toroidal conductivity value can be affected when installed close to a pipe wall.

while in the pipe. The sensor should be completely submerged in liquid. Mounting the sensor in a vertical pipe run with the flow from bottom to top is best. If the sensor must be mounted in a horizontal pipe run, orient the sensor in the 3 o'clock or 9 o'clock position.

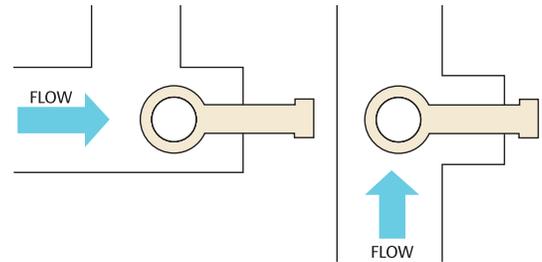


Figure 8. Correct sensor orientation

Sensors submerged in tanks, ponds, or basins

- > To prevent leakage, wrap the sensor threads with pipe tape before inserting into its mounting part.
- > Do not over tighten the sensor when installing. Hand tighten the sensor, and then tighten one or two (1-2) turns with a wrench.

- > The electrodes must be completely submerged in the process liquid to measure properly.
- > All sensor cables should be run through a pipe conduit; do not use the sensors cable to dangle the sensor into the tank, pond, or basin.

Incorrect Installation

Do not install sensor by hanging it directly into water.



Correct Installation

Always install sensor using pipe conduit.



Figure 9. Correct sensor installation is critical to proper sensor performance.

INSERTION SENSOR MOUNTING

The mounting parts contained in this section include in-line tees, low flow cells, a handrail mounting assembly, a floating ball system, a jet spray cleaner, mounting adapters, and process connectors. The in-line tees are offered in various configurations to assist in easy sensor insertion and removal without twisting cables. The low flow cells are available for sidestream samples with 1/4" OD tubing. The handrail mounting assembly is available with all the parts needed to install a sensor into a pond

or basin; the jet-spray cleaner can be used with this assembly for dirty applications. The floating ball system can be used as an alternative method of installing a sensor into a pond or basin. Many mounting adapters are offered for tank and pipe insertion, as well as for submersion applications. The process connectors are offered specifically for use with metal body sensors for insertion, submersion, and retractable applications.

MEASUREMENT TYPE	Sensor Product Numbers*
pH and ORP	 <p data-bbox="586 894 1321 926">389, 396, 396P, TF396, 3300HT, 3500, 3900, Hx338, 3800, RB546</p>
Conductivity	 <p data-bbox="586 1125 743 1157">140, 400, 228</p>
Dissolved Oxygen	 <p data-bbox="586 1356 821 1388">499ADO, 499ATRDO</p>
Ozone	 <p data-bbox="586 1587 683 1619">499AOZ</p>
Chlorine	 <p data-bbox="586 1818 756 1850">499ACL, 498CI</p>

* Sensors with integral cable or VP connector can be used.

IN-LINE TEES

These versatile in-line tees can be used with Rosemount Analytical pH, ORP, conductivity, dissolved oxygen, ozone, and chlorine sensors having 1-inch process connections. Compatible sensor models are listed in the table below. Tees can be installed directly in process piping or in slip streams. PN 23567-00 and PN 915240-03, -04, and -05 have union fittings that allow the sensor

to be removed without the need to unscrew it, thus eliminating the possibility of the cable becoming twisted and damaged. Tees are offered in PVC and CPVC and can connect to ¾, 1, and 1 ½ inch process lines.

Always install tees so that the sensor is completely submerged in the process liquid, and allow enough headroom to remove the sensor.

In-Line Tees	In-Line Tee Part Number				
	2002011	23567-00	915240-03	915240-04	915240-05
Size	1.5"		2.0"		
Process Connection Ends	1.0" thread	1.5" socket	.75" threads	1.0" threads	1.5" threads
Material	CPVC, Schedule 80		PVC, Schedule 80		
O-ring or Gasket Material	-		Buna N		
Maximum rating	150 psig (1136 kPa) @ 150°F (65°C)	65 psig (549 kPa) @ 122°F (50°C)	60 psig (515 kPa) at 120°F (49°C)		
Compatible Sensor Models*					
pH and ORP	396P, 389, 3500, 3900		396P, 389, 3500, 3900 using adapter PN S10283-LQD		
Conductivity	150		-		
Dissolved Oxygen	499ADO		499ADO		
Ozone	499AOZ		499AOZ		
Chlorine	499ACI		499ACI		

*Note: All sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" connectors can also be used.



Figure 10. When using sensor Model 3900VP with Tee PN 915240-03, -04, or -05, order adapter PN S10283-LQD (top of photo)

Direct mount into tee threads

IN-LINE TEE (PN 2002011) PRESSURE/TEMPERATURE SPECIFICATIONS

psig (kPa)	°F (°C)
150 (1136)	150 (65)
128 (984)	160 (71)
102 (805)	170 (77)
80 (653)	180 (82)
57 (494)	200 (93)
48 (432)	210 (99)

FIGURE 11. 1½ in. tee with 1 in. threaded process connection (PN 2002011) shown with TUPH 396P mounted for angle or straight process flow.

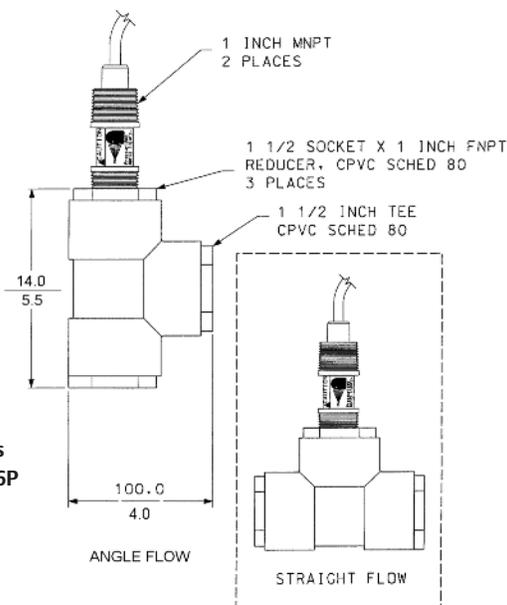


Figure 12. 389 pH sensor in PN 2002011 Tee



Figure 13. Sensor tip in process stream flow path.

IN-LINE TEES

Tees with union adapters offer quick and easy access and eliminate damage from cable twisting.

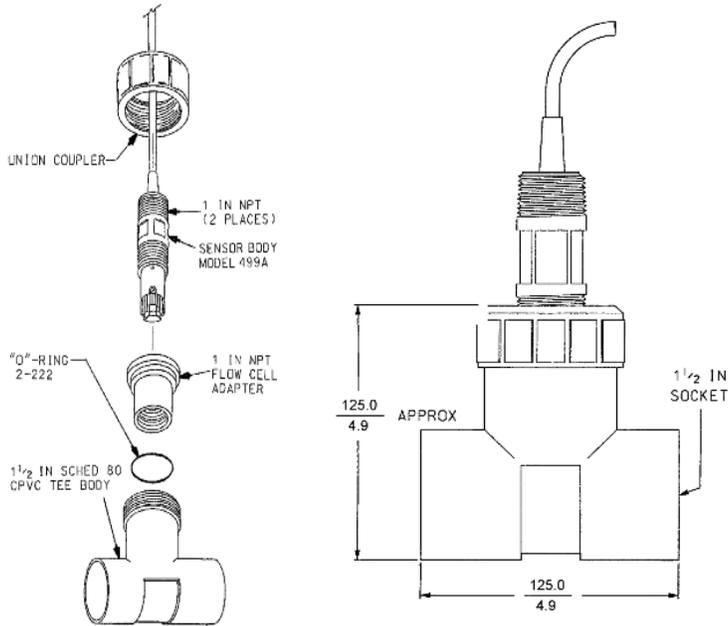


Figure 14. 1 1/2 in. tee with 1 1/2 in. socket process connection (PN 23567-00) shown with a Model 499A amperometric sensor. The tee assembly is offered with a sensor mounting adapter that allows the user to remove the sensor without twisting the cable.



Figure 15. 499ACL sensor in PN 23567-00 Tee



Figure 16. Sensor tip in process stream flow path.

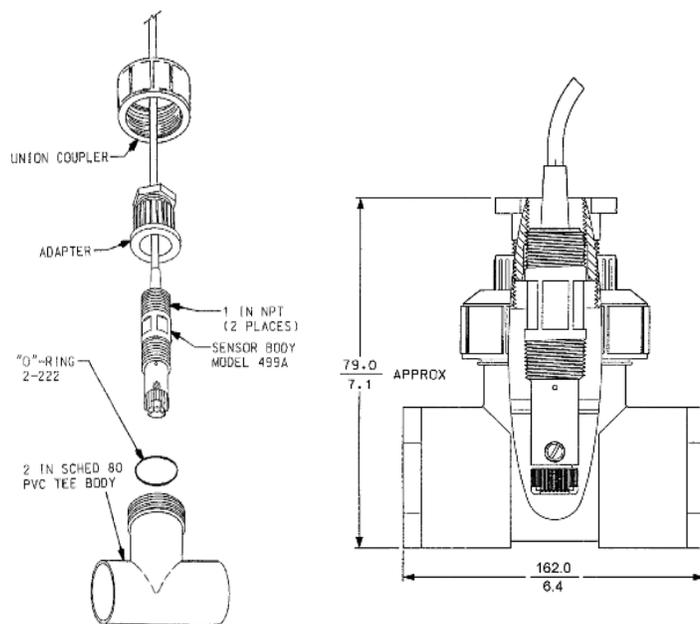


Figure 17. 2 in. tee with 3/4, 1, or 1 1/2 in. threaded process connections (PN 915240-03, -04, -05 respectively) shown with a Model 499A amperometric sensor. The tee assembly is offered with a sensor mounting adapter that allows the user to remove the sensor without twisting the cable.



Figure 18. PERpH-X 3500VP pH sensor in PN 915240-03 Tee



Figure 19. Sensor tip in process stream flow path



Figure 20. 3900VP pH sensor in PN 915240-03 Tee with adapter PN S10293-LDQ



Figure 21. Sensor tip in process stream flow path

LOW FLOW CELLS

Emerson offers a variety of low flow cells for sidestream applications where it is impractical to divert a large volume of sample, particularly if the sample must be sent to waste. Choose a transparent plastic or stainless steel body—both have ¼ inch FPT process connections. Plastic flow cells PN 24091-00, -01, and -02 are also supplied with ¼ inch MPT to ¼ inch OD tubing fittings

and have a union connection that allows easy removal of the sensor.

Valved rotameters are also available (see page 41) to adjust and measure sample flow in sidestream installations. Accurate control of flow is especially important when measuring dissolved oxygen, chlorine, and ozone.

Low Flow Cells

	PN 24091-00	PN 24091-01	PN 24091-02	S10240 (SQ 7716)	S10290 (SQ 7637)
Process Connection	1/4 inch 316 SST male tube connector				
Wetted Materials	Body and Nut - Polycarbonate/polyester blend; 1/4" Fittings - 316 SST; O-ring - Silicone			316 SST	
Maximum Temperature	158°F (70°C)			Consult Factory	
Maximum Pressure	90 psig (621 kPa)			Consult Factory	
Sensor Threaded Connection	1 inch	1 inch	3/4 inch	1 inch	3/4 inch
Special features	None	Bubble shedding nozzle	None	Order as a special request only	
Compatible Sensor Models*					
pH and ORP Sensors	396P, 389, 3500, 3900	-	RB-546	396P, 389, 3500, 3900	-
Conductivity Sensors	-	-	400, 400 VP	-	400, 400 VP
Dissolved Oxygen	499ATrDO, 499ADO	499ADO	-	499A DO	-
Ozone	499AOZ	-	-	-	-
Chlorine	499ACL	498CL, 499ACL	-	-	-

*Note: All sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" designation can also be used.



Figure 22. PN 24091-00 with 3900VP pH sensor

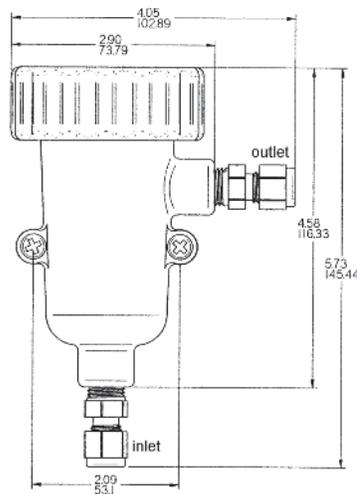


Figure 23. Low Flow Cell (PN 24091-00, 24091-01 or 24091-02) dimensions



Figure 24. PN S10290 with 400VP sensor

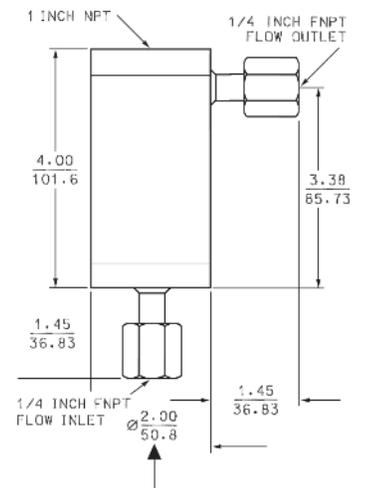


Figure 25. Metal Low Flow Cell (PN S10240 and S10290) dimensions

HANDRAIL MOUNTING

Use a handrail mounting assembly whenever a pH, ORP, or dissolved oxygen sensor must be installed in a tank, aeration basin, pond, or open channel. Two versions are available. PN 11275-01 consists of a 13-ft (4.0-m) long PVC pipe with a 45° bend about two feet (0.6 m) from the lower end where the sensor is connected. The angle allows bubbles to slide off the sensor. Clamps attach the pipe to a frame that can be bolted to a handrail.

The pipe insertion depth is adjustable. The HRMS consists of a 1 ½ inch pipe clamp held by a clevis and pin assembly, which can be attached to a railing. The user supplies the 1 ½ inch pipe. The clamp can be rotated from side to side and up and down and locked in place once the pipe is in the desired position. The sensor attaches to the pipe using either a threaded adapter (HRMS-02) or a union coupling (HRMS-01).

Handrail Mounting Assemblies

	Part Number 11275-01	HRMS-01***	HMRS-02***
Process Connection	Mounting brackets for Various Sizes of Handrails		
Wetted Materials	PVC	NA	NA
Temperature Rating	140°F (60°C) max.	NA	NA
Compatible Sensors*			
pH and ORP Sensors	396P, 389, 3500, 3900		
Dissolved Oxygen Sensors	499ADO**		
Optional Accessory	Jet Spray Cleaner (see pg 13)		

* Note: All sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" connector can also be used.

** If used with the Handrail Mounting Assembly in a tank, the correct measurement can only be made if there is a continuous flow or movement past the membrane of the sensor. These sensors will not operate properly in standing liquid.

*** 1 1/2 inch pipe not supplied in these systems.



HINT: Using a sensor with a VP connector and cable will allow for easier access to the sensor when cleaning or calibration is necessary.



Figure 26. Photo on left shows sensor being dangled into the pond, an incorrect installation. Photo on right shows correct sensor mounting – sensor is threaded into a pipe conduit while cable is run through the pipe of the Handrail Mounting Assembly.

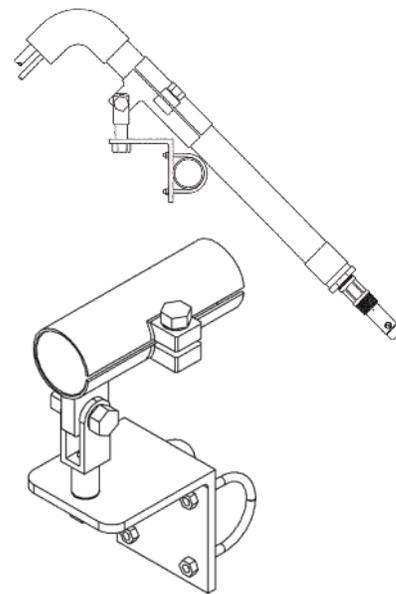


Figure 27. HRMS-01 shown with user-supplied 1-1/2" pipe (top) and assembled (bottom).

HANDRAIL MOUNTING ASSEMBLY

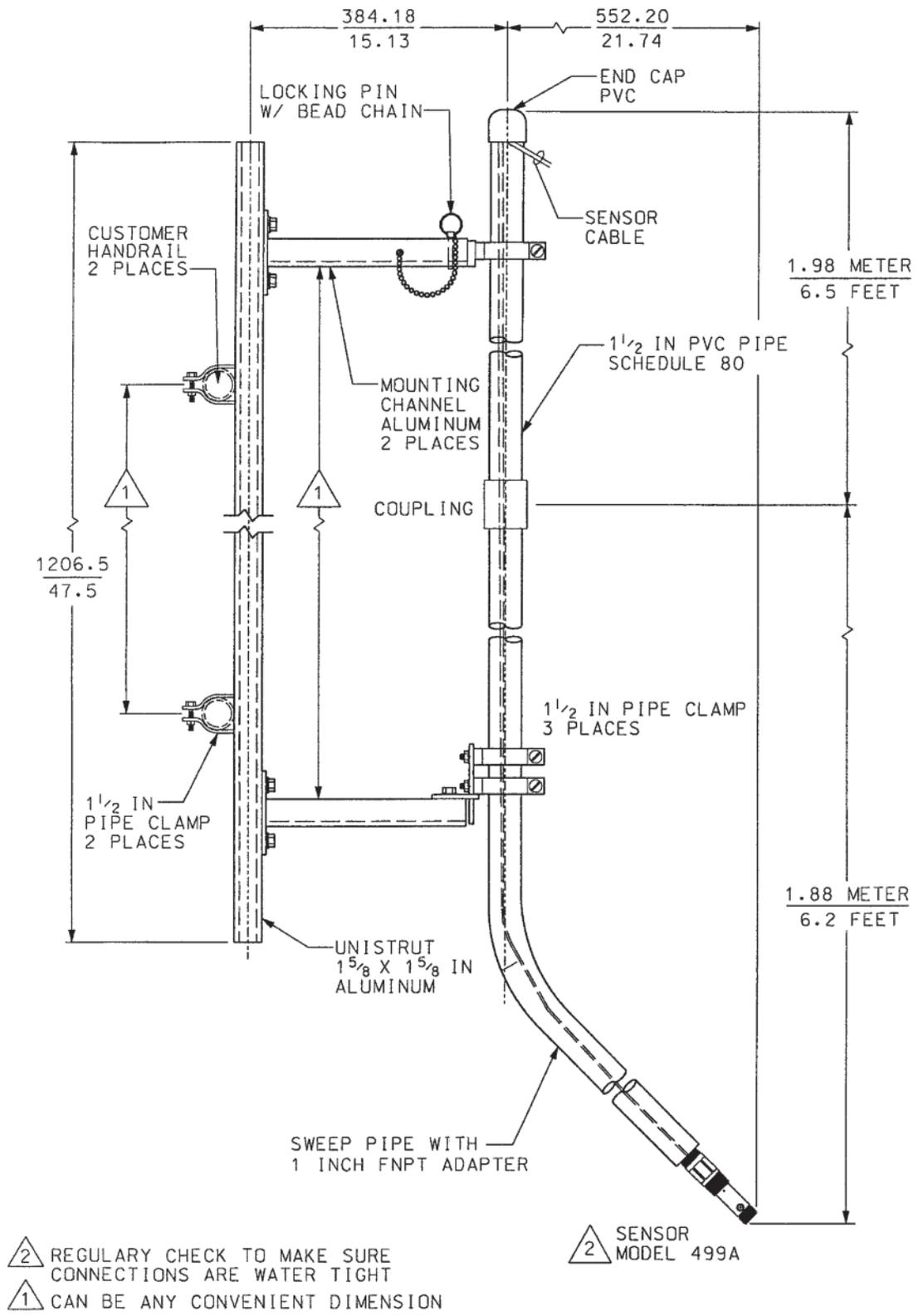


Figure 28. Handrail Mounting Assembly (PN 11275-01) shown with Model 499A Dissolved Oxygen Sensor.

FLOATING BALL SYSTEM

The floating ball system when used with the HRMS provides a convenient way of keeping the sensor a fixed distance below the surface of a pond or basin independent of the water level. The system accommodates any sensor having 1-inch back facing threads. The sensor attaches to the bottom of the float through a union coupling, and the sensor is held a 45° angle allows air bubbles to side off the sensor. The float can be readily inflated using a hand pump.

Floating Ball System

Part No.	Description
BB11-01	For Model 499ADO; includes sensor union adapter
BB11-03	For any sensor with a 1 inch rear-facing MNPT connection; includes union adapter

Wetted Material: Flexible PVC, rigid PVC

Temperature Range: 32°F to 140°F (0°C to 60°C)

Size (Diameter x Length): 11 x 13 inches (28 x 33 cm)

Maximum Inflation Pressure: 2.1 psig (0.15 bar)

Maximum Circumference: 34-1/2 inches (88.0 cm)

Buoyancy: 27lbs (12 kg)

Minimum Sensor Insertion Depth Into Process:

BB11-01 with 499ADO sensor: 13 inches (33 cm)

BB11-03 with standard 1 inch sensor: 17 inches (43 cm)

Pipe Boom Support Arm: 1-1/2 inch Sch 80 PVC pipe (by others)

Sensor Compatibility: 1 inch MNPT on sensor cable end

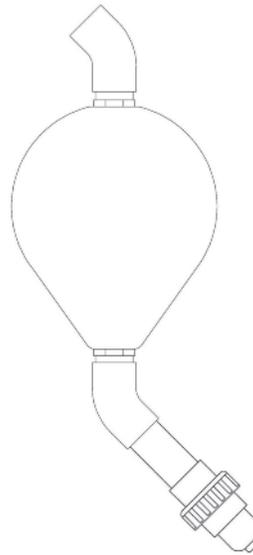


Figure 29. Assembled Floating Ball BB11-01 for the 499ADO dissolved oxygen sensor

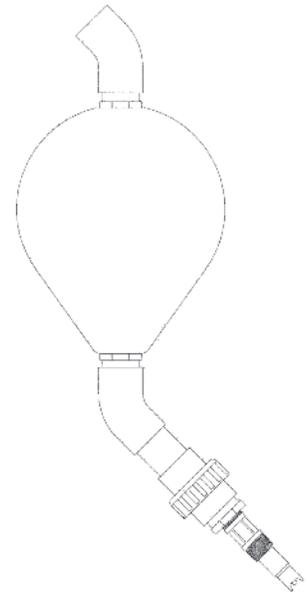


Figure 30. Floating Ball and Sensor with 1 inch Rear Facing MNPT Connection

JET SPRAY CLEANER

The jet spray cleaner is intended for use with pH, ORP, or oxygen sensors. It directs a spray of air, water, or other cleaning fluid at the end of the sensor flushing away suspended solids that have accumulated there. The cleaner can be used only if the sensor is installed in a tank or basin. It is not suitable for in-pipe installations.

Cleaning frequency and spray duration is controlled by an interval timer in the analyzer. During cleaning the analyzer can be programmed to hold the last reading, thus avoiding spurious outputs and relay actions. Hold can be continued beyond the end of the cleaning



period, allowing the sensor time to stabilize before the analyzer returns to normal operation.

Cleaning intervals and frequency as well as the best cleaning agent can be determined only by experience. Several trials will likely be necessary to determine the best program.

Jet Spray Cleaner

	Part Number 12707-00
Process Connection	2" NPT threads OR use sensor/conduit
Wetted Materials	316 SST, polypropylene, PVC
Maximum Pressure	50 psig (446 Kpa)
Compatible sensors*	
pH and ORP	396P, 389, 3900, 3500
Chlorine, dissolved oxygen, and ozone	499ACL, 499ADO, 499AOZ

*Note: All sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" designation can also be used.

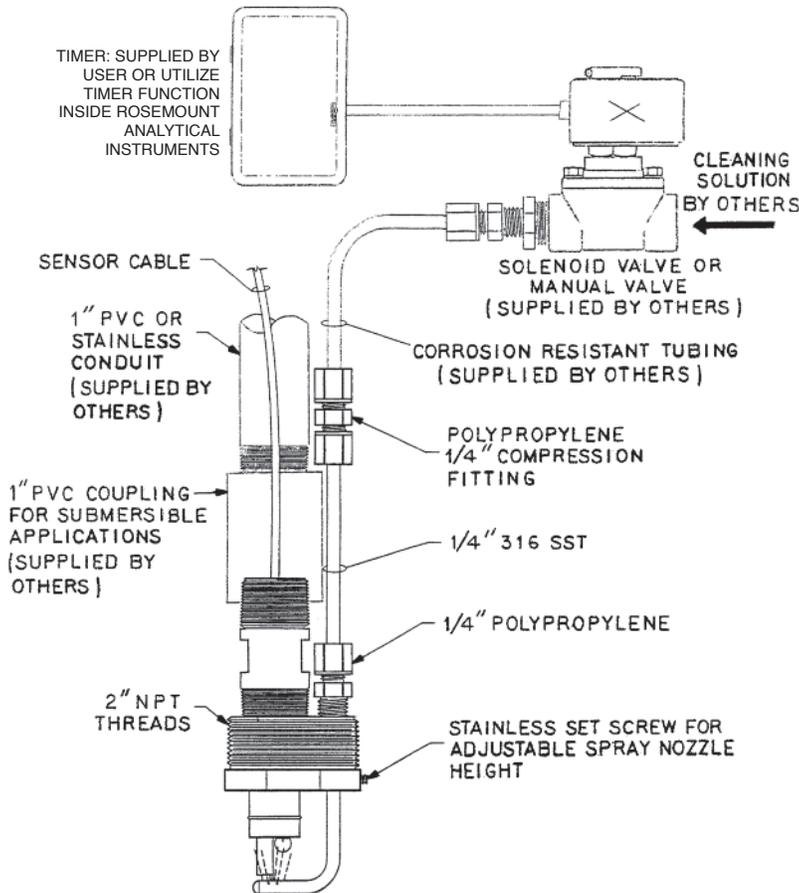


Figure 31. Example of Jet Spray Cleaner with timer and solenoid valve for interval timed cleaning

Figure 32. Jet Spray Cleaner shown with Model 3900 pH sensor using the front threads to connect to the cleaner and the back threads to connect to a watertight pipe conduit



Typical install uses these threads

MOUNTING ADAPTERS – THREADED CONNECTIONS

Use these adapters to install sensors with back facing threads into process piping or sample tees. The sensor screws into a plastic adapter that is held in the process connector by a union nut. The rear of the adapter is threaded for a conduit connection, if required. The union connection allows the sensor to be removed without the danger of twisting and damaging the cable.



Figure 33. 3500 PERpH-X pH sensor with adapter PN 23242-02



Figure 34. 228 Toroidal Conductivity sensor with adapter PN 23242-02 (or -03)

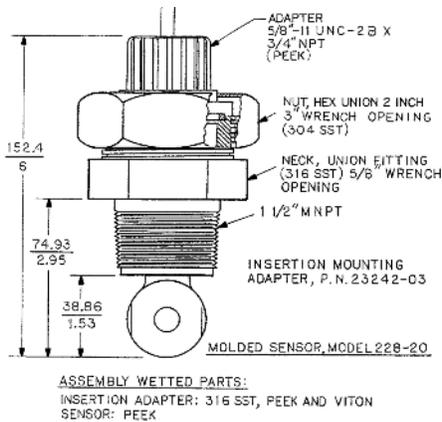


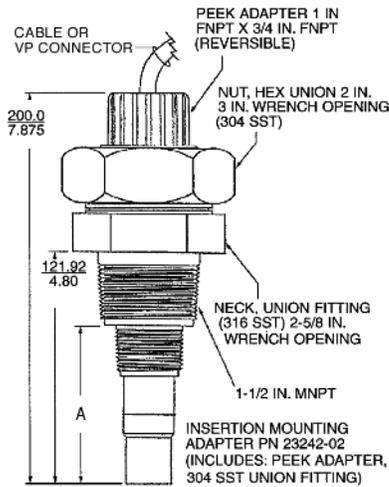
Figure 35. The 228 Toroidal Conductivity Sensor with Adapter PN 23242-03

Mounting Adapters



ADAPTER	23242-02	23242-03	2001990
Materials of Construction	316 SST, PEEK, Viton	316 SST, PEEK, Viton	CPVC, PEEK, Viton
Process Connection	1-1/2" MNPT	1-1/2" MNPT	2" MNPT
Sensor Adapter/ Union Thread Size	1" x 3/4" FPT	3/4" x 5/8" - 11 UNC	3/4" x 3/4" FPT
Temperature, Maximum	392F (200C)	392F (200C)	100F(38C) at 100 psig (791 kPa abs) OR 185F (85C) at 45 psig (412 kPa abs)
Pressure, Maximum	295 psig (2135 kPa abs)	295 psig (2135 kPa abs)	100 psig (791 kPa abs)
Compatible Sensor Models*			
pH and ORP	389, 396P 3500, 3900	-	-
Conductivity	228-21	228-20	228-21

*Note: Most sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" designation can also be used.



Sensor*	"A" Dimension	
	inches	mm
396P	3.5	88.9
389	3.75	95.2
3900	4.5	114.3
3500	5.5	139.7

*The VP connector versions can also be used.

Figure 36. The 396P pH Sensor with Adapter PN 23242-02. Can also be used for connection to a 228-21 toroidal conductivity sensor using the reversible PEEK adapter.

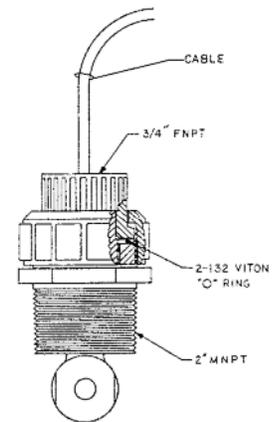


Figure 37. Adapter PN 2001990 with 228-21 Toroidal Conductivity sensor

MOUNTING ADAPTERS – SUBMERSION

Use this adapter to connect sensors with 1 inch back facing threads to standpipes for installation in tanks and basins.

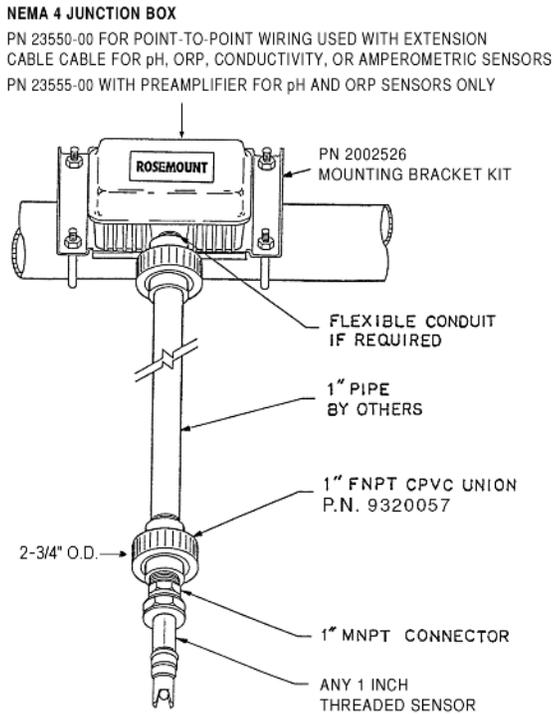


Figure 38. Example of pipe mounting sensor with mounting adapter PN 9320057.



Figure 39. 499ADOVP Dissolved Oxygen Sensor with adapter PN 9320057



ADAPTER	9320057
Materials of Construction	PVC, Sch 80
Process Connection	1" FNPT
Sensor Adapter/ Union Thread Size	1" FNPT
Temperature, Maximum	Ambient
Compatible Sensor Models*	
pH and ORP	389, 396P, 3500, 3900
Conductivity	-
Dissolved Oxygen	499ADO
Ozone	499AOZ
Chlorine	499ACL

*Note: Most sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" designation can also be used.

MOUNTING ADAPTERS – TRI-CLAMP® CONNECTIONS

Use these adapters to install threaded sensors into 1 ½ inch or 2 inch Tri-Clamp® process connections

Mounting Adapters



ADAPTER	S10021 (SQ8940)	SQP-10098-LQD*	SQ 10904A & B
Materials of Construction	316 SST, 16 Ra finish	316 SST	304 SST
Process Connection	1.5" Tri-Clamp	2" Tri-Clamp	2" (A) or 1.5" (B) Tri-Clamp
Sensor Adapter/Union Thread Size	PG 13.5	1"	1" FNPT
Compatible Sensor Models**			
pH and ORP	3800, Hx338	385+, 396, 396R, 398R, TF396, 398, 3300HT, 3400HT	389, 396P, 3500, 3900
Conductivity	-	-	-
Dissolved Oxygen	Hx438	-	-

* Formerly PN 23513-00

**Note: Most sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" connection can also be used.

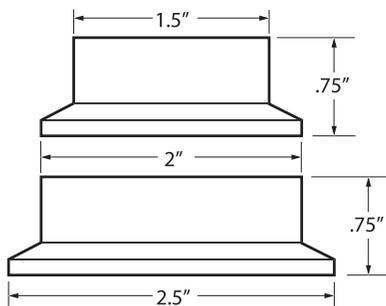


Figure 40. SQ10904 1.5" Tri-Clamp adapter (bottom) and 2" adapter (top)



Figure 41. 396P TUpH sensors shown with 1 inch threaded, 1.5 and 2 inch Tri-Clamp adapters

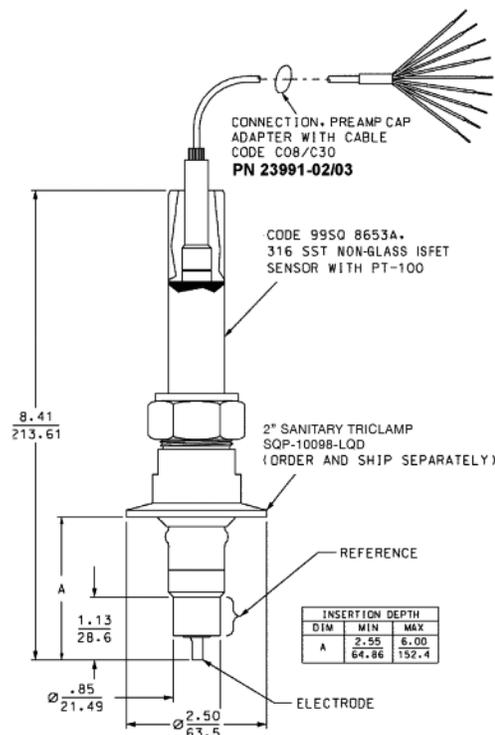


Figure 42. PN SQP-10098-LQD Compression fitting with Tri-Clamp Flange shown on TF396 sensor

PROCESS CONNECTORS FOR 1 INCH SENSOR TUBES

Certain models of pH and ORP sensors lack threads and must be installed in the process piping using one of the fittings shown below. The sensor slides into the fitting, and a nut and ferrule tightened against the sensor tube holds the sensor in place. The insertion depth is adjustable. A collar on the tube prevents the sensor from

being ejected by the process pressure if the nut is not sufficiently tightened. The fittings are available with 1-in MPT and 2-in Tri-Clamp process connections. To prevent the sensor from turning and twisting the cable while a threaded fitting is being installed or removed, loosen the nut to free the sensor.

Process Connectors



ADAPTER	PN 23166-00	PN 23166-01	PN 9510066	SQP-10098-LQD**
Materials of Construction	316 Stainless Steel	Titanium	Nylon	316 Stainless Steel
O-Ring Material	EPDM	EPDM	Polyethylene	Viton
Process Connection	1" MNPT	1" MNPT	1" MNPT	2" Tri-Clamp
Sensor Tube OD	1" (25.4 mm)	1" (25.4 mm)	1" (25.4 mm)	1" (25.4 mm)
Compatible pH and ORP Sensors	385+, 396, 398, 396R, 398R, 3300HT, 3400HT	385+, 396, 398, 396R, 398R, 3300HT, 3400HT	396, 398, 3300HT	385+, 396, TF396, 398, 396R, 398R, 3300HT, 3400HT

*Note: Most sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" designation can also be used.

** Formerly PN 23513-00

PROCESS CONNECTORS FOR 1 INCH SENSOR TUBES

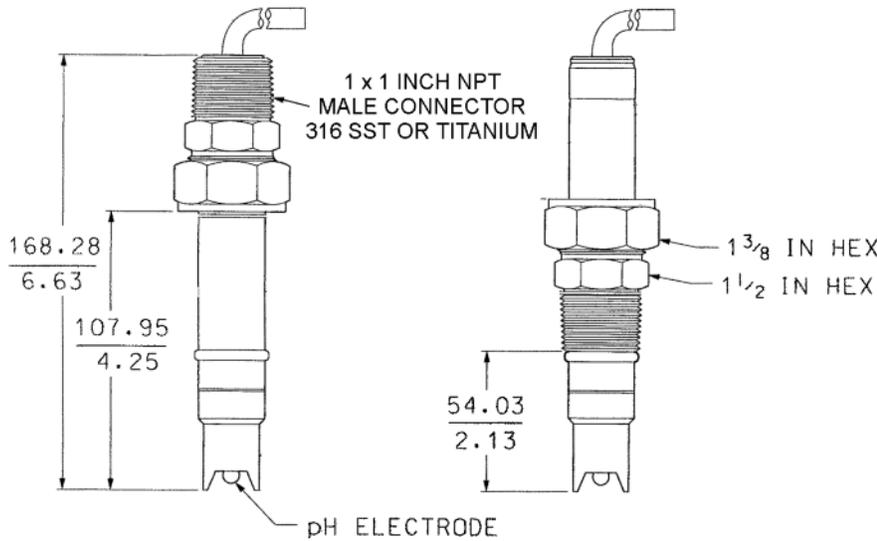


Figure 43. Metal process connector (PN 23166-00 [316 SST] or PN 23166-01 [titanium]) shown with TUph Model 396 pH sensor. This process connector can be used for all 396, 398, and 3300HT sensor installations. Also, it must be used for 396R, 398R, and 3400HT installations with or without a ball valve. See ball valve section for more information.



Figure 44. The 23166-00 (or -01) metal process connector, shown with the 3300HT PERpH-X sensor, allows various insertions depths, depending on where the user locates the compression fitting. Also the threads can be switched to face the top end of the sensor (right) for connection to submersion pipes.

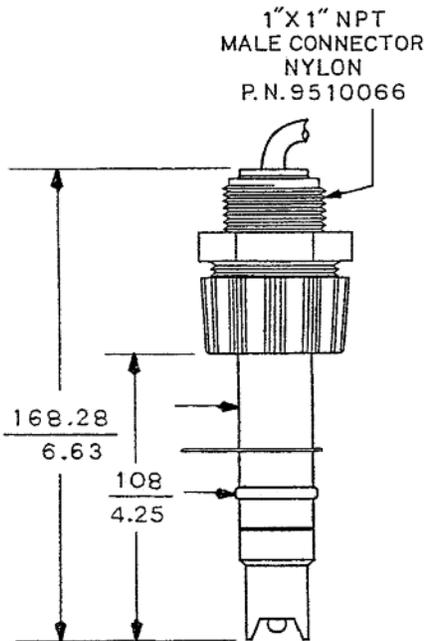


Figure 45. Nylon Process Connector PN 9150066 can be installed with threads facing up or down. NOTE: This connector should be used for low pressure, non-aggressive chemical processes only.



Figure 46. 398 TUph pH Sensor with SQP-10098-LQD Tri-Clamp flange adapter

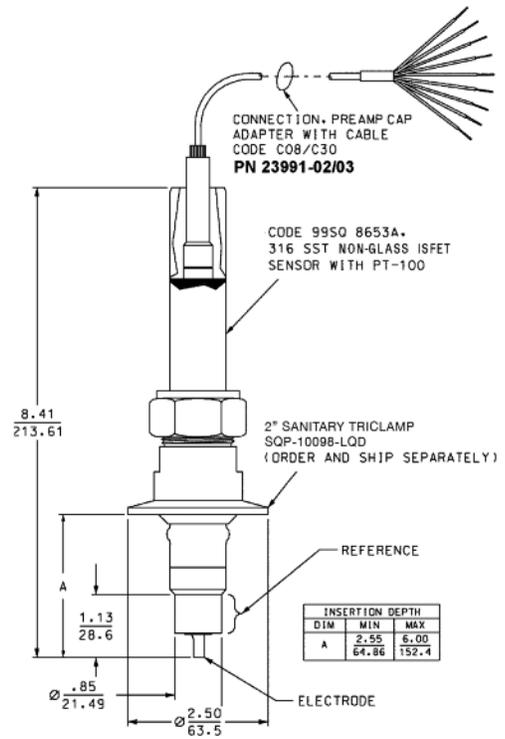


Figure 47. PN SQP-10098-LQD Compression fitting with Tri-Clamp Flange shown here with TF396. Can also be used with the 396, 398, and 3300HT sensors.

RETRACTION ASSEMBLIES

Retraction assemblies allow a pH, ORP, or conductivity sensor (both contacting and toroidal) to be inserted or removed from a vessel or pipe without the need for depressurizing or draining it. Insertion depth is adjustable. Five retraction assemblies are available. Two

include the ball valve needed to close off the process line before the sensor is removed. Two require the ball valve to be purchased separately. The fifth assembly is a rotary retraction valve.

MEASUREMENT TYPE	Sensor Model Numbers
pH and ORP	 <p data-bbox="634 751 1219 783">385+, 396, 396P, 396R, 398, 398R, 3300HT, 3400HT</p>
Conductivity	 <p data-bbox="634 982 740 1014">228, 402</p>

See following pages for retractable mounting options.

RETRACTION ASSEMBLIES – BALL VALVE INCLUDED

Two retraction assemblies are available. PN 23240-00 has a 1 ½ inch full port ball valve and PN 23765-00 has a 1 ¼ inch ball valve. Both assemblies can be used with the pH sensors listed in the table below. Model 402 and 402VP sensors can be used only with PN 23765-00.

PN 23765-00 includes a retraction chamber, 1 ¼ inch ball valve, and close nipple for attaching the retraction

assembly to an FPT process connection. PN 23240-00 includes only the ball valve and retraction chamber. A fitting (PN 23166-00 or 23166-01) is required to connect the sensor to the retraction chamber, and a 1 ½ inch close nipple (PN 9310102) is needed to attach the ball valve to a FPT process connection.

Ball Valve Kits



	1 1/2 in. Ball Valve Kit PN 23240-00	1 1/4 in. Ball Valve Kit PN 23765-00
Process Connections	1 1/2" FNPT	1 1/4" MNPT
Wetted Materials	316 SST	316 SST
Temperature Rating	32-212°F(0-100°C)	32-212°F(0-100°C)
Pressure Rating	100 psig (790 kPa)	200 psig (1481 kPa)
Maximum Retraction Pressure	For 21 inch pH sensors: 64 psig (542 kPa) For 36 inch pH sensors: 35 psig (343 kPa)	64 psig (542 kPa)
Compatible Sensor Models*		
pH and ORP	396R, 398R, 385, 385+, 3400HT, RB-547	
Conductivity	–	402
Other information	Use PN 23166-00 or -01 to connect sensor to ball valve. ** Use 1-1/2" close nipple (PN 93101-02) to attach ball valve to FTP process connection.	If ball valve is already available, the retraction assembly alone is available (PN 23796-00) 

* All sensor models noted in this graph are listed with integral cables. The sensor models with the "VP" connector can also be used.

**Process connector is included with the 385 and 385+ sensors



Figure 48. Retractable sensors have the distinct advantage of having an adjustable insertion depth. Sensor tubes can be installed with a short (top photo) or a longer (bottom) insertion. See sensor model information for more about sensor tube lengths.

RETRACTION ASSEMBLIES – BALL VALVE INCLUDED

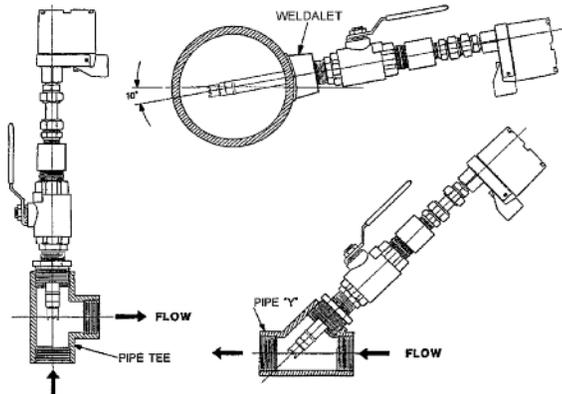
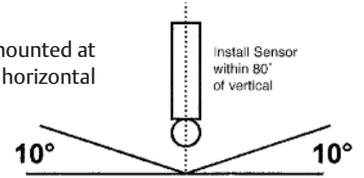


Figure 49. Examples of sensor mounting using a ball valve retraction kit connected to a standard pipe tee, pipe “Y”, or pipe weldolet.

pH sensors should be mounted at least 10 degrees above horizontal



Conductivity sensors should be mounted between 0 and -30 degrees from the horizontal

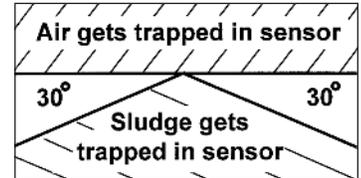


Figure 50. Observe the above mounting angles to obtain best measuring results.

To retract a sensor:

- 1) Loosen the retraction chamber or process connector nut.
- 2) Slide the sensor into the retraction chamber. The stop collar on the sensor prevents the sensor from sliding out of the retraction chamber.
- 3) Close the ball valve.
- 4) Remove the process connector or retraction chamber and sensor from the ball valve.

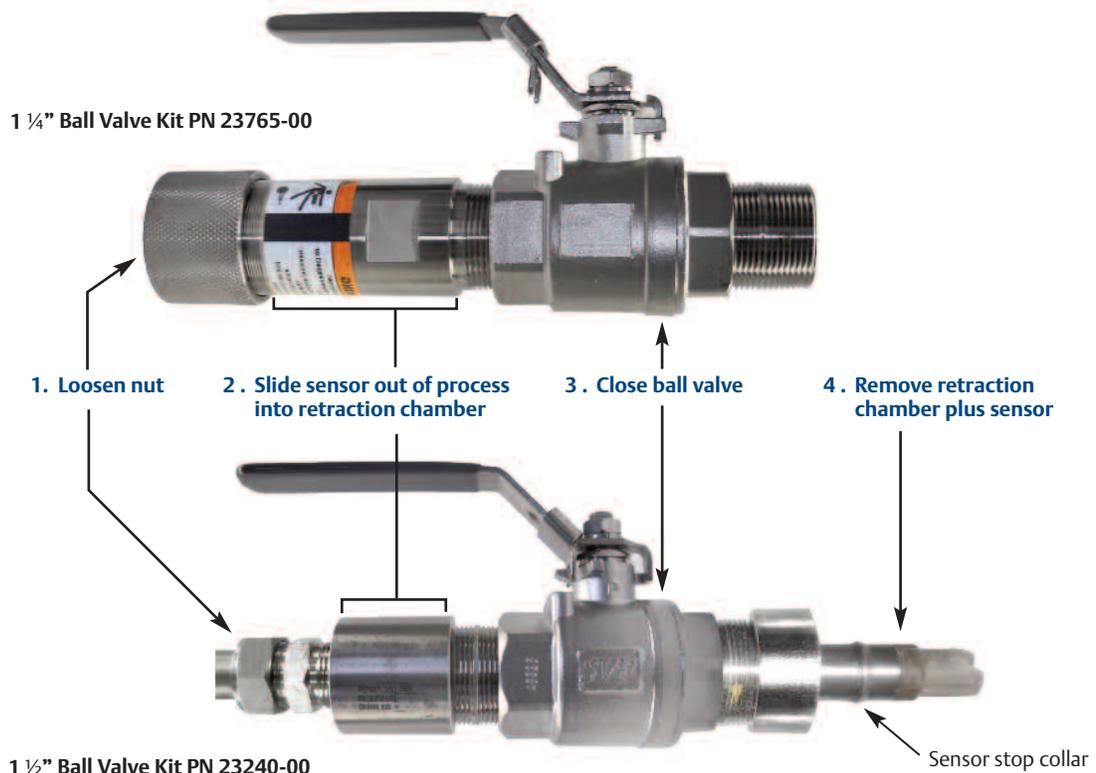


Figure 51. Follow these four steps to easily remove the sensor from a pressurized system.

RETRACTION ASSEMBLIES – BALL VALVE INCLUDED

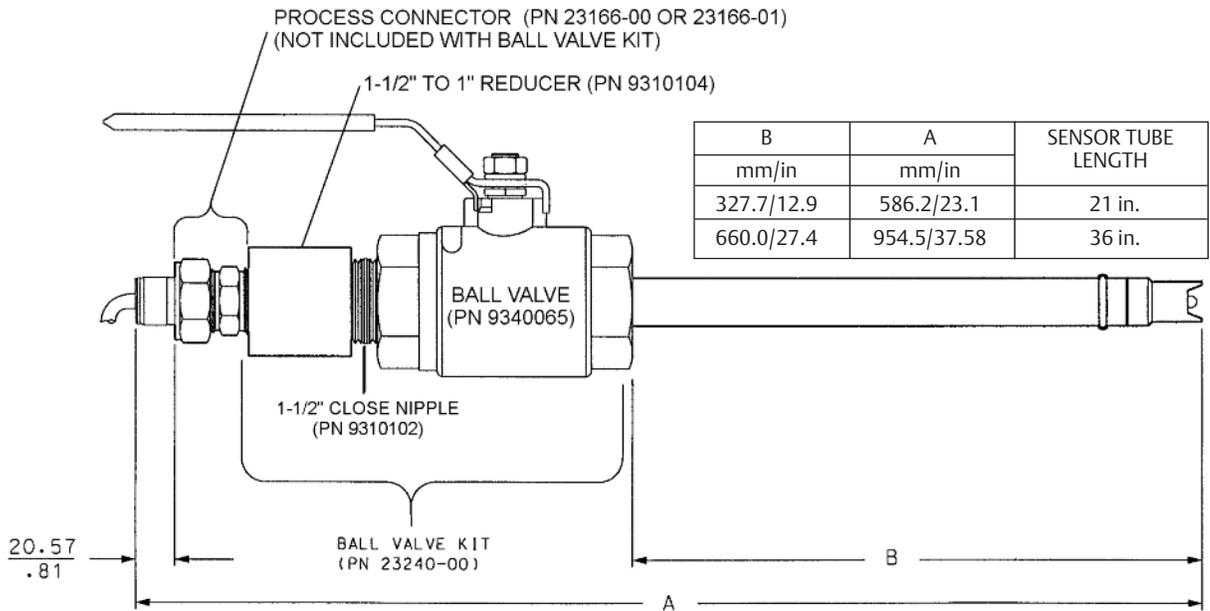


Figure 52. 1½ in. FNPT Ball Valve Kit (PN 23240-00) shown with process connector (sold separately) and TUph Model 396R pH sensor. Ball valve kit includes a 1½ in. full port ball valve, a 1½ in. FTP to 1 in. FTP reducer (which serves as the retraction chamber) and a 1½ in. close nipple that connects the reducer to the ball valve. A connector (PN 23166-00 or 23166-01) is required to connect sensor to the reducer.

Process Connector
PN 23166-00 or -01
(sold separately) is
required to connect the
sensor tube to the ball
valve kit .



1½ inch close nipple PN 9310102
(not included in ball valve kit) is
available for installations requiring
an MNPT connection to mate to
the 1½ inch FNPT threads.

Ball valve kit PN 23240-00 includes
a 1½ inch ball valve, a close nipple
to connect the reducer to the ball
valve. The reducer is also the
retraction chamber.

Figure 53. Ball valve kit PN 23240-00 with other accessories (sold separately).

RETRACTION ASSEMBLIES – BALL VALVE INCLUDED

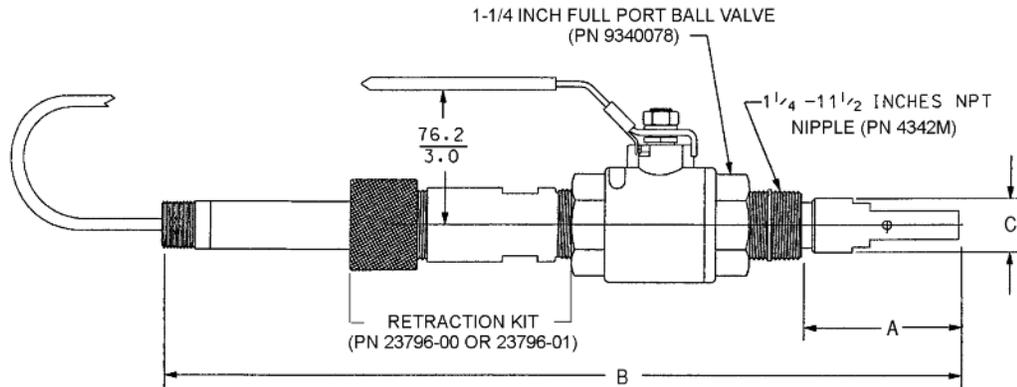


Figure 54. 1¼ in. MNPT Ball Valve Kit (PN 23765-00 or 23765-01) shown with retraction kit and Endurance Model 402 conductivity sensor. Ball valve kit includes a 1¼ in. full port ball valve, a 1¼ in. nipple, and a retraction chamber.

Model	A Dimensions				B Dimensions		C Dimensions	
	Minimum*		Maximum		inches	mm	inches	mm
	inches	mm	inches	mm				
402-11	3.21	82	5.34	136	18.13	460.5	1.19	30.2
402-12	2.34	59	4.47	114	17.33	440.2	1.19	30.2
402-13	2.36	60	4.49	114	17.33	440.2	1.19	30.2
402-14	3.89	99	4.91	125	18.83	478.3	1.19	30.2
396R-21	2.0	50.8	12.12	307.85	21	533.4	1.0	25.4
398R-21	2.0	50.8	12.12	307.85	21	533.4	1.0	25.4
3400HT-21	2.0	50.8	12.12	307.85	21	533.4	1.0	25.4
396R-25	2.0	50.8	26.62	676.15	36	914.4	1.0	25.4
398R-25	2.0	50.8	26.62	676.15	36	914.4	1.0	25.4
3400HT-25	2.0	50.8	26.62	676.15	36	914.4	1.0	25.4

*Minimum dimension must be met in order for sensor to measure correctly



Figure 55. The ball valve kit (PN 23765-00 or -01) has all parts needed to install the sensor. The retraction chamber (PN 23796-00) can be purchased separately.

RETRACTION ASSEMBLIES (BALL VALVES NOT INCLUDED)

These retraction assemblies are primarily intended for use with Model 228 toroidal conductivity sensors. However, they can be modified for use with certain pH and contacting conductivity sensors. Consult the factory for information.

A mechanical (PN 23311-00) and manual (PN 23311-01) retraction assembly are available. The mechanical

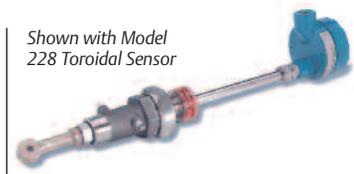
retraction assembly, which uses a drive screw to insert and retract the sensor, can be operated against a pressure as high as 295 psig (2036 kPa abs). Both retraction assemblies are fitted with 1/8" flush ports on the retraction chamber to allow the sensor to be washed clean of sample before it is removed. Both assemblies were designed to be used with a 1-1/2" full port ball valve (purchased separately – PN 9340065).

*Shown with Model
228 Toroidal Sensor*



**PART NUMBER 23311-00
Mechanical Retraction Assembly**

*Shown with Model
228 Toroidal Sensor*



**PART NUMBER 23311-01
Manual Retraction Assembly**

	PART NUMBER 23311-00 Mechanical Retraction Assembly	PART NUMBER 23311-01 Manual Retraction Assembly
Process Connection	1.5" MNPT	1.5" MNPT
Wetted Materials	316 SST, Teflon, EP	316 SST, Teflon, EP
Maximum Operating Temperature	392°F (200°C)	392°F (200°C)
Maximum Operating Pressure	295 psig (2036 kPa)	295 psig (2036 kPa)
Max. Insertion/Retraction Conditions	392°F (200°C) 295 psig (2036 kPa)	266°F (130°C) 35 psig (241 kPa)
Maximum Insertion Travel	8.5" (21.6 cm)	12" (30 cm)
Maximum Insertion Travel using PN 9340065 Ball Valve	6.25" (15.9 cm)	7.0" (17.8 cm)
Compatible Toroidal Conductivity Sensors	Model 228	Model 228
Compatible Contacting Conductivity Sensors	Consult factory for information	Consult factory for information
Compatible pH & ORP Sensors	Consult factory for information	Consult factory for information

RETRACTION ASSEMBLIES (BALL VALVES NOT INCLUDED)

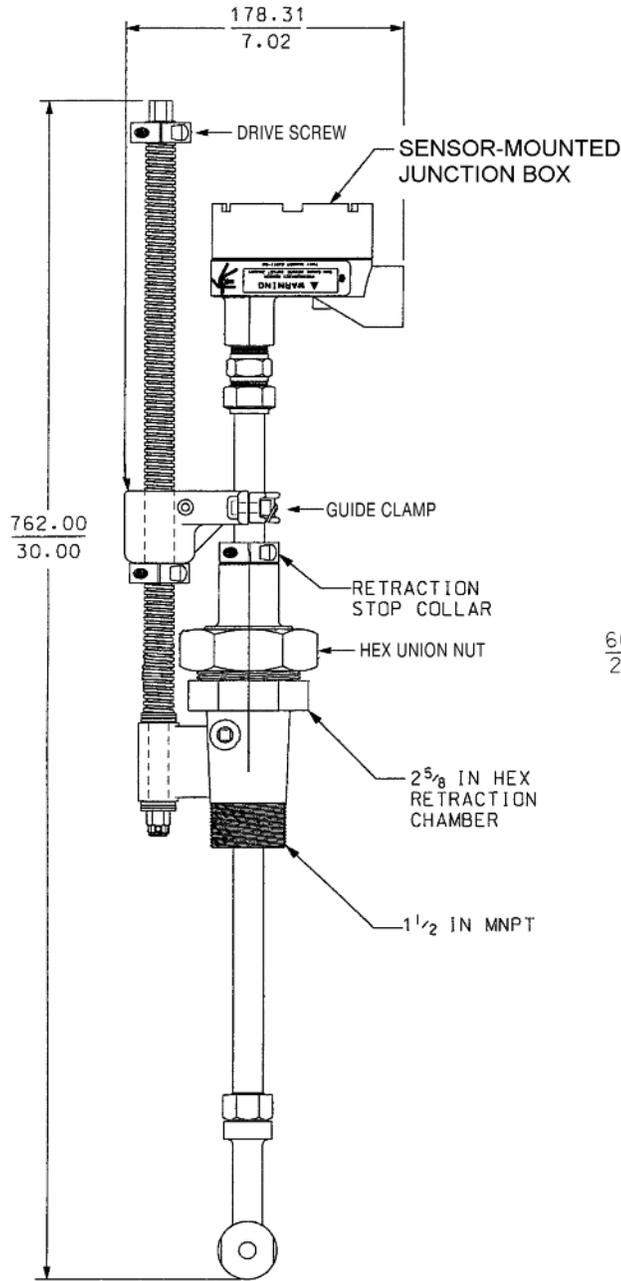


Figure 56. Mechanical Retraction/Insertion Assembly (PN 23311-00). To remove the sensor, use a socket wrench to turn the drive screw until the sensor is inside the retraction chamber. Close the ball valve (not shown) and flush the retraction chamber. Loosen the hex union nut. Remove the stop collar and the front half of the guide clamp. Remove the sensor.

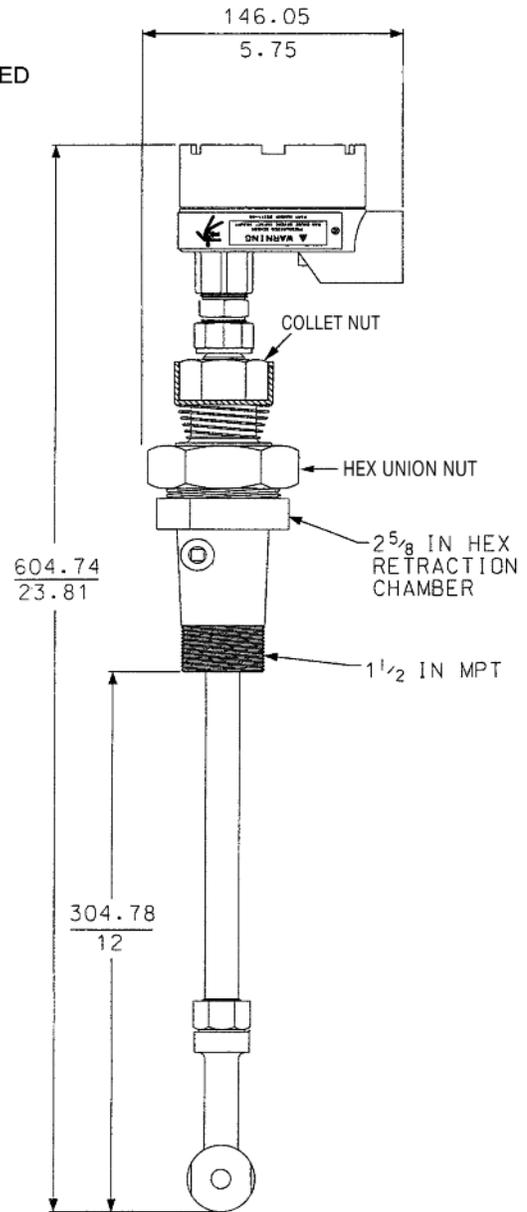


Figure 57. Manual Retraction/Insertion Assembly (PN 23311-01). To remove the sensor, loosen the collet nut and pull the sensor into the retraction chamber. Close the ball valve (not shown) and flush the chamber. Loosen the hex union nut and remove the sensor.

PASVE ROTARY RETRACTION VALVE

The PASVE is a mounting/service valve for pH sensors. It allows the cleaning and calibration of pH sensors without stopping the process. When required, this can be done automatically.

When using the sensor in abrasive processes, it can be rotated to the measuring position only for the duration of the actual measurement.

The PASVE valve is available in a manually operated type or equipped with a pneumatic or electric actuator. It is offered in a version for welding directly onto the pipe or tank. It is also available with flanged connections. Contact factory for more details.



Figure 58. PASVE valve, shown in welded on tank, manual operation configuration

PASVE Specifications

Process Connections	Code B: Welded on Tank at 15° angle Code C: Welded on Tank Code P: Welded on Pipe Code F: Flange Code D: Flow through with flanged connection
Wetted Materials (Valve)	AISI 316LSST or Titanium
Wetted Materials (Seals)	PTFE (Teflon) or PTFE (With carbon graphite filling)
Maximum Operating Temperature	482°F (250°C)
Maximum Operating Pressure	570 psig (4000 kPa)
Cleaning Port Connections	¼ inch
Compatible pH Sensors	396, 396P, 389, 398, and 3300HT (with SQ9608) 385+, 396PVP, 3300HTVP (SQ 9608) and no others

PASVE ROTARY RETRACTION VALVE

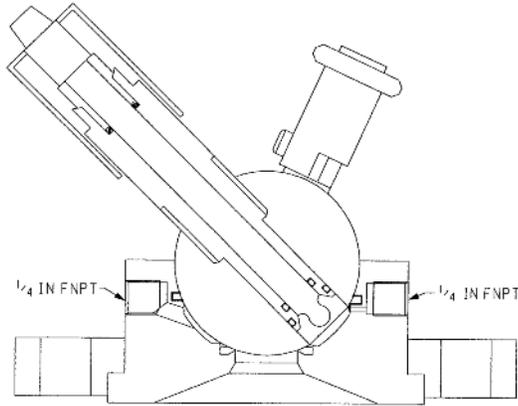


Figure 59. Operating PASVE Measuring Position

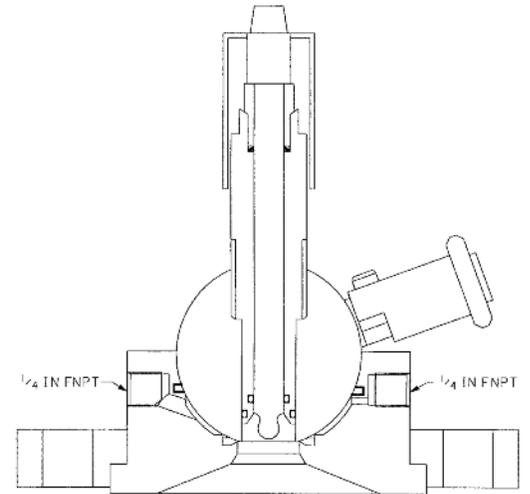


Figure 60. Operating PASVE Servicing and Calibration Position

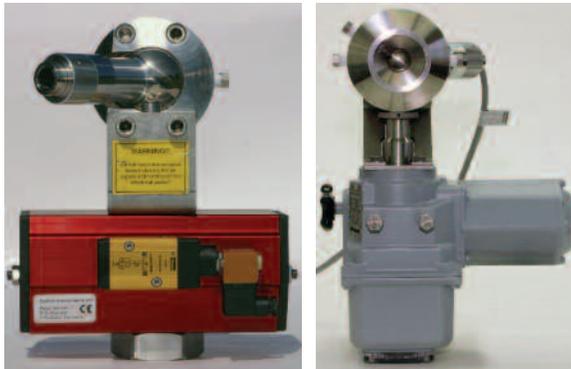


Figure 61. Pasve valve with spring return, double action, and pneumatic (left) or electric (right) actuator

Flush ports to connect cleaning liquid or air to spray directly onto the sensor.

Spray tube from cleaning port.

Sensing end of the pH sensor.

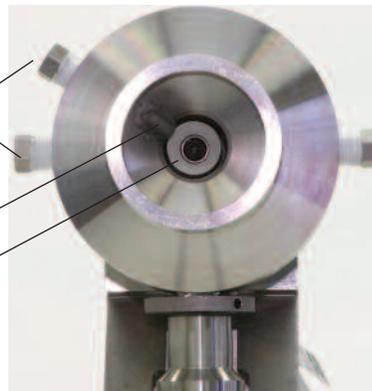


Figure 62. Close-up of PASVE valve with cleaning ports

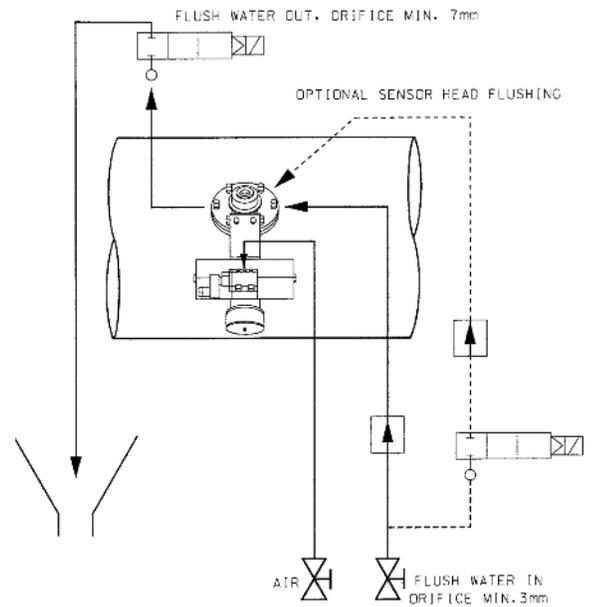


Figure 63. PASVE Example of Flush Water Set-Up

INSTRUMENT MOUNTING

The instrument mounting accessories found in this section include instrument mounting kits for pipe or wall mounting. These can be used with the following Rosemount Analytical Instruments:

TWO-WIRE INSTRUMENTS

5081 Transmitter

Features a rugged, weatherproof, corrosion-resistant enclosure.

- > Meets NEMA 7B explosion proof standards.
- > Digital communication protocols: HART® and FOUNDATION® fieldbus, allowing access to AMS (Asset Management Systems)



1066 Transmitter

Broad range of measurements, advanced communications capability, and unique ease-of-use.

- > Uses HART version 7 and FOUNDATION fieldbus digital communication protocols.
- > User-definable measurement diagnostic parameters.



WIRELESS INSTRUMENTATION

6081

Remote locations and installation costs are no longer barriers to getting information you require for critical applications.

- > 6081-C measures conductivity
- > 6081-P measures pH
- > Self-organizing network for high data reliability and network stability
- > Industry leading wireless security



FOUR-WIRE INSTRUMENTS

56 Analyzer

- > High resolution screen shows faults and warnings in color for immediate recognition of an out of range parameter.
- > Extensive help screens for rapid start up.
- > Process disruptions can be pinpointed in the color trending graphs.
- > Process data can be downloaded to a USB drive.
- > Proportional, Integral and Derivative (PID) control.
- > TPC (Duty Cycle Control/Pulse Width Modulation).



1056 Analyzer

- > Single or dual input analyzer.
- > Large, easy-to-read display allows operators know at a glance if the process is within allowable parameters.
- > Easy to install and wire.



1057 Analyzer

- > Three-input analyzer.
- > Choose from pH/ORP/ISE or Contacting Conductivity/Resistivity, in any combination.



INSTRUMENT MOUNTING ACCESSORIES

Rosemount Analytical instruments can be mounted on a pipe, in a panel, or on a wall using the various versatile mounting accessories. These kits contain all parts needed for a successful instrument installation.

PN 23820-00 and 23820-01 are Mounting Bracket Kits for Pipe, Surface or Wall Mounting. Kit includes one bracket and two u-bolts with washers and screws. Use for mounting Rosemount 56, 1056, 1057, 1066, 5081, and 6081 instruments.



Mounting part	23820-00	23820-01
Bracket	Carbon Steel, blue epoxy coating	316 SST
Bracket Dimensions	7.5" x 4.0" x 1.2"	
U-Bolt	SST	
U-Bolt Dimensions	for 2" pipe maximum	
Screws and washers	SST	
Compatible Instruments	56, 1056, 1057, 1066, 5081, 6081	

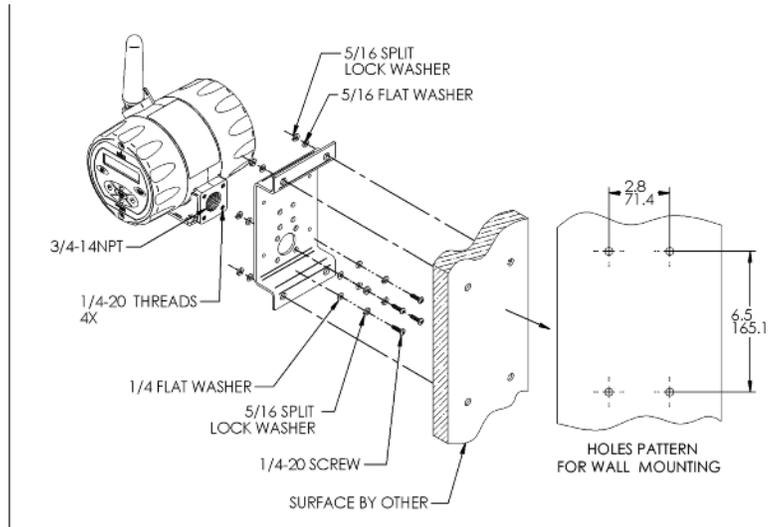
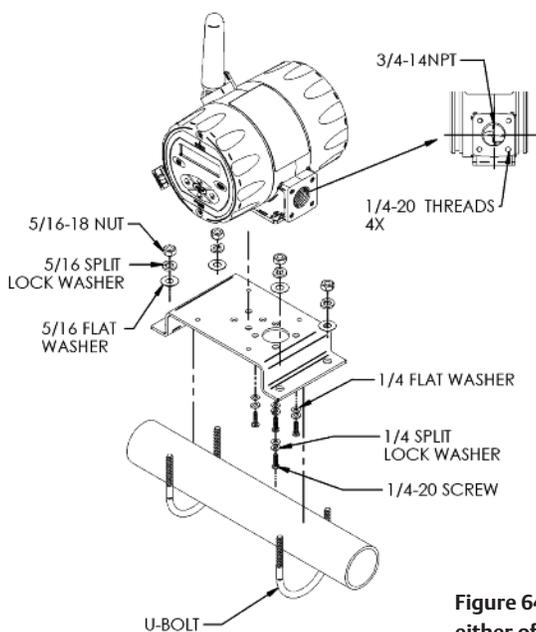


Figure 64. These two graphics are examples of pipe or wall mounting a 6081 instrument using either of the mounting bracket kits. On the left is an example of the instrument mounting onto a pipe. On the right, the instrument uses the kit to mount onto a wall. Other Rosemount Analytical instruments can be mounted similarly.

INSTRUMENT MOUNTING ACCESSORIES

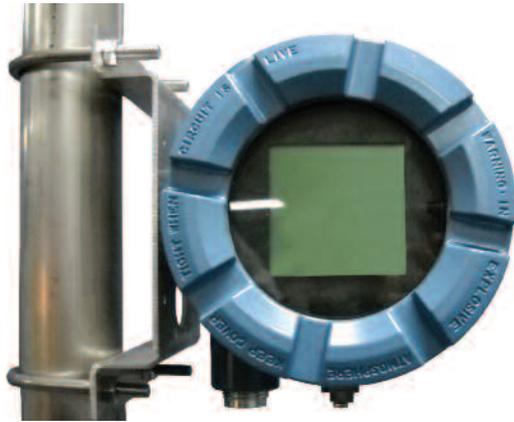


Figure 65. 5081 pipe mounted with the PN 23820-01 SST Kit.

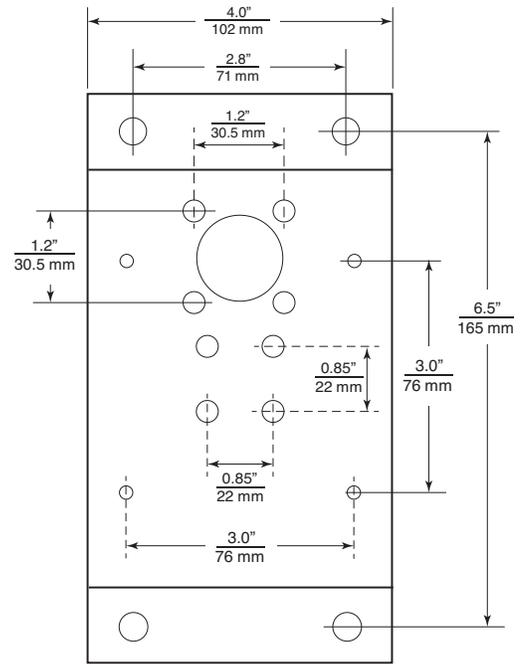


Figure 66. Dimensions of the mounting bracket found in kits PN 23820-00 and 23820-01

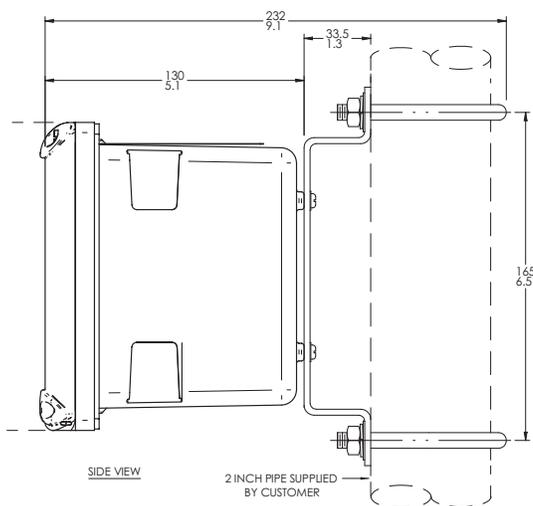


Figure 67. 1056 shown mounted on a pipe using either pipe mount kit, side view.

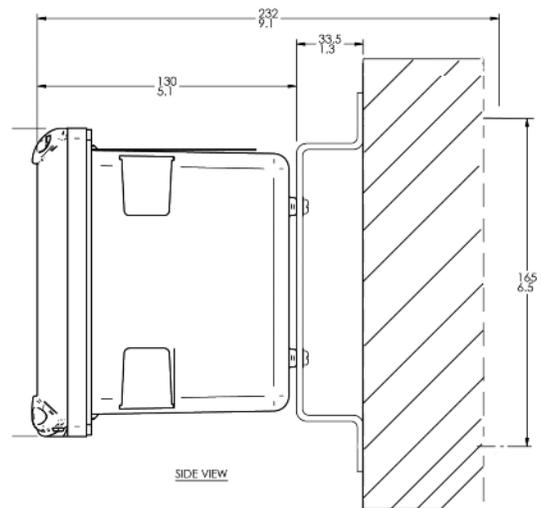


Figure 68. The 1056 is shown mounted on a wall/surface using either pipe mount kit, side view.

WIRING ACCESSORIES

This section features junction boxes and cables compatible with Rosemount Analytical sensors and instruments.

Cable Extensions through Junction Boxes

Use a junction box when the analyzer must be installed further from the sensor than the standard cable length allows. To replace the sensor, disconnect the cable at the junction box. The cable between the junction box and the analyzer never needs to be disturbed.

- > The distances between the sensor and instrument are recommendations only.
- > Long cable distances may degrade the signal; for best performance, install long cable runs in a noise-free environment.
- > For contacting conductivity sensors, long cable runs will result in some loss of linearity.
- > Consider an Emerson Wireless solution instead. Mount the analyzer within standard cable length of the sensor and send the signal wirelessly to the control room. Emerson offers wireless pH and conductivity instruments as well as the THUM, which converts any Rosemount Analytical HART instrument into a wireless device. All wireless instruments require

a Model 1420 Gateway to receive the signal.

Best Practice Tip

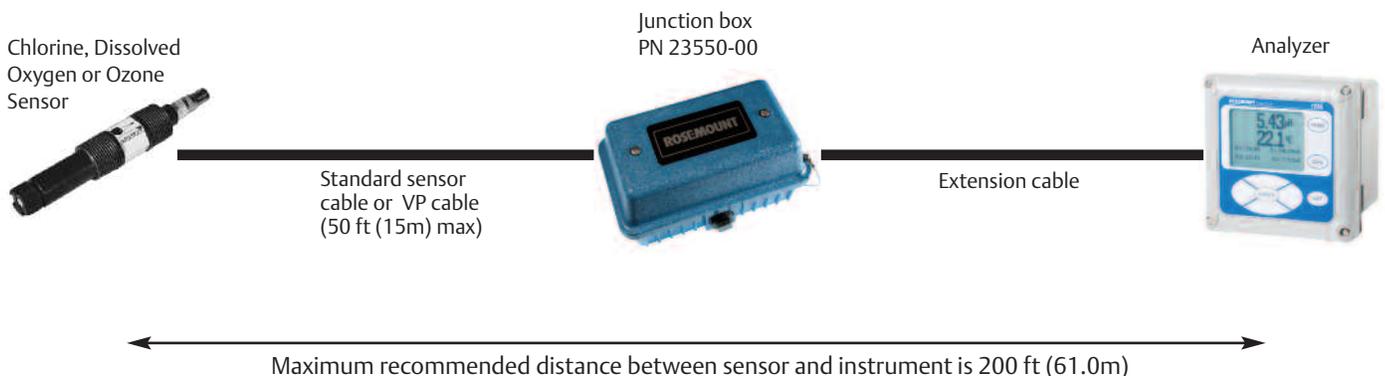
The best practice for extended distances are recommended below to assist with the easiest sensor replacement. Follow this guideline when installing sensors at a long distance from the instrument:

1. Install the junction box closest to the sensor.
2. Use an extension cable to run the signal from the junction box to the instrument. The use of factory prepared cable is strongly recommended. The cables designated as “prepped” are prepared with the cable jacket and all of the wires stripped and ready for a quick installation.
3. Distances between the sensor and instrument are cumulative and include the sensor cable plus the extension cable. For instance, if the maximum cable required is 200 ft (61.0 m) and the sensor cable is 15 ft (4.6 m), the extension cable maximum length is 185 ft (56.4m).

Chlorine, Dissolved Oxygen, and Ozone Sensors

Sensor to Analyzer Separation Distances

Measurement	Sensor	Sensor Cable Length		Junction Box	Extension Cable	
		Standard	Recommended maximum distance between sensor and instrument*		Prepped	Unprepped
Dissolved Oxygen	499ADO	25 ft (7.6m)	200 ft (61.0m)	23550-00	23747-00	9200275
Chlorine	498CL or 499ACL	25 ft (7.6m)	200 ft (61.0m)	23550-00	23747-00	9200275
Ozone	499AOZ	25 ft (7.6m)	200 ft (61.0m)	23550-00	23747-00	9200275

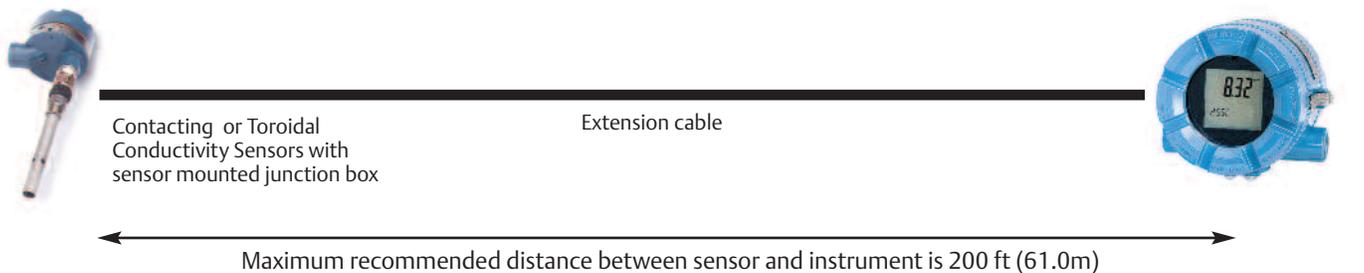
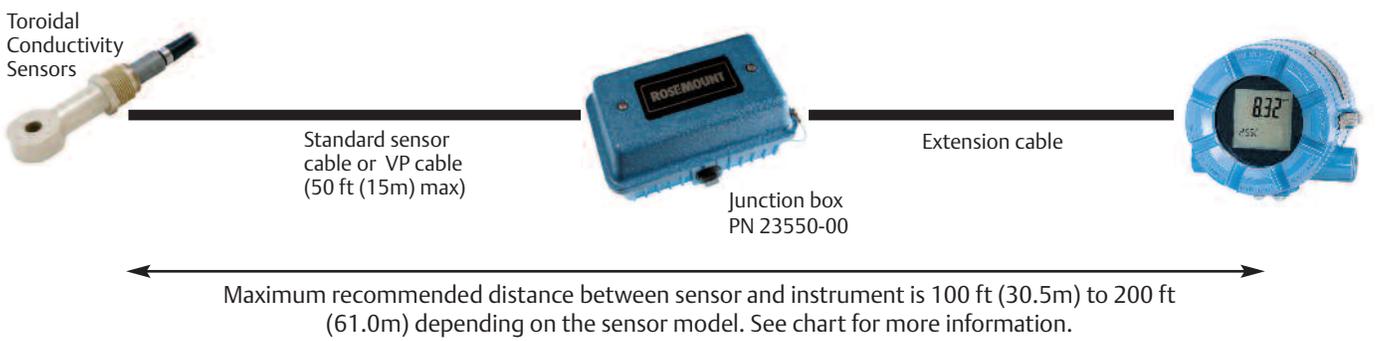
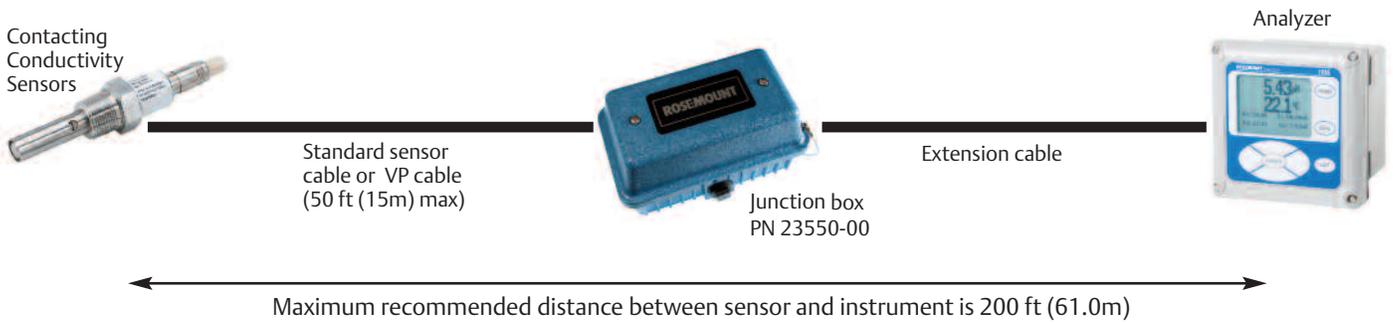


WIRING ACCESSORIES

Conductivity Sensors

Sensor to Analyzer Separation Distances

Measurement	Sensor	Sensor Cable Length			Junction Box	Extension Cable	
		Standard	Optional	Recommended maximum distance between sensor and instrument		Prepped	Unprepped
Contacting Conductivity	140, 141, 142	No Cable; use extension cable		200 ft (61.0m)	Included	23747-00	9200275
	150	10 ft (3.1m)		200 ft (61.0m)	23550-00	23747-00	9200275
	400, 401, 403, 404	10 ft (3.1m)	50 ft (15.2m)	200 ft (61.0m)	23550-00	23747-00	9200275
	402	10 ft (3.1m)		200 ft (61.0m)	Included	23747-00	9200275
Toroidal Conductivity	225, 226, 228	20 ft (6.1m)		200 ft (61.0m)	23550-00	23294-04	9200276
	222	20 ft (6.1m)		100 ft (30.5m)	23550-00	23294-04	9200276
	242, 245 (flow through)	Use extension cable		200 ft (61.0m)	Included	23909-00	

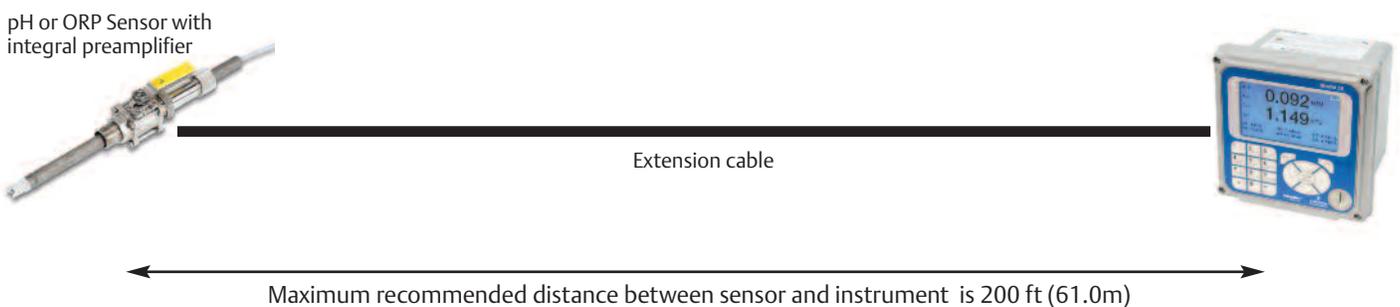
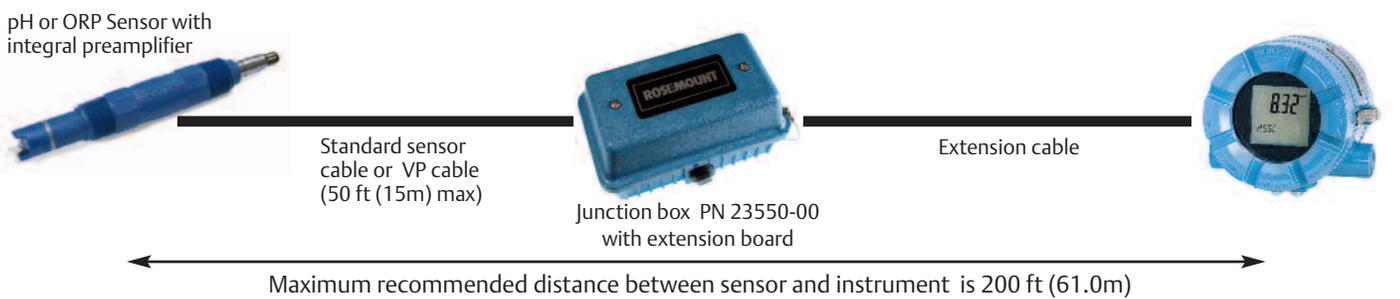
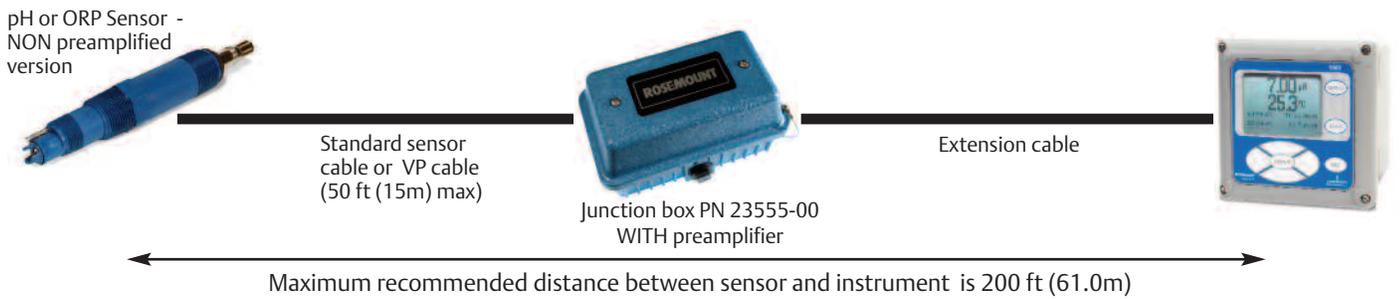


WIRING ACCESSORIES

pH and ORP Sensors

Sensor to Analyzer Separation Distances

Measurement	Sensor	Sensor Cable Length			Junction Box	Extension Cable	
		Standard	Optional	Recommended maximum distance between sensor and instrument		Prepped	Unprepped
pH Sensors	No preamp in the sensor	15 ft (4.6m)		200 ft (61.0m)	23555-00 (contains preamp)	23646-01	9200273
	Preamp in the sensor	25 ft (7.6m)		200 ft (61.0m)	23550-00	23646-01	9200273
	Preamplifier in Sensor Mounted Junction Box	No Cable; use extension cable		200 ft (61.0m)	-	23646-01	9200273



REMOTE JUNCTION BOXES

Use remote junction boxes to extend the sensor cable for longer runs. Two captive screws allow easy access to the board inside the box. There are two ports for cable; the bottom port is for the sensor cable and the side port is for the extension cable. These weatherproof junction boxes are also ideal for indoor mounting.

- > PN 23550-00 can be used to extend the cable of almost any Rosemount Analytical sensor. The terminal board allows point-to-point wiring between the sensor and extension cable.
- > PN 23555-00 has an integral preamplifier (PN 23557-00) and is used for pH and ORP sensors only. The preamplifier has FM, CSA and ATEX approval for use in hazardous locations. Any non-preamplified Rosemount Analytical pH or ORP sensor can be used with this junction box. The preamplified signal is compatible with Rosemount Analytical 56, 1056, 1057, 1066, 5081, and 6081 instruments.
- > Both junction boxes have identical dimensions.



Figure 69. Junction Box PN 23550-00.

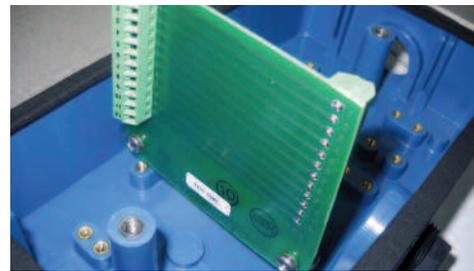


Figure 70. Junction Box PN 23550-00 is used for extending any Rosemount Analytical sensor's cable by connecting the sensor cable to an internal extension board. Extension cable sold separately.

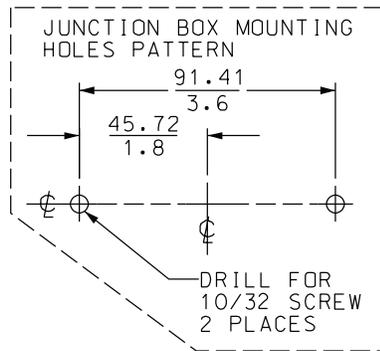


Figure 71. Junction Box PN 23555-00 is used for pH and ORP sensors only. A preamplifier board is mounted internally.

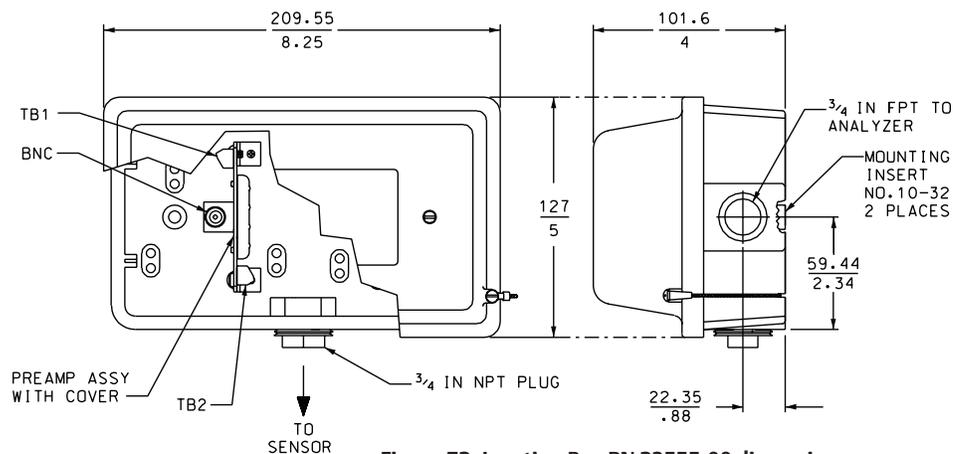


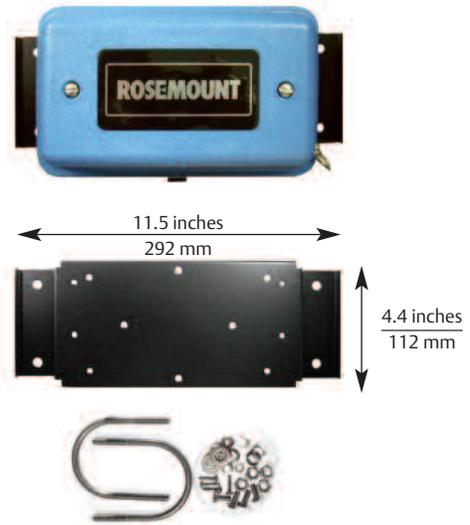
Figure 72. Junction Box PN 23555-00 dimensions. Junction Box PN 23550-00 has identical dimensions.

MOUNTING BRACKET FOR REMOTE JUNCTION BOXES

Remote mount junction boxes can be mounted on a wall or pipe using the Mounting Bracket PN 2002526.

Mounting Bracket Specifications

Mounting part	2002526
U-Bolt	SST
U-Bolt Dimensions	for 2" pipe maximum
Screws and washers	SST
Compatible Junction Boxes	23550-00 and 23555-00



SENSOR HEAD JUNCTION BOX

Sensor Head Junction box PN 23709-00 is for use with all Rosemount Analytical retractable style pH and ORP sensors. It is mounted on the back end of the sensor using a compression fitting. The junction box contains an integral preamplifier (PN 23557-00) and has terminals to connect an extension cable (sold separately) directly to an instrument.

- > Dimensions: 5"D x 5 $\frac{3}{8}$ " H x 4"W
- > Materials: Aluminum Alloy
- > Preamplifier: FM, CSA, ATEX
- > Compatible Sensors: 396R, 398R, 3400HT and RB547



Figure 72. Sesor Head Junction Box PN PN 23709-00.

VP CONNECTOR CABLES, EXTENSION CABLES, AND CABLE GLANDS

Rosemount Analytical offers various extension and connector cables for the best EMI protection in the industry. VP connector cables are used with sensors

having VP quick disconnect fittings. Extension cables are used with sensor mounted or remote junction boxes. Follow this simple guide to select the appropriate cable.

VP Connector Cables

pH and ORP Sensor Cables

The VP8 connector cable is compatible with the following sensors: 3300HTVP, 3400HTVP, 3500VP, 3900VP, 389VP, 396VP, 396PVP, 396RVP, 398VP, 398RVP, HX338, 3800VP.

Part Number	VP8 Cable for pH & ORP sensors	
	Feet	Meters
24281-02	2.5	0.8
24281-05	4	1.2
24281-06	10	3.0
24281-00	15	5
24281-07	20	6.1
24281-01	25	7.6
24281-08	30	9.1
24281-03	50	15.2
24281-04	100	30.5

The VP8 Cable PN 24281-XX is a 6 conductor cable with 1 coax and 3 shields.

Jacket Material: PVC

Jacket Maximum Diameter: 0.31 inches

Temperature Range: -40C to 105C; sunlight resistant



Figure 73. VP8 connector cables (bottom) can be used with all pH and ORP sensors with a VP designation. 3500VP (top) and 396PVP shown.

Conductivity, DO, OZ, and Chlorine Sensor Cables

VP6 cable PN 23747-XX is compatible with the following sensors: 400VP, 402 VP, 403VP, 499ACL-VP, 499ADO-VP, 400ATrDO-VP, and 499AOZ-VP. For 410VP (four-electrode contacting sensor) use PN 24287-00 or -01.

Part Number	VP6 Cable for conductivity, dissolved oxygen, ozone & chlorine sensors	
	Feet	Meters
23747-02	10	3.0
23747-03	50	15.2
23747-04	4	1.2
23747-05	2.25	0.7
23747-06	2.5	0.8
23747-07	15	4.6
23747-08	20	6.1
23747-09	25	7.6
23747-10	30	9.1
23747-11	100	30.5
24287-00	10	3.0
24287-01	20	15.2

The VP6 Cable PN 23747-XX is a 3 conductor cable with 2 coax and 3 shields.

Jacket Material: PVC

Jacket Maximum Diameter: 0.31 inches

Temperature Range: -40C to 105C; sunlight resistant

The VP6 cable PN 24287-XX is a cable with 2 twisted pairs and 1 triad.

Jacket Material: PVC

Jacket Maximum Diameter: 0.31 inches

Temperature Range: 0C to 105C; sunlight resistant



Figure 74. VP6 connector cables can be used with conductivity and amperometric sensors with a VP designation. 499ADO-VP and 400VP (bottom) shown.

EXTENSION CABLES

Rosemount Analytical offers two types of cables; prepped and unprepped. The unprepped cables are raw cables; user must cut the cable jacket and strip all of the wires before use. The cables designated as prepped are

prepared with the cable jacket and all of the wires stripped and ready for quick installation. The use of factory-prepped cables is strongly recommended. All extension cables can be ordered at user specified length.

pH and ORP Sensor Extension Cables

Cable Part No.	Cable Description	3300HT/HTVP	3400HT/HTVP	3500/VP	3900/VP	385+	389/VP	396/VP / 398/VP	396P/VP	396R/VP 398R/VP	398R/VP
9200273	Gray Ext Cable, 11-cond, shielded, unprepped	X	X	X	X	X	X	X	X	X	X
23646-01	Extension Cable, 11-cond, shielded, prepped (raw cable PN 9200273)	X	X	X		X	X	X	X	X	X

Conductivity and Amperometric Sensor Extension Cables

Cable Part Number	Extension Cable Description	Conductivity							Amperometric*	
		140, 141, 142	150	222	225, 226, 228	242	245	400 & 400VP, 401, 402 & 402VP, 403 & 403VP, 404	410VP	499ACI, 499ADO, 499AOZ, 499ATRDO
9200275	Shielded 9-cond, unprepped	X	X					X		
9200276	Unprepped				X	X	X			
9200334	For 410VP sensor								X	
23294-00	Unshielded, Prepped			X	X					
23294-04	Shielded for improved EMI/RFI protection. Prepped			X	X					
23294-05	Shielded with additional shield wire for -03 option. Prepped			X	X					
23747-00	Prepped	X	X					X		X
23909-00	Prepped				X	X	X			
24289-00	For 410VP sensor								X	

9200275 is the raw cable for prepped cable 23747-00

9200276 is the raw cable for prepped cables 23909-00, 23294-00, 23294-04, 23294-05

* Amperometric sensors measure dissolved oxygen, ozone, and/or chlorine

Cable Glands

Use cable glands to seal the cable where it enters the analyzer or junction box. Cable glands also prevent the weight of the cable from pulling on and dislodging wiring connections in the analyzer. Cable gland kit PN 23554-00 provides 5 cable glands that fit all Rosemount Analytical instruments and junction boxes.



Figure 75. Cable gland found in kit PN 23554-00

CALIBRATION ACCESSORIES

Portable Conductivity Validation Unit

The conductivity validation unit (CVU) consists of a factory-calibrated Model 1056 conductivity analyzer and Model 404 flow-through conductivity sensor housed in a rugged carrying case. The CVU is ideal for applications where calibrating a conductivity sensor against a standard solution is impractical. This includes sensors that cannot easily be removed from the process piping and sensors having 0.01/cm cell constants for which stable low conductivity calibration standards are not available. The CVU is widely used for calibrating conductivity sensors in water for injection applications.

Using the CVU is easy. Connect the Model 404 sensor in series with the process sensor using the tubing provided with the CVU. Allow the sample to flow past both sensors. Once readings are stable, adjust the process analyzer reading to match the CVU reading.

The calibration system is completely enclosed. The solution never contacts atmospheric carbon dioxide, which can contaminate low conductivity standards, leading to erroneous calibration. Thus, the CVU is ideal for calibrating 0.01/cm cell constant sensors.

The CVU is available in two versions:

- > CVU-01: One 404-11-17 Stainless Steel Sensor with a 0.01 cell constant pre-wired to the 1056-01-20-38-AN analyzer.
- > CVU-02: Two sensors, one 404-11-17 Stainless Steel Sensor with a 0.01 cell constant and one 404-12-17 Stainless Steel Sensor with a 0.1 cell constant pre-wired to the model 1056-01-20-30-AN analyzer.

See Product Data Sheet PDS 71-CONDVALII for more information.



Figure 76. The 1056 conductivity instrument and 404 conductivity sensor are hard mounted into a protective case. Each unit includes all cabling and tubing needed for connection to a water system.

CALIBRATION STANDARDS

pH Buffer Solutions

Emerson offers pH 4.01, pH 6.86, and pH 9.18 NIST buffer solutions that meet most pH calibration requirements. Accuracy is ± 0.02 pH at 25°C (77°F). A chart listing the pH of the buffer at other temperatures is provided on the label.

Other buffer solutions, pH 4.00, pH 7.00, and pH 10.00, are available. These solutions are color-coded for easy recognition. They are available as single bottles or in packages of six.

All Rosemount Analytical pH instruments have an auto-

matic buffer calibration feature that recognizes the pH of the buffer and uses the temperature-adjusted pH value during calibration.

A 475 mV ORP (redox) standard solution is also available.



Part Number	Description	Size	Color Code
9210012	Rosemount Analytical pH 4.01 buffer solution	16 oz (473 ml)	Pink
9210013	Rosemount Analytical pH 6.86 buffer solution	16 oz (473 ml)	Clear
9210014	Rosemount Analytical pH 9.18 buffer solution	16 oz (473 ml)	Clear
905-3506	pH 4 buffer solution	16 oz (473 ml)	Red
905-582517	6 pack of pH 4 buffer solution (PN 905-3506)	Box of 6 16 oz (473 ml) bottles	Red
905-3501	pH 7 buffer solution	16 oz (473 ml)	Green
905-582521	6 pack of pH 7 buffer solution (PN 905-3501)	Box of 6 16 oz (473 ml) bottles	Green
905-3505	pH 10 buffer solution	16 oz (473 ml)	Blue
905-582525	6 pack of pH 10 buffer solution (PN 905-3505)	Box of 6 16 oz (473 ml) bottles	Blue
R508-8oz	ORP Standard, 475mV, 8oz	8 oz (237 ml)	NA

Conductivity Standards

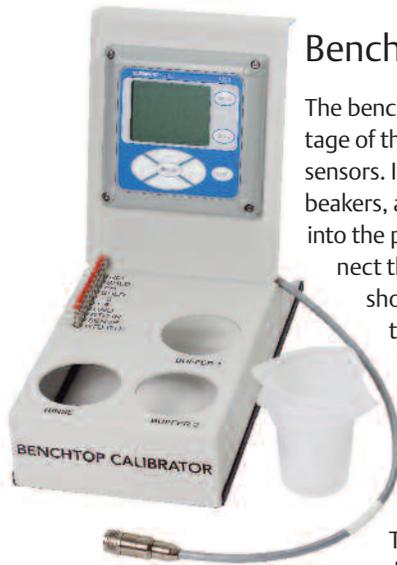
Emerson offers a variety of conductivity standards in both 16 oz (473 mL) and 1 gal (3.8 L) sizes. To determine the best standard to use, consult the analyzer product data sheet and choose a standard whose conductivity is in the recommended range for the cell constant.



Part Number	Standard Solution Value	Size	Color Code
05010781899 (SS-6)	200 $\mu\text{S}/\text{cm}$	16 oz (473 ml)	Red
05000705464 (SS-1)	1409 $\mu\text{S}/\text{cm}$	16 oz (473 ml)	Blue
05010782468 (SS-5)	1000 $\mu\text{S}/\text{cm}$	16 oz (473 ml)	Yellow
05010782147 (SS-7)	5000 $\mu\text{S}/\text{cm}$	16 oz (473 ml)	Violet
05010797875 (SS-6A)	200 $\mu\text{S}/\text{cm}$	1 gallon (3.8 L)	Red
05000709672 (SS-1A)	1409 $\mu\text{S}/\text{cm}$	1 gallon (3.8 L)	Blue
05010783002 (SS-5A)	1000 $\mu\text{S}/\text{cm}$	1 gallon (3.8 L)	Yellow
05010782026 (SS-7A)	5000 $\mu\text{S}/\text{cm}$	1 gallon (3.8 L)	Violet

CALIBRATION ACCESSORIES

Bench Top Calibrator



The bench top calibrator lets you take full advantage of the power of Emerson's SMART pH sensors. Instead of carrying buffer solutions, beakers, a waste container, and a wash bottle into the plant to calibrate the sensor, just disconnect the SMART sensor and bring it to the shop or laboratory. Connect the sensor to the bench top calibrator and complete the calibration. The results are automatically stored in the sensor. When the sensor is reconnected to the field analyzer, it transfers the stored calibration data to the field instrument.

The calibrator has a pre-wired VP cable and pre-wired spring-loaded push connec-

tors, so it can be used with both VP and integral cable sensors. Although the calibrator is most convenient for use with SMART sensors, it can also be used with non-SMART pH sensors. In the latter instance, the user notes the calibration data and enters it manually in the field instrument.

The bench top calibrator (PN S10119) consists of a dual channel Model 1056 pH analyzer—one channel connected to the VP cable, the other to the push connectors—mounted on a stand with openings in front to accommodate three 250 mL beakers for buffers and rinse water. Beakers are not provided.

pH sensors and buffers solutions are sold separately. See product data sheet PDS 71-BTC for more information.

Handheld pH Simulator

The handheld pH simulator PN S10104 (SQ7428) supplies switch-selectable pH 4, 7, and 10 inputs to an analyzer. Two other switches allow the user to simulate a cracked glass membrane and a coated reference junction. The simulator is compatible with any Rosemount Analytical pH instrument. The unit is battery operated.

Consult the factory for more information.



pH and Conductivity Simulator Module with VP plug

Simulator modules, when connected to a VP cable, simulate either a pH or contacting conductivity sensor. They are used for checking the proper working of the cable and analyzer.

PN SQ8705 simulates pH 7.00, 25°C, 100 MΩ glass impedance, and 5 kΩ reference impedance. Use it with any VP pH cable having part number 24281-XX.

PN 23979-00 contains two modules for checking VP conductivity cables and conductivity analyzers. One module puts a 20 kΩ resistor across the electrode

terminals; the other puts a 100 kΩ resistor across the terminals. The expected conductivity or resistivity depends on the cell constant stored in the analyzer. Both modules simulate 25°C. Use the module with any VP conductivity cable having part number 23747-XX

Consult the factory for more information.



FLOW ACCESSORIES

Rosemount Analytical offers a variety of rotameters with integral valves to help measure and control flow in sidestream samples. A constant head flow controller is also available.



Rotameters – Sensor Recommendations

Sensor Model	Flow Rate*	Recommended Valve Rotameter
All pH Sensor Models	2-5 g/hr (7.6 - 19 L/hr)	PN 9390004 or PN 196-898754
499A CL	8-15 g/hr (30-57 L/hr)	PN 196-898754
499A DO	2-5 g/hr (7.6-19 L/hr)	PN 9390004
499A OZ	2-5 g/hr (7.6-19 L/hr)	PN 9390004

* When used with low flow cells (see page 9)

Rotameter Specifications

	PN 9390004	PN 196-898754
Range of Flow Required	0.4 - 5.0 g/hr (1.5 - 19.0 L/hr)	2.0 - 20.0 g/hr (7.6 - 76.0 L/hr)
Wetted Parts	Acrylic, 316 SST, Viton	polycarbonate, 316 SST, brass, Buna N
Process Connection	1/4 inch FNPT (316 SST)	1/8 inch FNPT (brass)
Maximum Pressure	100 psig (790 kPa)	100 psig (790 kPa)
Maximum Temperature	130°F (54°C)	130°F (54°C)

CONSTANT HEAD FLOW CONTROLLER

The constant head flow controller SQP-10077-LQD (SQ10957) uses gravity to control flow in sidestream samples, eliminating the need for pressure regulators, valves, and rotameters. The overflow sampler consists of two concentric tubes with the annular space closed at the bottom. The sample enters through a fitting at the bottom of the outside tube and fills the space between the tubes, eventually overflowing the inside tube and running to drain. A second fitting on the outside tube connects to a low flow cell, which holds the sensor. The outlet from the low flow cell joins the drain from the overflow sampler. The flow of sample to the sensor is controlled by the difference between the height of the overflow tube and the outlet from the low flow cell as well as by an orifice in the flow cell inlet. The flow controller provides a steady flow of 2 gph (126 mL/min)

as long as the inlet flow is enough to cause the sample to overflow the center tube of the flow controller.

The flow controller is part of the FCL, FCLi, and MCL systems for measuring free chlorine and monochloramine. The system shown can also be used with pH and ORP sensors. It is not recommended for ENDURANCE conductivity sensors because the orientation of the flow cell does not allow the sensor to be completely submerged in the sample. The flow controller may not be suitable for ozone or oxygen sensors. Consult the factory for these applications.

The flow controller is mounted on a plastic back plate for ease of installation.

Flow Controller Specifications

Inlet flow	3 – 80 gph (0.2 – 30 L/hr)
Inlet pressure	3 – 65 psig (122 – 549 kPa abs)*
Temperature	32 - 122°F (0 - 50°C)

*The minimum inlet pressure is required to open a check valve, which prevents the flow cell from draining if sample flow is lost. Removing the check valve lowers the inlet pressure requirement to a few feet of water head.

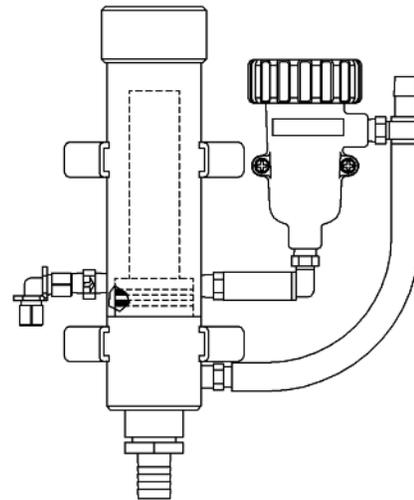
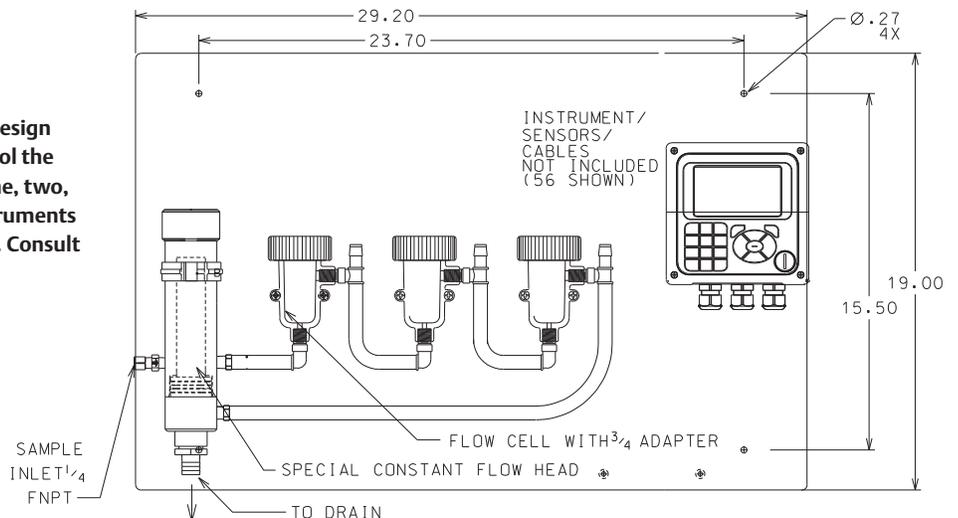


Figure 77. Example of Overflow Sampler with Low flow cell PN 24091-00 (see page 9).

Figure 78. Example of a panel using a specially design constant head flow controller designed to control the flow to three flow cells. Panels with choice of one, two, or three flow cells and choice of one or two instruments (shown with the 56 are offered under SQ 11102. Consult factory for more information



TAGS FOR SENSORS AND INSTRUMENTS

It is common for most facilities to tag their sensors and instruments. It is especially critical in large facilities so that all instruments and sensors are correctly located. Rosemount Analytical makes it simple to tag all of your

new equipment before it gets installed into your facility. Tags are also useful for large projects and OEM users. Up to three lines of information can be added with 13 characters per line including spaces.



Figure 79. PN 2001492 SST Tag
Used for sensors, commonly installed on sensor with wire
Dimensions: 3.125"W x 1.31"H



Figure 80. PN 9240048-00 SST Tag
Used for most instruments
Dimensions: 3.125"W x 1.31"H



Figure 81. PN 9241178-00 SST Tag
Used for 5081 and 6081 instruments only
Dimensions: 2.56"W x 1.28"H

SAMPLE COOLERS

Rosemount Analytical offers a pre-packaged sample cooler suitable for cooling high temperature and pressure liquid samples, such as boiler and boiler feedwater. The cooler is not recommended for steam. The cooler consists of a sediment trap to remove suspended solids, a coil-in-shell heat exchanger, a needle valve for control-

ling flow and pressure, a pressure relief valve set to 75 psig (618 kPa abs), and a bimetal thermometer for local display of temperature. The entire system is mounted on a strut channel frame. The system is available in two versions: the sample cooler alone (Model BSA), or the sample cooler with a Model 141-06 conductivity sensor (Model 99-14).



Figure 82. Sample Cooler example

Uncooled sample

Temperature: 600 F (315C) max
Pressure: 1500 psig (10,440 Kpa abs)

Cooled sample

Operating Temperature Range: 32 F to 203 F (0C to 95C)
Preferred: 70F to 90 F (21 C to 32 C)

Cooling Water

Temperature: 122F (50C) maximum
Pressure: 200 psig (1480 Kpa abs) maximum

Contact factory for more information.

SPECIAL PARTS AND ASSEMBLIES

Need a small modification to a standard product? Want a small sampling system but don't have the facilities or personnel to design and build it yourself? Whether your requirement is as simple as increasing the insertion length of a retractable sensor or building a special sample panel, our Special Request Department can help.

Figure 82 shows an example of a sample cooling system built to customer specifications. It includes a sample cooler, throttle valve, bimetal thermometer, stainless steel flow cell, and pressure relief valve. The entire sample system is mounted on a stainless steel back plate along with a Model 5081 transmitter.

Figure 83 shows a stainless steel enclosure with air purge. A 5081 transmitter and flow cell is visible inside the enclosure.

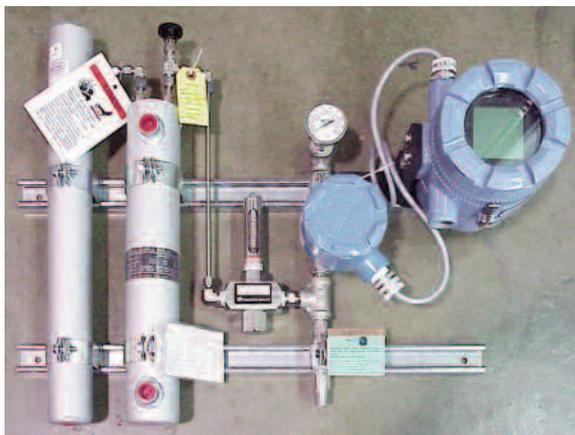


Figure 82. Customer specified system including a sample cooling system with a 5081 instrument and a conductivity sensor was created as PN SQ 8413B.

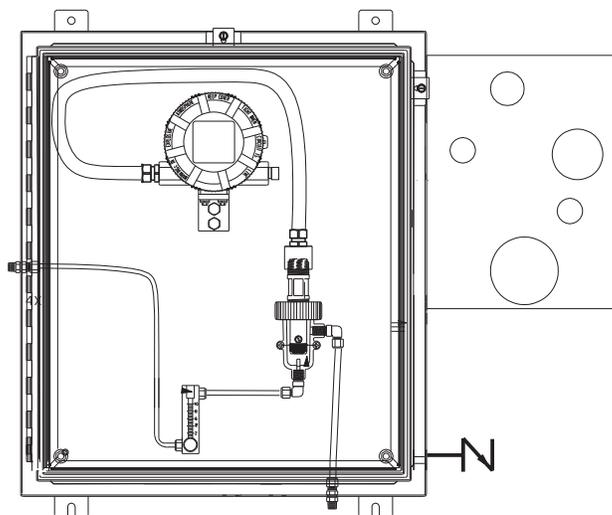
Figure 84 is an example of a customer specified special system with an air purge system located on the outside of the Hoffman enclosure. The 5081 instrument, 499DO sensor, and rotameter are mounted in the enclosure and was build under the special request part number SQ10645E1 / SQP 10081-LQD. Similar systems can be specified to mount multiple sensors and instruments, such as that found in Figure 85.

Examples of other special requests include sensor material substitutions, modifications of a mounting parts, and cable length adjustments. Some of special requests are found throughout this catalog and are designated with a part number starting with SQP or SQ. Other types of special requests can be accommodated upon request. Consult the factory for more information about your special needs.



Figure 83. 5081 and sensor mounted inside customer specified Hoffman enclosure.

Figure 84. Stainless steel Hoffman enclosure with 5081 instrument mounted internally. The process inlet is controlled with a flow meter with regulator valve. The liquid flows into a plastic low flow cell and pass the 499ADO dissolved oxygen sensor. Systems can be special ordered to have instruments and sensors mounted in a similar manner. Special order part number for system shown is SQ10645E1 / SQP 10081-LQD. Contact factory for details.



SPECIAL PARTS AND ASSEMBLIES

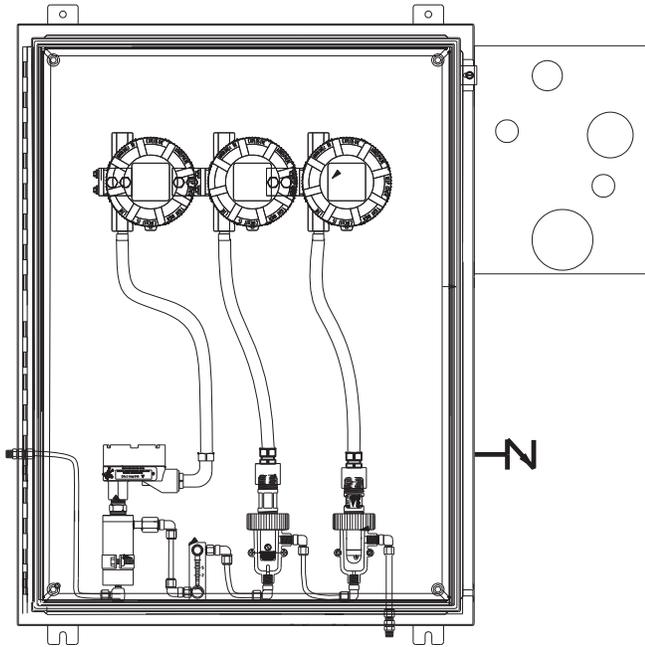


Figure 85. Stainless steel Hoffman enclosure with 3 5081 instruments mounted internally. A corrosion protection air purge system is mounted on the outside of the enclosure. A flow meter with regulator valve controls the flow to the 400VP conductivity, 499ADO dissolved oxygen, and 389 pH sensors. All three sensors are mounted in low flow cells. Customized systems for wall or panel mount can be special ordered similarly, having instruments and sensors mounted and ready to connect to 1/4 inch tubing. This system was designed per customer specifications – special order part number is SQ10645F1 / SQP 10082-LDQ. Contact factory for details.

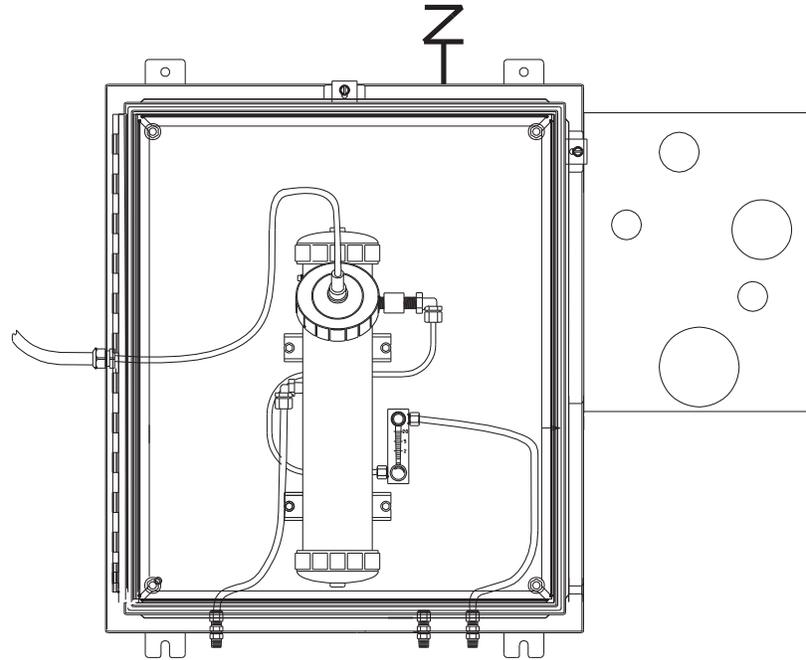


Figure 86. Clarity II turbidity sampling system with Z purge heated enclosure for hazardous areas. One of many examples that is offered through our special request system. This system was designed per customer specifications – special order part number is SQ 10341 / SQP 10030-LQD. Contact factory for details.



Figure 87. Multiple 1056 instruments with HART communication, shown mounted on a panel for simple Plug-N-Plumb installation. Four sensors (conductivity, pH, dissolved oxygen, and turbidity) are mounted with a flow regulator. The system shown was designed on a stand-alone panel for table-top mounting but can be purchased as a panel mount version.

CERTIFICATES FOR SENSORS, INSTRUMENTS, AND CHEMICALS

CERTIFICATES and CALIBRATIONS: All certificates state our compliance with our quality system which is in accordance with ISO-9001, ANSI/NCSL Z540-1-1994, and traceability to NIST.

LEVEL 1: Analyzer or Sensor Certificate of Calibration (NO actual test data provided): Code 99CC. Calibration certificate at standard factory ranges only. Identifies the Model, Serial and/or Tag numbers. Does not include actual test data. Can be provided after the fact. Certificates states compliance to our quality system, as noted above.

LEVEL 2: Electronic Calibration Test Data Report, Code 99EC or Electronic Calibration Tag, Code 99ET: Calibration certificate for specific, customer specified ranges. Identifies the Model, Serial and/or Tag numbers, applicable test standards, and NIST report numbers. This certificate includes the actual test data recorded during the electronic calibration. It also states that instrumentation on the specified order is compliant with our quality system.

LEVEL 3: Loop Calibration (with Test Data Report) Code 99LC with one or two sensors. A custom calibration with validation point within Cell Constant range is also available. A loop calibration is where the analyzer is calibrated with its mating sensor(s). The loop is calibrated against our NIST traceable certified reference instruments, at our standard or customer specified range. The calibration certificate identifies the Model, Serial and/or Tag numbers, test standards, and NIST report numbers. In addition, this certificate includes the actual test data recorded during the calibration, therefore this certificate can not be provided after shipment has been made. It also states that equipment on the specified order is compliant with our quality system.

OTHER CERTIFICATES

1. Hazardous Area Certificates: (FM, CSA, Baseefa)
Specify requirements with placement of order.
2. NAFTA Certificates of Origin with or without Chamber of Commerce stamp.
3. Material Certificate: for various Sensors and calibration chemicals.

						Rosemount Analytical Inc. 2400 Barranca Parkway Irvine, CA 92606-5018 USA Tel 1(800) 854-8257 Fax 1(949) 863-0171 www.emerson.com					
Certificate of Calibration											
TO:						DATE:					
RCM or SO #						PO #					
Line Item	Model Number/ Customer Part Number	Range	K=	Serial Number	Tag Number						
6	5081-C-HT-20-89-99CC	0-20mS	1.0	A10-12282470-017	48-A1-402						
8	3200HF-01-99CC	Refer. Manual	N/A	A10-1218201-008	48-A1-401						
7	5081-P-HT-21-89-99CC	0-14pH±1400mV	N/A	A10-1228018-001	N/A						
8	490-11-60-99CC	0-50µS	0.01cm	J09-498212	N/A						
SAMPLE OF 99CC											
This certifies that the furnished materials have been manufactured and tested in accordance with all applicable product specifications under compliance of our Quality System. Rosemount Analytical is certified to ISO 9001:2008 by Det Norske Veritas Certification # 09242-2006-AQ-HOU-ANAB and complies with Standard CSA Z299.3. Our calibration system is maintained in accordance with all requirements of ANSI/NCSL Z540-1-1994, American National Standard for Calibration System Requirements, and is traceable to the National Institute of Standards and Technology (NIST).											
All products, including packaging, are free of Mercury and are certified to contain no hazardous materials or wood products. Records of inspection, testing and other required supporting documentation are on file and available for your examination upon request.											
K. TIEU- QA Company Representative						QA INSPECTOR					
Level 1 Code 99CC						42-6050 Rev. Date: Aug. 3, 2009					

						Rosemount Analytical Inc. 2400 Barranca Parkway Irvine, CA 92606-5018 Tel 1(800) 854-8257 Fax 1(949) 863-0171 Fax 1 (949) 787-8620 (QA Office) www.emerson.com						
Certificate of Loop Calibration												
TO:						DATE:						
SO# or RMA#						P.O.#						
This certifies that the furnished materials have been manufactured and tested in accordance with all applicable product specifications under compliance of our Quality System. Rosemount Analytical is certified to ISO 9001:2008 by Det Norske Veritas Certification # 09242-2006-AQ-HOU-ANAB and complies with Standard CSA Z299.3. Our calibration system is maintained in accordance with all requirements of ANSI/NCSL Z540-1-1994, American National Standard for Calibration System Requirements, and is traceable to the National Institute of Standards and Technology (NIST).												
All products, including packaging, are free of Mercury and are certified to contain no hazardous materials or wood products. Records of inspection, testing and other required supporting documentation are on file and available for your examination upon request.												
Units Under Test (UUT)			Calibrated Range: 0-100mS			Verified Range: N/A						
Line Item	Instrument/Sensor Model Number	Customer Part Number	Serial Number	Tag Number	Cell Constant							
1	1055-02-21-00-99LC	N/A	J09-694019	N/A	N/A							
2	225-07-56-99CB-99LC-99CB	N/A	J09-694079	N/A	3.3000							
Standards (STD):												
Standards	Asset No. / NIST Report No.	Lot Number	Calibration Date	Calibration Due/Expiration Date								
KCL (459501)	N/A	GS0422	N/A	N/A								
HC-20	2602	N/A	08-07-09	02-07-10								
THERMOMETER	180804820-2	N/A	05-27-09	05-27-10								
H50Y3B	1047	N/A	05-09-09	01-09-10								
Test Results:												
After Calibration	STD Value	UUT Reading	Tolerance	Deviation	MCU of Tol.	STD Freq. Reading	UUT Tolerance	UUT Temp Reading	UUT Temp			
	111.624mS	111.700mS	±1%	.07 %	IN	21.5 °C	± 1°C	21.3 °C	°C			
			±1%	%		°C	± 1°C	°C	°C			
pH Sensor Only: SLOPE = mV/pH @ 25 °C OFFSET = mV												
Note: UUT and RTD must be within tolerance specified of the Standard Value												
J. Flores - Company Representative						Sr. Test Technician						
Level 3 Code 99LC						42-6048 Rev. Date: Aug. 3, 2009						

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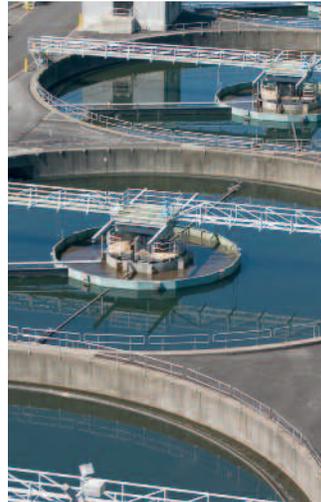
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Emerson Process Management
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Houston TX 77040 USA
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T 866.422.3683
F 1.713.466.8175
gc.csc@emerson.com



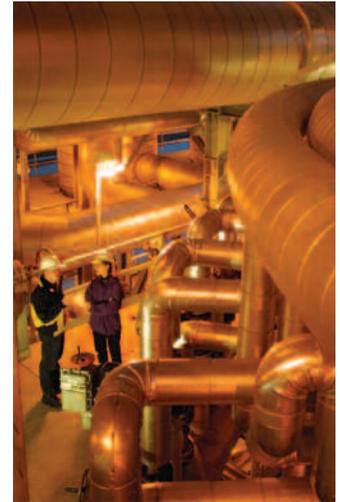
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Emerson Process Management
Rosemount Analytical
6565 P Davis Industrial Parkway
Solon, OH 44139 USA
T 1.440.914.1261
T 800.433.6076
F 1.440.914.1262
gas.csc@emerson.com



ANALYTICAL HEADQUARTERS

Emerson Process Management
Rosemount Analytical
2400 Barranca Parkway
Irvine, CA 92606 USA
T 1.949.757.8500
T 800.854.8257
F 1.949.474.7250
liquid.csc@emerson.com



FLAME AND GAS DETECTION

Emerson Process Management
Net Safety Monitoring
2721 Hopewell Place N.E.
Calgary, AB T1Y 7J7 Canada
T 1.403.219.0688
T 866.347.3427
F 1.403.219.0694
safety.csc@emerson.com

LATIN AMERICA

Emerson Process Management
Rosemount Analytical
10241 West Little York, Suite #200
Houston, TX 77040 USA
T 713.467.6000
F 713.827.3328

EUROPE

Emerson Process Management AG
Blegistrasse 21
CH-6341 Baar-Walterswil
Switzerland
T 41.41.768.6111
T 41.41.761.8740

MIDDLE EAST AND AFRICA

Emerson Process Management
EPM Building
P. O. Box 17033
Jebel Ali Free Zone
Dubai, United Arab Emirates
T 971.4.8835235
F 971.4.8835312

ASIA- PACIFIC

Emerson Process Management
Asia Pacific Private Ltd.
1 Pandan Crescent
Singapore 0512
Republic of Singapore
Phone: +65.777.8211
Fax: +65.777.0947

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