

Rosemount™ 396/396VP/396P/396PVP/396R/ 396RVP

TUpH pH/ORP Sensors



TUpH sensors for your tough pH/ORP applications

Rosemount TUpH pH/ORP sensors are robust sensors designed to meet a number of difficult application requirements. Sensors feature a variety of options suited to meet a number of installation requirements and are ideal for use in dirty, abrasive, coating, and high solid applications.

Overview



Robust sensor design

- TUpH reference technology minimizes sensor maintenance and ensures a steady pH/ORP signal even when sensor is coated.
- Maximize sensor life with poisoning resistant helical reference pathway design.
- Optional flat pH glass electrode for abrasive and coating applications.
- Maximum process pressure 150 psig.
- Maximum process temperature 212 °F (100 °C).



Versatile mounting options to meet your installation requirements

- Rosemount™ 396P/396PVP sensors feature 1-in. MNPT front and rear facing process threads.
- Rosemount 396R/396RVP offered in 21 in. (533,4 mm) and 36 in. (914,4 mm) lengths suitable for use with retraction assemblies. Easily remove sensors for maintenance and calibration without having to shut down your process.
- Variopol (VP8) cable connection option, for quick cable-to-sensor release, eliminates cable twisting.



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Ordering information



Rosemount 396 and 396VP sensors feature a stainless steel body for use with optional 1-in. (25.4 mm) threaded process connectors suitable for insertion, submersion, or flow-through installation. Sensors are available with either a standard pH hemi glass bulb or optional pH flat glass bulb. Rosemount 396 sensors feature a standard 15-ft. (4.6 m) cable, and Rosemount 396VP sensors feature a Variopol cable connection for use with VP8 quick disconnect interconnecting cables (sold separately; see [Accessories](#)).

Table 1: Rosemount 396 Ordering Information

Option	Description
396	pH sensor: TUpH [®] insertion/submersion/flow-through
Cable termination	
54	For use with models 56, 1056, 1066, and 1057. Series: 5081
Option 1	
–	No selection, standard 15-ft. (4.6 m) cable
62	Cable without BNC for direct wiring to models: 56, 1056, 1057, 1066, and 5081
07	Without preamplifier, 4-ft. (1.2 m) cable
08	Without preamplifier, 10-ft. (3 m) cable
Option 2	
–	No selection
71	GPHT flat bulb
Calibration and conformance certificates - optional level	
CC	Certificate of Calibration (no test given)
LC	Loop Calibration certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

Note

The sensor includes a general purpose glass pH electrode and a large area polypropylene reference junction with a gel filled reference electrolyte. The Rosemount 396 TUpH is available without an integral preamplifier only. Automatic temperature compensation is standard (Pt 100 RTD).

Table 2: Rosemount 396VP Ordering Information

Option	Description
396VP	pH sensor: TUpH Variopol connector
Temperature compensation	
54	Pt100, for use with Models 56, 1056, 1066, 1057, and 5081
55	For Models 1056, 1057, 1066, 56, and 5081 (-70 option only)

Table 2: Rosemount 396VP Ordering Information (*continued*)

Option	Description
Options	
–	No selection
71	Flat general purpose low resistivity glass
Preamplifier option	
–	No preamplifier
70	Preamplifier (for -55 only)
Special	
–	No selection
99	Special (consult factory)
Calibration and conformance certificates	
CC	Certificate of Calibration (no test given)
LC	Loop Calibration certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

Note

VP8 cable assembly works with both VP6 and VP8 connector.



Rosemount 396P and 396PVP pH/ORP sensors feature a model reinforced polypropylene body with forward and rear facing 1-in. MPT threads suitable for insertion, submersion, and flow-through installations. The Rosemount 396P sensor has an integral cable connection, and the Rosemount 396PVP sensor has a Variopol cable connection for use with VP8 interconnecting cables (sold separately; see [Accessories](#)).

Table 3: Rosemount 396P Ordering Information

Option	Description
396P	pH sensor: TUpH insertion/submersion/flow-through
Preamp/cable selection	
01	Preamplifier, 25-ft. (7.6 m) cable. (Preamplifier is SMART for pH electrodes used with -55 option only).
02	Without integral preamplifier, 15-ft. (4.6 m) cable
03	SMART preamplifier, 33-ft. (10 m) cable (standard preamp if used with ORP)
04	SMART preamplifier, 50-ft. (15.2 m) cable (standard preamp if used with ORP)
05	SMART preamplifier, 66-ft. (20 m) cable (standard preamp if used with ORP)
06	SMART preamplifier: 100-ft. (30.5 m) cable (standard preamp if used with ORP)

Table 3: Rosemount 396P Ordering Information (continued)

Option	Description
07	No preamplifier, 4-ft. (1.2 m) cable
08	No preamplifier, 10-ft. (3 m) cable
Measuring electrode	
10	pH GPLR glass, general purpose low resistivity
12	ORP
13	GPLR flat bulb, general purpose low resistivity
Analyzer/thermocouple compatibility	
54	For use with models: 1054 and 2054 and series 2081 (Pt-100)
55	For use with models: 56, 1056, 1057, and 1066 and series: 5081 (Pt-100)
Optional	
–	No selection
41	Slotted tip
Calibration and conformance certificates - optional level	
CC	Certificate of Calibration (no test given)
LC	Loop Calibration certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

Note

The Rosemount 396P pH/ORP sensor is available with or without an integral hermetically sealed preamplifier.

Table 4: Rosemount 396PVP Ordering Information

Option	Description
396PVP	pH sensor: TUpH Variopol connector
Measuring electrode	
10	pH GPLR glass, general purpose low resistivity
12	ORP
13	GPLR flat bulb, general purpose low resistivity
Analyzer/thermocouple compatibility	
54	For use with models: 1054 and 2054 and series 2081 (Pt-100)
55	For use with models: 56, 1056, 1057, and 1066 and series: 5081 (Pt-100)
Optional	
–	No selection
41	Slotted tip
Preamplifier options	
–	No preamplifier
70	SMART preamplifier (for use with -10, -13, and -55 only)

Table 4: Rosemount 396PVP Ordering Information (*continued*)

Option	Description
Calibration and conformance certificates - optional level	
CC	Certificate of Calibration (no test given)
LC	Loop Calibration certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

Note

The Rosemount 396PVP comes standard with a patented reference junction, a solution ground, and a recessed electrode; an optional slotted tip is also available. You must purchase a mating Variopol (VP) cable for all new Rosemount 396PVP installations. VP8 cable assembly works with both VP6 and VP8 sensor connector.



Rosemount 396R and 396RVP pH/ORP sensors are available in 21-in. (533.4 mm) and 36-in. (914.4 mm) titanium tube sensor lengths for use with a ball valve (sold separately) for hot tap applications. Rosemount 396RVP sensors feature a Variopol cable connection for use with VP8 quick disconnect interconnecting cables (sold separately; see [Accessories](#)).

Table 5: Rosemount 396R Ordering Information

Option	Description
396R	pH sensor: TUpH retractable
Measuring electrode	
10	pH GPLR glass, general purpose low resistivity
12	ORP
13	GPLR flat bulb, general purpose low resistivity
Sensor length	
21	21-in. (533.4 mm) titanium tube
25	36-in. (914.4 mm) titanium tube
Analyzer/thermocouple compatibility	
54	For use with models: 1054 and 2054 and series 2081 (Pt-100)
Options	
–	No selection, without preamplifier, 15-ft. (4,6 m) cable
60	9.5-in. (241.3 mm) cable with BNC
61	9.5-in. (241.3 mm) cable without BNC
07	Without preamplifier, 4-ft. (1.2 m) cable
08	Without preamplifier, 10-ft. (3 m) cable

Table 5: Rosemount 396R Ordering Information (continued)

Option	Description
Calibration and conformance certificates - optional level	
CC	Certificate of Calibration (no test given)
LC	Loop Calibration certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

Note

You must order junction box kits with preamplifiers separately if the transmitter does not have an integral preamplifier within 15-ft. (4,6 m) of the sensor.

Table 6: Rosemount 396RVP Ordering Information

Option	Description
396RVP	pH sensor: TUpH retractable Variopol connector
Measuring electrode	
10	pH GPLR glass, general purpose low resistivity
12	ORP
13	GPLR flat bulb, general purpose low resistivity
Sensor length	
21	21-in. (533.4 mm) titanium tube
25	36-in. (914.4 mm) titanium tube
Transmitter/thermocouple compatibility	
54	For use with models: 1054 and 2054 and series 2081 (Pt-100)
55	For use with models: 56, 1066, 1056, 1057, 1066, and 5081 (Pt-100)
Preamplifier options	
–	No selection
70	SMART preamplifier (for use with -10, -13, and -55 only)
Calibration and conformance certificates - optional level	
CC	Certificate of Calibration (no test given)
LC	Loop Calibration certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

Specifications

Table 7: Rosemount 396/396VP/396P/396PVP/396R/396RVP Sensors Specifications




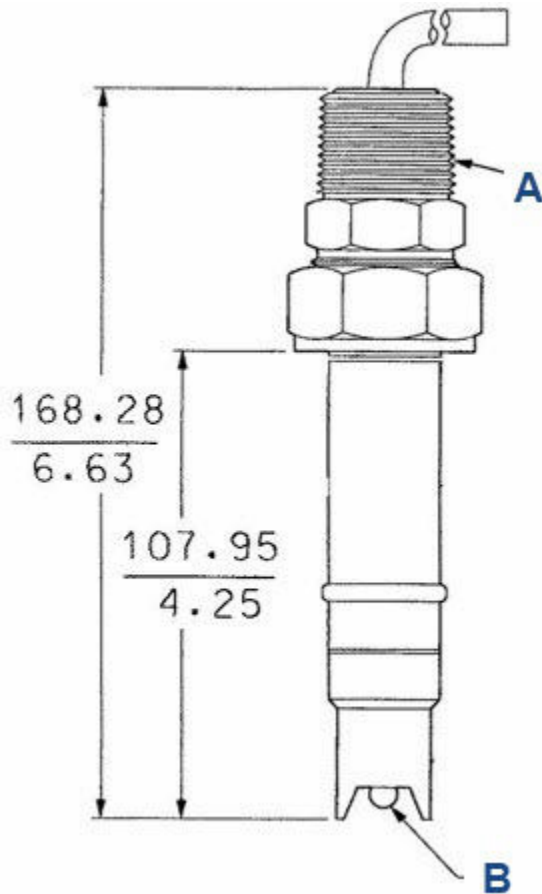
Specifications	Rosemount 396/396VP	Rosemount 396P/396PVP	Rosemount 396R/396RVP
Photo			
Measurements and ranges	pH: 0 to 14	pH: 0 to 14 ORP: -1500 to 1500 mV	pH: 0 to 14 ORP: -1500 to 1500 mV
Available pH ACCUGLASS types	GPHT hemi bulb or GPHT flat bulb	GPLR hemi bulb or GPLR flat bulb	GPLR hemi bulb or GPLR flat bulb
Wetted materials	316 stainless steel, polypropylene, EPDM, glass	Titanium, polypropylene, EPDM, glass, platinum (ORP only)	Titanium, polypropylene, EPDM, glass, platinum (ORP only)
Process connection	None, use 1-in. NPT process connector, PN 23166-00 or 23166-01 (sold separately)	1-in. MNPT front and rear facing threads	None, use 1-in. process connector or ball valve kit (1½-in. or 1¼-in.) sold separately
Temperature range	32 to 212 °F (0 to 100 °C)		
Pressure range-hemi bulb	0 to 150 psig (100 to 1135 kPa [abs])		
Pressure range-flat bulb	0 to 100 psig (100 to 790 kPa [abs])		
Maximum pressure at retraction or insertion	Not applicable	Not applicable	Code 21: 64 psig (542 kPa [abs]) Code 25: 35 psig (343 kPa [abs])
Minimum conductivity	100 µS/cm		
Integral cable	Various, coaxial with BNC	Code 01, 03, 05, and 06: Various lengths, 11 conductor Code 02, 07, and 08: Various lengths coaxial	Standard: 15 ft. (4,6 m) coaxial Code 60: 9.5-in. (241,3 mm) coaxial with BNC Code 61: 9.5-in. (241,3 mm) coaxial
Preamplifier options	Remote or integral SMART		
Weight/shipping weight	1 lb./2 lb. (0.45 kg/0.9 kg)	1 lb./2 lb. (0,45 kg/0,9 kg)	Sensor: Code 21: 2.0 lb./3.0 lb. (0.9 kg/1.40 kg) Code 25: 3.0 lb./4.0 lb. (1.40 kg/1.80 kg) Ball valve PN 23240-00: 5.0 lb./7.0 lb. (2.25 kg/3.20 kg) Junction box: 3.0 lb./4.0 lb. (1.40 kg/1.80 kg)
VP cable	Use cable PN 24281-XX (where XX = -01 through -08 and designates various cable lengths).		

Table 8: Percent Linearity

pH range	Rosemount 396/396VP		Rosemount 396P/396PVP		Rosemount 396R/396RVP	
	GPHT hemi	GPHT flat	GPHT hemi	GPHT flat	GPHT hemi	GPHT flat
0 to 2 pH	94%	95%	94%	N/A	94%	93%
2 to 12 pH	99%	99%	97%	98%	97%	98%
12 to 13 pH	97%	96%	98%	95%	98%	95%
13 to 14 pH	92%	N/A	98%	N/A	98%	N/A

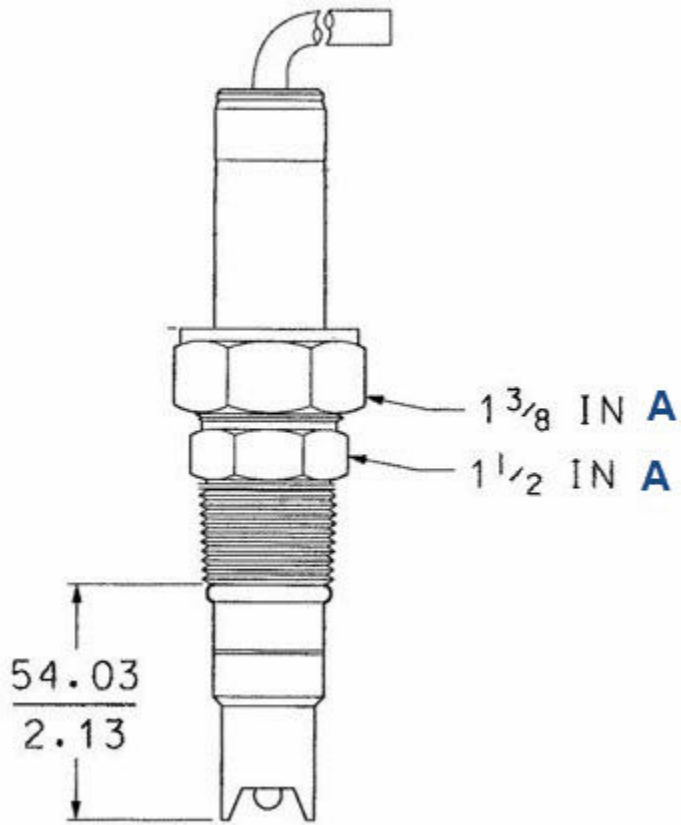
Dimensional and installation drawings

Figure 1: Rosemount 396 with Optional Connector Dimensional Drawings



- A. 1 x 1-in. NPT male connector 316 stainless steel or titanium
- B. pH electrode

Figure 2: Rosemount 396VP Dimensional Drawing



A. Hex

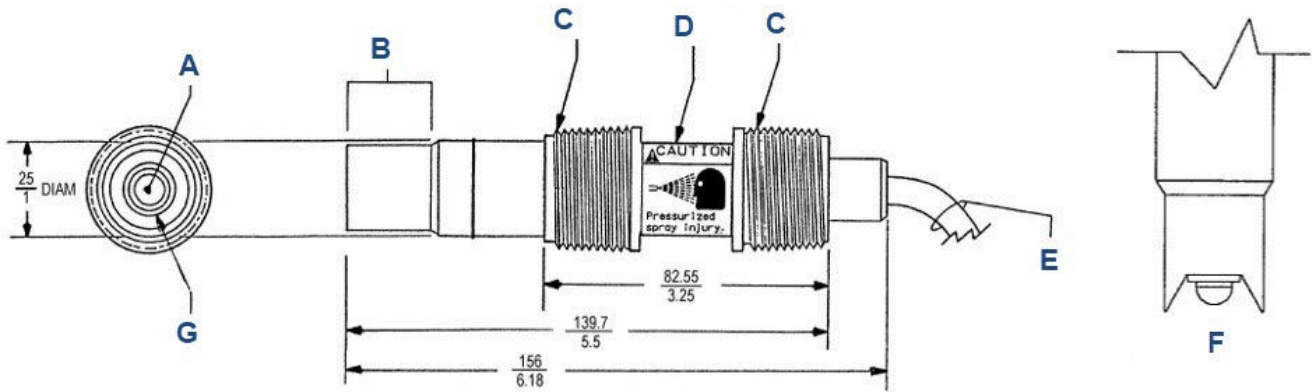
Metal process connector PN 23166-xx (xx = 00 for 316 stainless steel and xx=01 for titanium) can be used for insertion or submersion Rosemount 396 connection to 1-in. tee fittings. It also must be used to connect the Rosemount 396R to ball valve PN 23240-00 or directly to the process.

The metal process connector gives the sensor various insertion depths, depending on where you locate the compression fitting. Also, you can switch the threads to face the cable end of the sensor for connection to submersion pipes.

Figure 3: Rosemount Metal Process Connector

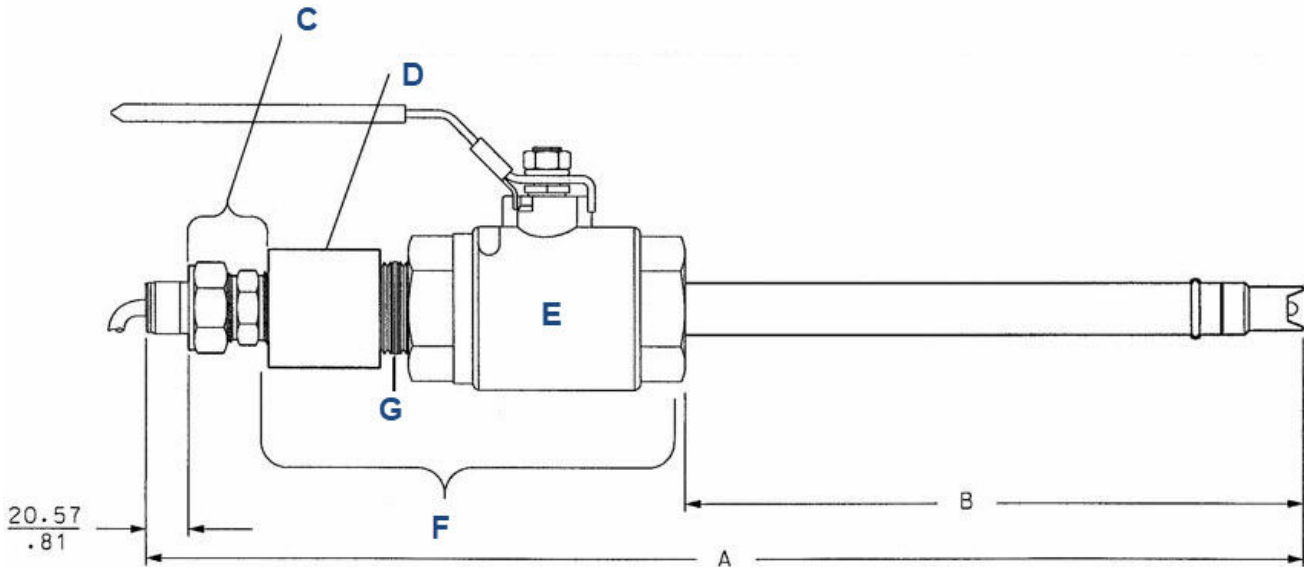


Figure 4: Rosemount 396P/396PVP Dimensional Drawing



- A. Electrode
- B. Reference junction
- C. 1-in. MNPT
- D. 1-in. wrench opening
- E. Cable or V connector (not shown)
- F. Sensing end tip, slotted tip option
- G. Solution ground

Figure 5: Rosemount 396R pH Sensor and 1½-in. FNPT Ball Valve Kit (PN 23240-00) with Process Connector



- A. Dimension (see Table 9)
- B. Dimension (see Table 9)
- C. Process connector (PN 23166-00 or 23166-01) (not included with ball valve kit)
- D. 1½-in. to 1-in. reducer (PN 9310104)
- E. Ball valve (PN 934065)
- F. Ball valve kit (PN 23240-00)
- G. 1½-in. close nipple (PN 931012)

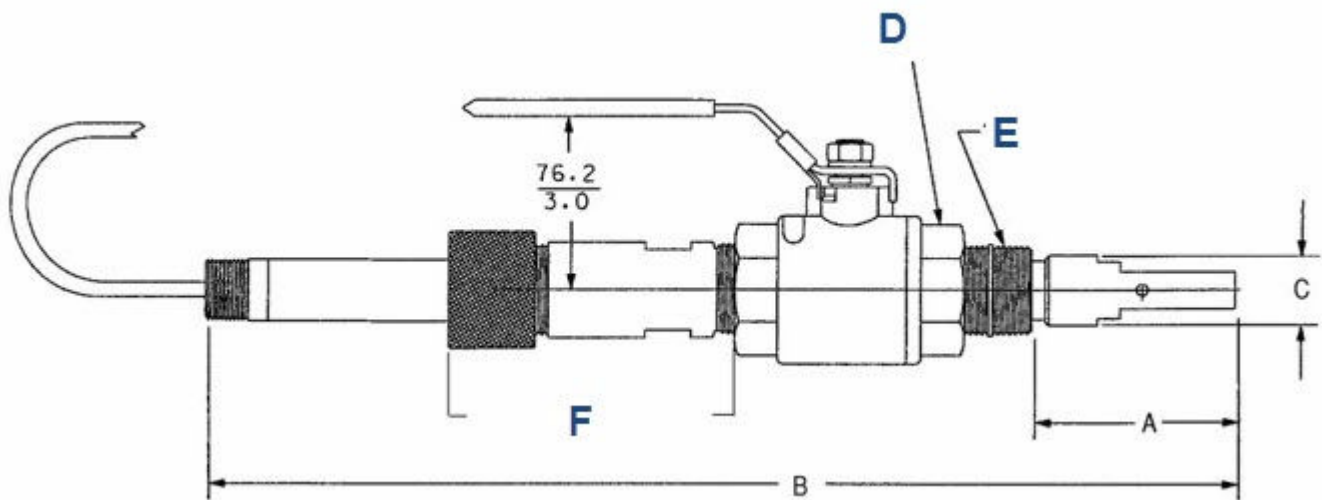
Table 9: Rosemount 396R Dimensions

Sensor tube length (in./mm)	A (in./mm)	B (in./mm)
21/533,4	23.1/586,2	12.9/327,7
36/914,4	37.58/954,5	27.4/660,0

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 the sensor to the reducer.



Figure 6: MNPT Ball Valve Kit 1¼-in. (PN 23765-00 or 23765-01) with Retraction Kit



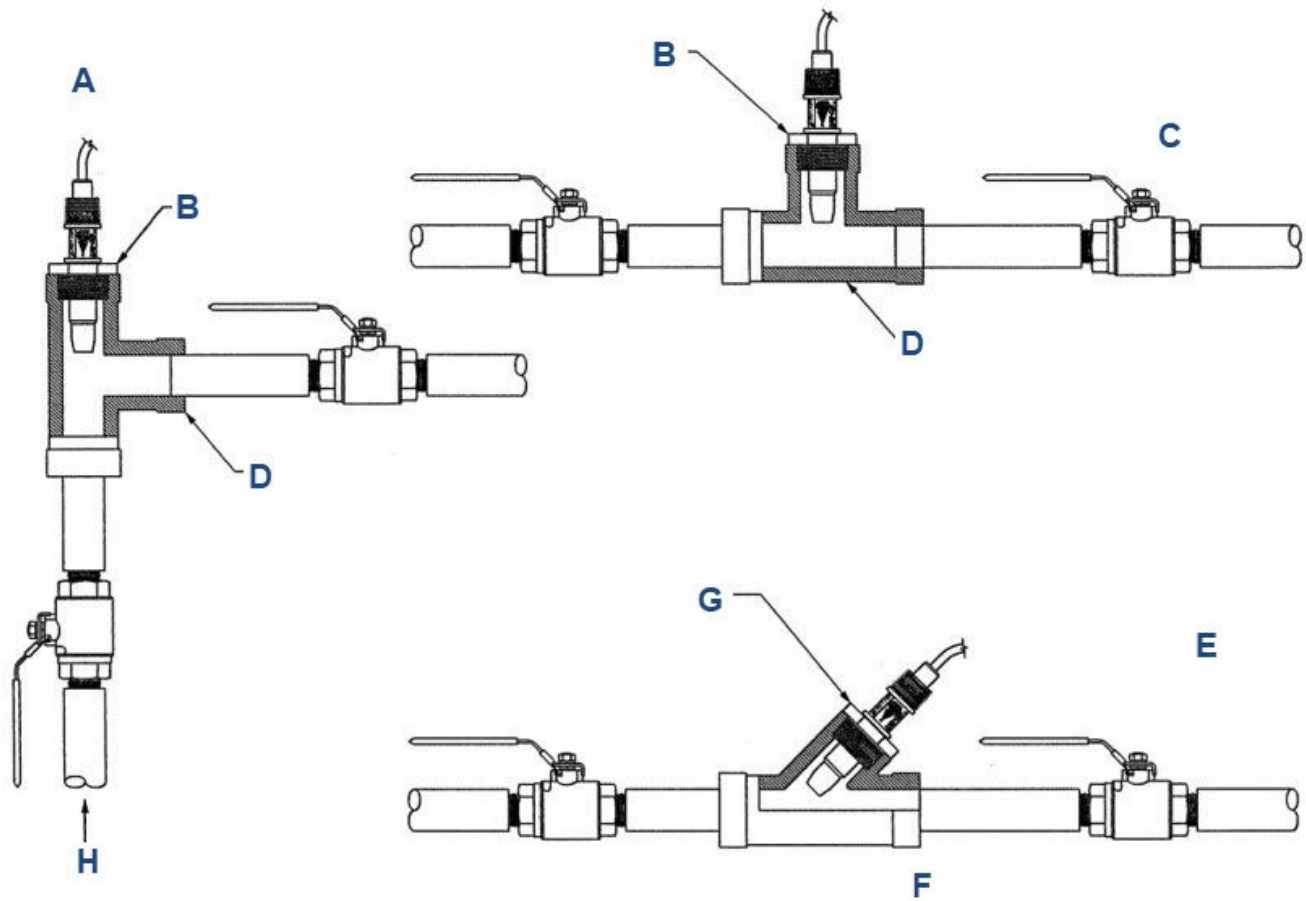
- A. Dimension
- B. Dimension
- C. Dimension
- D. 1¼-in. full port ball valve (PN 9340078)
- E. 1¼ to 1½-in. NPT nipple (PN 4342M)
- F. Retraction kit PN 23796-00 or 23796-01)

Table 10:

Ball valve kit includes a 1¼-in. full port ball valve, a 1¼-in. nipple, and a retraction chamber. 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.

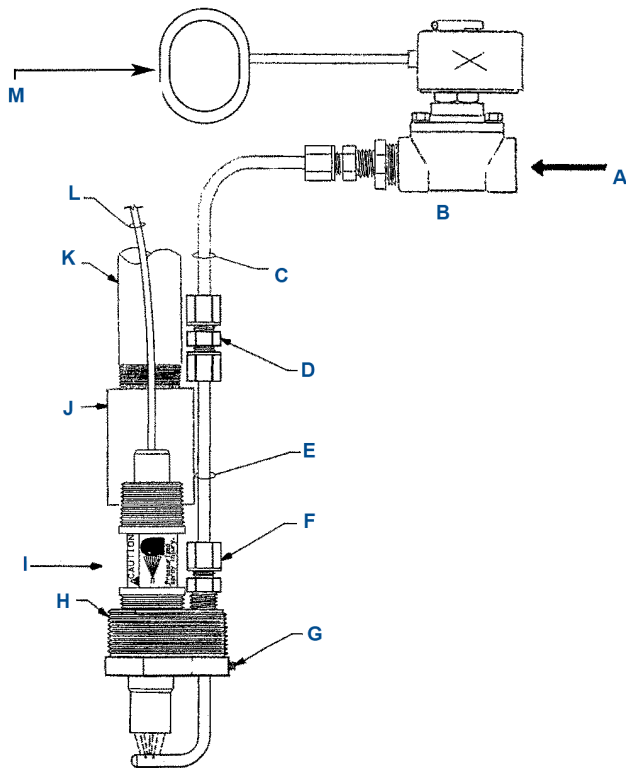


Figure 7: Typical Flow-through Installation



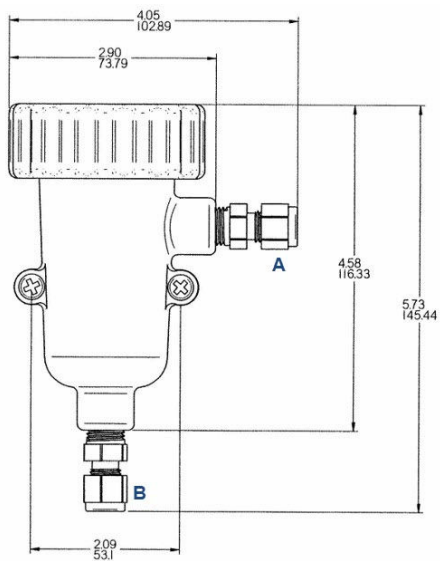
Sensor must be installed at least 10 degrees above the horizon.

- A. Angle flow shown
- B. 1½-in. x 1-in. reducing bushing
- C. Straight flow shown
- D. 1½-in. pipe tee with reducing bushing PN 2002011
- E. Pipe "Y" installation shown
- F. 1½-in. pipe "Y" (by others)
- G. 1½-in. x 1-in. reducing bushing PN 9330044
- H. Flow



- A. Cleaning solution by others.
- B. Solenoid valve or manual valve (supplied by others).
- C. Corrosion resistant tubing (supplied by others).
- D. Polypropylene ¼-in. compression fitting.
- E. ¼-in. 316 stainless steel.
- F. ¼-in. polypropylene.
- G. Stainless set screw for adjustable spray nozzle height.
- H. 2-in. NPT threads.
- I. Sensor.
- J. 1-in. PVC coupling for submersible applications (supplied by others).
- K. 1-in. PVC or stainless conduit (supplied by others).
- L. Cable.
- M. Timer supplied by others or use timer feature in Rosemount instrument.

Figure 8: Low Flow Cell (PN 24091-00) for Rosemount 396 and 396P-41 Sensor

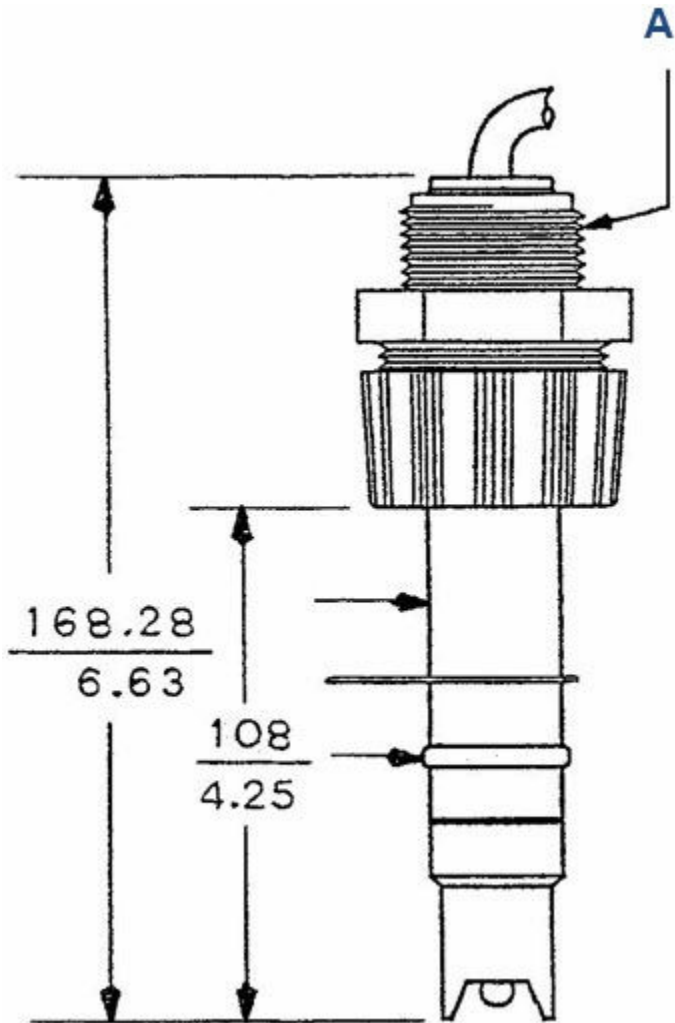


Maximum pressure: 65 psig (549 kPa [abs])

Maximum temperature: 122 °F (50 °C)

- A. Outlet
- B. Inlet

Figure 9: Submersion Accessory (PN 9510066) for Rosemount 396/396VP Sensors



A. 1-in. x 1-in. NPT male connector, nylon PN 9510066

Accessories

Table 11: Connector Cable (Required for all First Time Installations)

Part number	Description
24281-00	15-ft. (4.6 m) VP8 cable
24281-01	25-ft. (7.6 m) VP8 cable
24281-02	2.5-ft. (0.8 m) VP8 cable
24281-03	50-ft. (15.2 m) VP8 cable
24281-04	100-ft. (30.5 m) VP8 cable
24281-05	4-ft. (1.2 m) VP8 cable
24281-06	10-ft. (3 m) VP8 cable

Table 11: Connector Cable (Required for all First Time Installations) (continued)

Part number	Description
24281-07	20-ft. (6.1 m) VP8 cable
24281-08	30-ft. (9.1 m) VP8 cable

Table 12: Extension Cables (Requires a Remote Junction Box)

Part number	Description
23646-01	Extension cable, 11-conduit, shielded, prepped, per foot
9200254	Cable, 4-conduit, 22 AWG, 2 shielded pair, per foot
9200273	Extension cable, 11-conduit, shielded, unprepped, per foot

Table 13: Mounting Assemblies

Part number	Description
11275-01	Handrail mounting assembly
2002011	CPVC flow through tee: 1½-in. NPT process connection
24091-00	Cell, low flow, ¼-in. inlet and outlet
915240-03	Tee, flow-through, 2-in. PVC, ¾-in. NPT
915240-04	Tee, flow-through, 2-in. PVC, 1-in. NPT
915240-05	Tee, flow-through, 2-in. PVC, 1½-in. NPT
23240-00	Ball valve assembly, 316 stainless steel, 1½-in. (process connector required)
23765-00	1¼-in. ball valve assembly

Table 14: Process Connectors (Required for all First Time Installations)

Part number	Description
23166-00	Connector: 1-in. x 1-in. 316 stainless steel with O-ring groove
23166-01	Connector, 1-in. x 1-in. titanium with O-ring groove
9510066	Process connector, nylon, submersion. 1-in. MNPT

Table 15: Remote Junction Boxes

Part number	Description
2002565	Mounting bracket kit
23550-00	Junction box, remote, without preamplifier
23555-00	Junction box, Rosemount 54/5081/1055/XMT compatible preamplifier

Table 16: Sensor Head Junction Box

Part number	Description
23709-00	Junction box, sensor head with preamplifier for Rosemount 54/3081

Table 17: Other Accessories

Part number	Description
12707-00	Jet spray cleaner
23242-02	Mounting adapter, 1½-in. insertion, 1-in. x ¾-in.
9120516	BNC adapter
9120531	BNC splitter, female BNC to 20 AWG leads
9210012	Buffer solution, pH 4.01, 16 oz. (473,2 ml)
9210013	Buffer solution, pH 6.86, 16 oz. (473,2 ml)
9210014	Buffer solution, pH 9.18, 16 oz. (473,2 ml)
9320057	Union, PVC
R508-8OZ	ORP standard, 475 mV, 8 oz.

Table 18: Spare Parts

Part number	Description
2001492-00	Tag (label one hole, blank stainless steel)
2001492-01	Tag (label two holes, blank stainless steel)
23557-00	Preamplifier for remote weatherproof junction box
33946-00	Shroud, 399/396P
9310100	Ferrule, 1-in. Teflon
BG0228	Union for flow-through tee
23472-00	Connector, junction box to tube
23594-01	O-ring, 2-214, EPDM, 4 each with lube
33046-00	Ferrule, 1-in. 316 stainless steel split
9310096	Nut, Swage, 1-in. 316 stainless steel

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