

Rosemount™ 389/389VP

General Purpose pH/ORP Sensors



Dependable pH/ORP measurements to solve your process needs

Rosemount 389/389VP sensors are suitable for use in a wide variety of applications. Reliably measure pH or oxidation/reduction potential of aqueous solutions in pipelines, open tanks, and ponds. These sensors are ideal for use in process solutions containing poisoning ions.

Overview

Reliability meets robustness.

- A triple junction reference prolongs sensor life and protects against poisoning ions, such as ammonia, chlorine, cyanides, and sulfides.
- Enhanced performance and increased life with cracking resistant glass.
- Available with a glass electrode option for high pH applications.
- Superior chemical resistance provided by a rugged Tefzel® body with Viton® O-rings.

Ease of installation.

- The molded sensor body features 1-in. (25,4 mm) MNPT front and rear facing process connections for insertion, submersion, and flow-through applications.
- Variopol (VP8) cable connection option, for quick cable-to-sensor release, eliminates cable twisting (Rosemount™ 389VP).

Maintenance made simple.

- Automatic recognition of pH sensors by Rosemount transmitters: 56, 1056, 1057, and 1066 with integral SMART preamplifier.
- pH calibration data is stored, which allows sensors to be calibrated in advance for "plug and play" installations in the field.

Ordering information

The Rosemount 389 and 389VP General Purpose pH/ORP Sensors are housed in a molded Tefzel® body with 1-in. (25,4 mm) MNPT forward and rear facing threads suitable for insertion, submersion, or flow through installation.

The sensors can be configured with a general purpose pH, high pH, or platinum ORP electrode. Emerson offers the sensors with SMART preamplifiers for pH measurements and standard integral parameters for ORP measurements. These sensors may be configured without a preamplifier, but must be used with a remote preamplifier (junction box or transmitter). Automatic temperature compensation is standard. The sensors are available with either an integral cable connection (Rosemount 389) or Variopol (VP8) connector (Rosemount 389VP).

Table 1: Rosemount 389 Ordering Information

Option	Description
389	pH/ORP sensor
Preamplifier cable	
01	Integral preamplifier, 25-ft. (7,6 m) cable
02	No preamplifier, 15-ft. (4,6 m) cable
03	Integral preamplifier, 33-ft. (10 m) cable

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Table 1: Rosemount 389 Ordering Information (continued)

Option	Description
04	Integral preamplifier, 50-ft. (15 m) cable
05	Integral preamplifier, 66-ft. (20 m) cable
06	Integral preamplifier, 100-ft. (30,5 m) cable
07	No preamplifier, 4-ft. (1,3 m) cable
08	No preamplifier, 10-ft. (3 m) cable
Combination electrode	
10	pH: general purpose low resistivity glass
11	pH: high pH glass
12	Oxidation reduction potential (ORP)
Transmitter/thermocouple compatibility	
54	For Rosemount 1054A/B, 81, and 2081, use -01 or -02. For Rosemount 56, 1056, 1057, 1066, and 5081, use codes -02, -07, and -08 only.
55	For Rosemount 56, 1056, 1057, 1066, and 5081, use codes -01, -03, -04, -05, and -06 only.
Optional	
–	No selection
62	Cable without BNC for Rosemount 56, 1056, 1066, 1057, and 5081 (Codes -02, -07, -08, and -54 only)
Calibration and conformance certificates - optional level	
CC	Certificate of Calibration (no test data 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 389 pH/ORP Sensor is housed in a molded TEFZEL body with 1-in. (25,4 mm) MPT threads suitable for insertion, submersion, or flow-through installation. The sensor includes a general purpose pH or high pH electrode or platinum ORP electrode with a triple junction gel filled reference cell. Automatic temperature compensation is standard with the Rosemount 389pH, but is not required on the Rosemount 389ORP.

Table 2: Rosemount 389VP Ordering Information

Option	Description
Combination electrode	
10	pH - general purpose low resistivity glass
11	pH - high pH glass
12	ORP
Transmitter/thermocouple compatibility	
54	For Rosemount 1056, 1057, 1066, 56, and 5081 (Pt-100 TC)
55	For Rosemount 1056, 1057, 1066, 56, and 5081 (-70 option only)

Table 2: Rosemount 389VP Ordering Information (continued)

Option	Description
Preamplifier option	
–	No preamplifier
70	SMART preamplifier (must choose -55 on Level 2. Not allowed with options -12 or -54.)
Calibration and conformance certificates - optional level	
CC	Certificate of Calibration (no test data 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 389VP pH/ORP Sensor is housed in a molded Tefzel body with 1-in. (25,4 mm) MNPT threads suitable for insertion submersion or flow-through installation. The sensor includes a general purpose pH or high pH electrode or a platinum ORP electrode with a triple junction gel filled reference cell. Automatic temperature compensation is standard for pH, but is not required for ORP. VP8 cable assembly works with both VP6 and VP8 sensor connector.

Specifications

Table 3: Percent Linearity over pH Range

pH range	GPLR glass (-10)	High pH glass (-11)
0 to 2 pH	94%	94%
2 to 12 pH	99%	97%
12 to 13 pH	97%	98%
13 to 14 pH	92%	98%

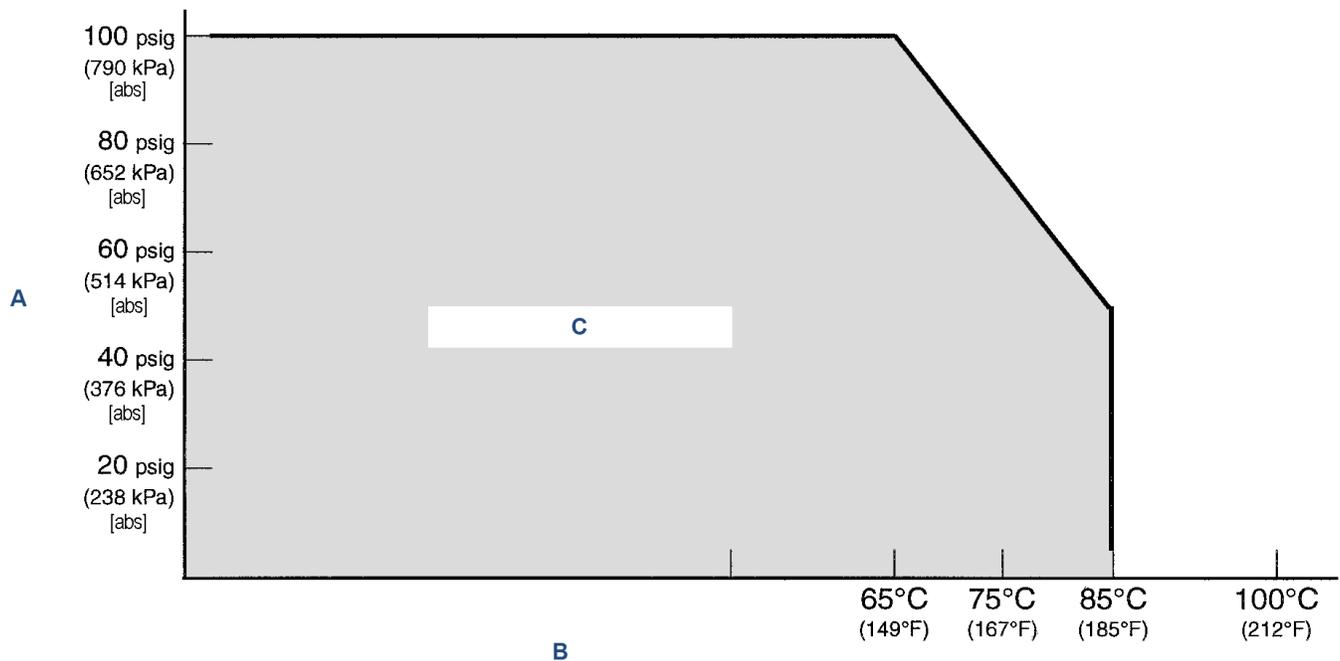
Table 4: Sensor Specifications

Measurement range	
pH	0 to 14
ORP	-1500 to +1500 mV
Temperature range	
32 to 185 °F (0 to 85 °C)	
Automatic temperature compensation : 32 to 185 °F (0 to 85 °C)	
Maximum pressure	
100 psig (790 kPa[abs]) at 150 °F (65 °C) - see Figure 1	
Materials of construction	
Sensor body	Tefzel®
pH electrode	Glass

Table 4: Sensor Specifications (continued)

ORP electrode	Platinum
Junction	Ceramic
O-ring	Viton®
Process connections	
Front facing	1-in. MNPT
Rear facing	1-in. MNPT
Cable	
389	Various lengths from 4 to 100 ft. (1,2 to 30,5 m). Maximum length of 15 ft. (4,6 m) for sensors without a preamplifier.
389VP	Use 24281-XX, 2.5 ft. (0,8 m) to 100 ft. (30,5 m) (see Accessories)
Weight/shipping weight	
1 lb. / 2 lb. (0,45 kg / 0,9 kg)	

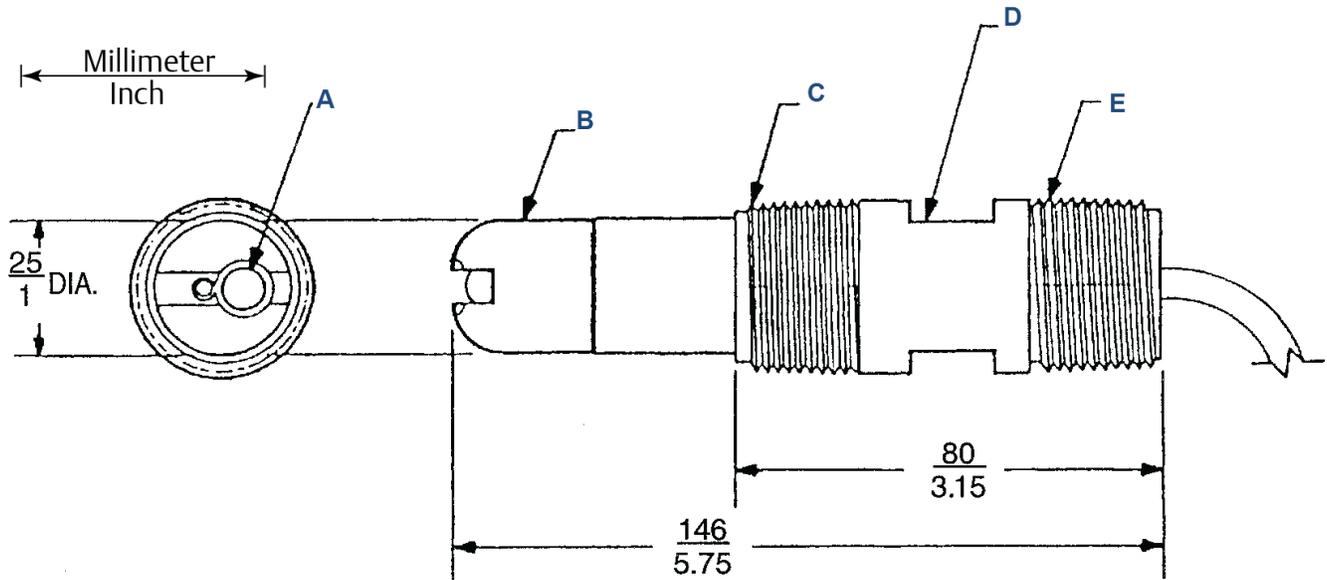
Figure 1: Pressure/Temperature Operating Range



- A. Pressure
- B. Temperature
- C. Operating range

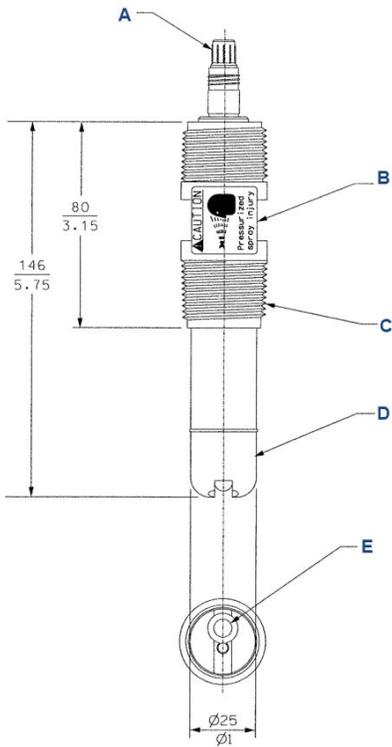
Dimensional drawings

Figure 2: Rosemount™ 389 with Integral Cable Connection



- A. pH/ORP electrode
- B. Thermocouple
- C. 1-in. MNPT
- D. 1-in. wrench opening
- E. 1-in. MNPT

Figure 3: Rosemount 389VP with Variopol Cable Connection

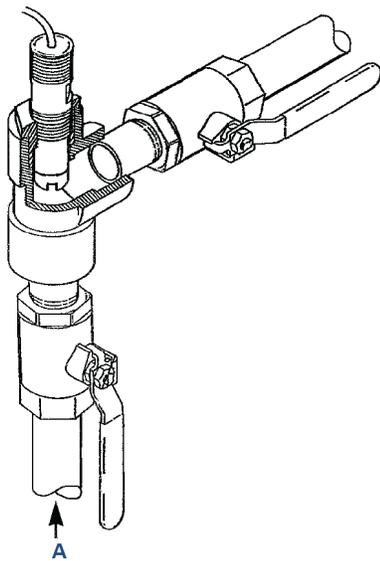


- A. VP (Variopol connection)
- B. 1-in. wrench opening
- C. Two 1-in. MNPT
- D. Thermocouple
- E. pH/ORP electrode

Note

Valves and fittings by others. Mount the sensor at least 10 degrees from horizontal.

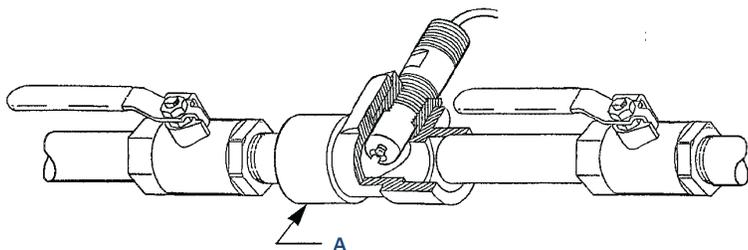
Figure 4: Angle Flow



1½-in. pipe tee PN 2002011

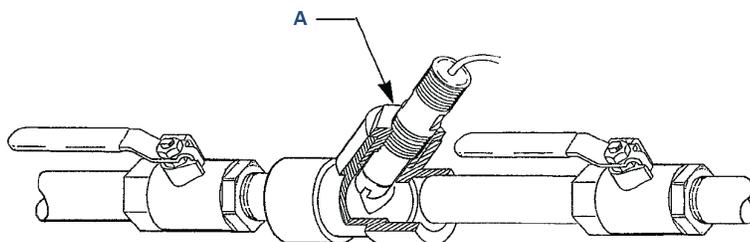
A. Flow

Figure 5: Straight Flow



A. 1½-in. pipe tee PN 2002011

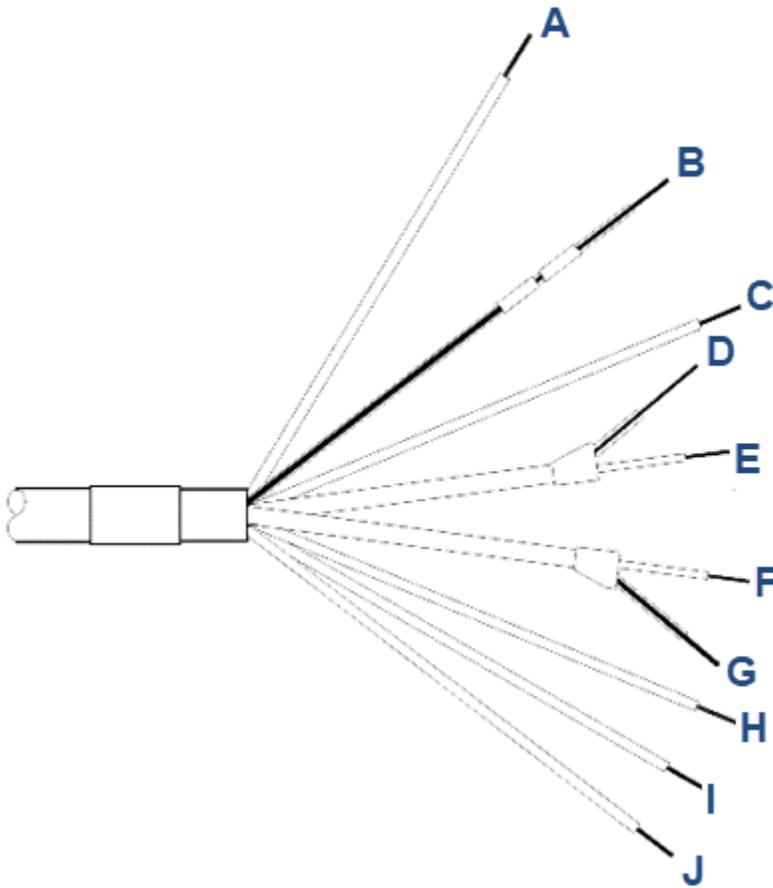
Figure 6: Pipe "Y" Installation



1½-in. pipe "Y"

A. 1½-in. by 1-in. reducing bushing

Figure 7: VP8 Cable, Instrument End



- A. Green: earth ground
- B. ID, clear
- C. Blue: solution ground
- D. Clear
- E. Gray: reference in
- F. Orange: pH/mV in
- G. Clear: pH/mV shield
- H. White: resistance temperature device return
- I. White/red: resistance temperature device sense
- J. Red: resistance temperature device in

Figure 8: VP8 Cable, Sensor End

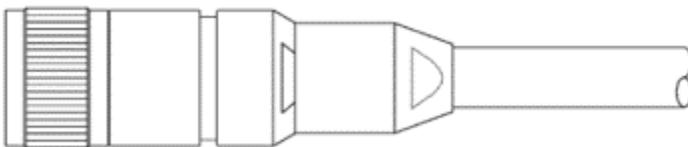
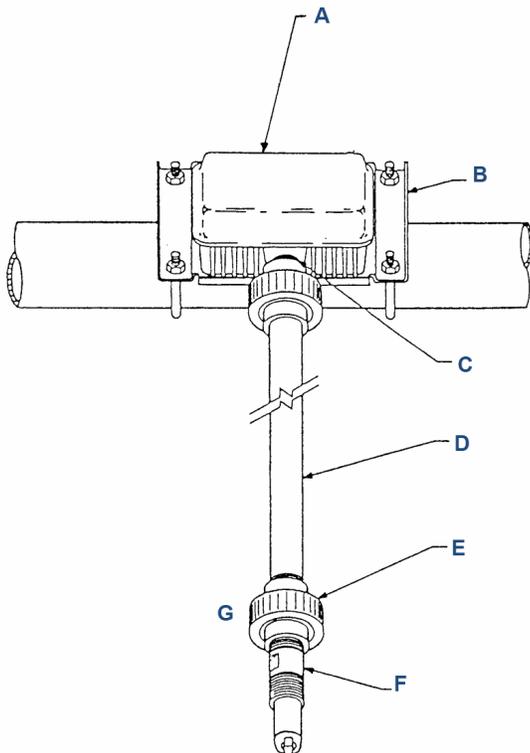


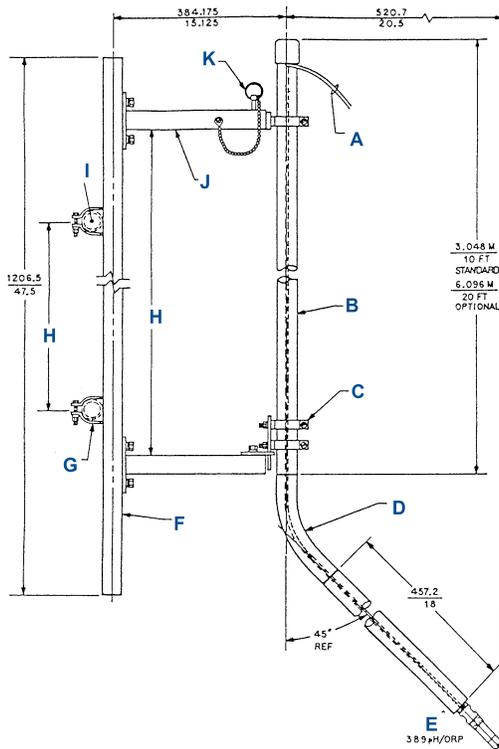
Figure 9: Submersion Installation: Junction Box and Pipe Mounting Accessory

- A. NEMA 4X junction box.
PN 23550-00: junction box with extension board.
PN 23555-00: junction box with internal preamplifier.
- B. 2-in. pipe mounting bracket, PN 2002565.
- C. Flexible conduit if required.
- D. 1-in. pipe by others.
- E. 1-in. FNPT CPVC union, PN 9320057.
- F. Rosemount 389.
- G. Regularly check to make sure connections are water tight.

Note

Unless otherwise specified.

Figure 10: Submersion Installation: Handrail Mounting Accessory (PN 11275-01)



- A. Sensor cable.
- B. 1½-in. PVC pipe schedule 80.
- C. 1½-in. pipe clamp, three places.
- D. 45 degree sweep ell extension pipe.
- E. Regularly check to make sure connections are water tight.
- F. Unistrut 1⅝-in. by 1⅝-in. aluminum.
- G. 1½-in. pipe clamp, two places.
- H. Can be any convenient dimension.
- I. Customer handrail, two places.
- J. Mounting channel aluminum, two places.
- K. Locking pin with bead chain.

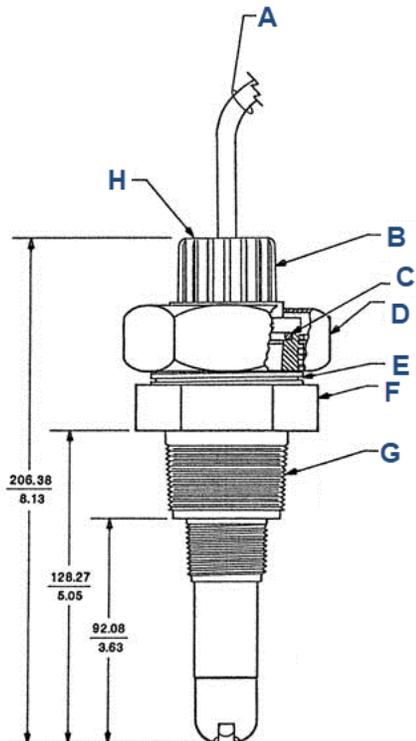
Note

Unless otherwise specified.

Figure 11: Rosemount 389 with Insertion Adapter Photo



Figure 12: Rosemount 389 with Insertion Adapter (PN 23242-02) Dimensional Drawing



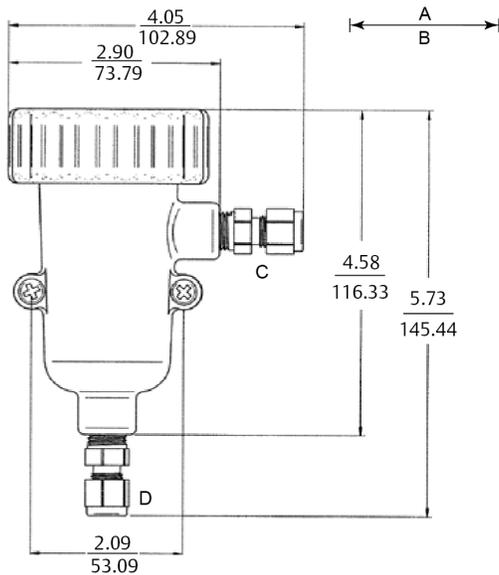
Insertion mounting adapter PN 23242-02 (includes PEEK adapter, 304 stainless steel union fitting).

- A. Cable
- B. PEEK adapter, 1-in. FNPT by 1-in. FNPT (reversible)
- C. 2-135 Viton O-ring⁽¹⁾
- D. Nut, hex union 2-in.
3-in. wrench opening (304 stainless steel)
- E. 2.531.8 Acme thread (typ)
- F. Neck, union fitting (316 stainless steel)
2 5/8-in. wrench opening.
- G. 1 1/2-in. MNPT
- H. 3/4-in. FNPT

The insertion adapter mounts the sensor into a 1 1/2-in. NPT process pipe. Unscrewing the hex nut allows easy sensor removal without twisting the sensor cable.

(1) O-ring must be in place prior to use (PN 9550175).

Figure 13: Low Flow Cell (PN 24091-00)



- A. Inches
- B. Millimeters
- C. Outlet
- D. Inlet

Inlet and outlet connections are stainless steel and take ¼-in. OD tubing. Flow cell is polycarbonate with ¼-in. FNPT fittings.

Table 5: Low Flow Cell Specifications (PN 24091-00)

Wetted materials	
Body and nut	Polyester/polycarbonate
Fittings	316 stainless steel
Seals	Silicone
Flow cell ratings	
Temperature	32 to 158 °F (0 to 70 °C)
Maximum pressure	90 psig (721 kPa [abs])
Flow rate	2 to 5 gallons per hour (7,6 to 18,9 liters per hour)
Sensor threaded connection	
1-in. NPT adapter	

Accessories

Table 6: Connector Cable (Required for all First Time Installations of Rosemount 389VP)

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. (7,6 m) VP8 cable

Table 6: Connector Cable (Required for all First Time Installations of Rosemount 389VP) (continued)

Part number	Description
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
24281-07	20-ft. (6,1 m) VP8 cable
24281-08	30-ft. (9,1 m) VP8 cable

Table 7: Extension Cables (Requires a Remote Junction Box)

Part number	Description
23646-01	Extension cable, 11 conduit, shielded, prepped, per foot
9200273	Extension cable, 11 conduit, shielded, unprepped, per foot

Table 8: 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

Table 9: Remote Junction Boxes

Part number	Description
2002565	Mounting bracket kit
23555-00	Junction box, Rosemount 54/5081/1055/XMT compatible preamplifier

Table 10: Other Accessories

Part number	Description
12707-00	Jet spray cleaner
23242-02	Mounting adapter, 1½-in. insertion, 1-in. by ¾-in.
9120516	BNC adapter
9210012	Buffer solution, pH 4.01, 16 oz. (453,6 g)
9210013	Buffer solution, pH 6.86, 16 oz. (453,6 g)
9210014	Buffer solution, pH 9.18, 16 oz. (453,6 g)
9320057	Union, PVC
R508-8OZ	ORP standard, 475 mV, 8 oz. (226,8 g)

Table 11: Spare Parts

Part number	Description
33081-00	Adapter insert, PEEK, 1 by $\frac{3}{4}$ -in. for 23242-02
33946-00	Shroud, 399/396P
9200254	Cable, 4 conduit, 22 AWG, 2 shielded pair, per foot
2001492-00	Tag (label one hole, blank stainless steel)
2001492-01	Tag (label two holes, blank stainless steel)

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