

General Purpose pH/ORP Sensors



- SMART enabled
- NEW OPTIONS to meet a variety of applications requirements, including: processes with low conductivity, hydrofluoric acid, high pH, and reference poisoning elements
- VP8 QUICK CABLE-TO-SENSOR RELEASE, provided by the watertight VP8 multiple-pin connector, eliminates cable twisting.
- EXTENDED SENSOR LIFE provided by double or triple junction reference cell in process solutions containing poisoning ions (special options).
- OPTIMUM VERSITILITY WITH VARIOUS MOUNTING OPTIONS provided by one-piece construction with process threads in two places.
- MAXIMUM CHEMICAL RESISTANCE provided by rugged Tefzel¹ body, completely sealed to eliminate sensor leakage.
- ENHANCED PERFORMANCE AND INCREASED LIFE with minimized glass cracking provided by field-proven AccuGLASS^{®2} pH glass formulations.



MODEL 399
Insertion/Submersion
Sensor with integral cable



MODEL 399VP
Insertion/Submersion Sensor
with new VP8 connector
(uses mating VP8 cable)

¹ Tefzel and Viton are registered trademarks of E.I. du Pont de Nemours and Co.

² AccuGLASS is trademark of Rosemount Analytical.

FEATURES AND APPLICATIONS

General purpose pH/ORP sensor model 399/399VP is now offered with SMART capabilities. SMART option becomes enabled when used with the Model 1056, 1057 Analyzers and on 6081P wireless transmitter. The pH-loop capabilities include auto-recognition of the SMART sensor, automatic upload of calibration data and associated time stamp, historical recording of pH diagnostics (slope, offset, reference impedance, glass impedance). This trending data allows technicians to predict frequency of maintenance and estimate sensor life for a particular process condition. Additional SMART features include factory calibration, resetting SMART sensor calibration data with user menus without power cycling, and manufacturing information.

The reference junction aids in the sensor's resistance to poisoning ions and helps prolong sensor life. Models 399 and 399VP are provided with a double junction reference, which protects the reference element from poisoning

ions — such as ammonia, chlorine, cyanides, and sulfides — in the process. When large amounts of poisoning agents are present, an optional triple junction may be ordered to help prolong the sensor life. Both models, in either the double or triple reference configuration, are made with an outer ceramic junction constructed in an annular design around the pH/ORP-sensitive membrane.

The AccuGLASS pH glass formulations exceed industry standards. The AccuGlass pH glass is a result of many years of glass research resulting in a formulation which has been found to increase the life of the sensor. Unlike other pH glasses presently on the market, this glass resists cracking especially at higher temperatures and reduces sodium ion error commonly found in high pH applications. Overall, the AccuGlass formulation enhances the sensor performance to measure pH more accurately and have a longer sensor life than ever before.

FEATURES AND APPLICATIONS (cont.)

A choice of pH glass electrodes is available to best meet various application needs. Four types are available: hemi bulb, flat bulb, HF resistant, and Hi pH glass. The AccuGLASS hemi bulb is the standard glass offered on both models and can be used for most applications. The hemi bulb is also found on the HF resistant and Hi pH glass options. The AccuGLASS flat glass option can be used in abrasive or coating applications that etch or build up on glass, respectively.

NEW - SMART is standard option. A preamplifier converts the high impedance pH signal into a stable, noise-free signal and must be used with all pH sensors. The Model 399/399VP offers the Models 399-10, 399-14, 399-34 and 399VP (-70) with an integral SMART preamplifier. Other Models can use a remote preamplifier, integral to the analyzer/transmitter or in a remote junction box. All preamplifiers have a transmission capability of up to three miles. The Rosemount Analytical preamplifier method has become the industry standard for pH/ORP measurement reliability.

Model 399VP is offered with a watertight sensor-to-cable connector which eliminates re-wiring and cable twisting when replacing sensors. The Variopol VP multiple pin connector is an integral part of each sensor model and uses a mating VP cable; see page 5 for example. Once the cable is installed and wired to the analyzer, sensors are easily replaced without replacing the cable and without rewiring the analyzer. Also the cable can be disconnected from the sensor before removal from the process which eliminates cable twisting. VP8 cable assembly works with both VP8 and VP6 sensor connector.

Models 399 and 399VP are housed in a molded Tefzel body with Viton o-rings, making each sensor virtually indestructible and chemically resistant. Complete encapsulation eliminates leakage or high humidity problems traditionally found in other pH/ORP designs. The simplified construction, designed with user convenience in mind does not require electrolyte (KCl) replenishment or any high maintenance troubleshooting procedures.

Installation is easily achieved through the wide variety of mounting configurations. Both Models feature 1 inch (MNPT) front and rear facing connections for insertion, submersion, or flow-through pH and ORP applications.

New options are available for special application needs, including high purity/low conductivity water, heavy reference poisoning, and continuous high or low temperature processes. Consult the factory or your local sales representative for more details on these new options.

Both models are combination sensors (pH, reference, and temperature within sensor body) and measure pH or ORP (Oxidation/Reduction Potential) of aqueous solutions in pipelines, open tanks, or ponds. Models 399 and 399VP are suitable for virtually all applications and are compatible with Rosemount Analytical and other manufacturers' instruments.

PHYSICAL PERFORMANCE AND SPECIFICATIONS

Sensor Type:: General purpose 399, 399VP

Measured Range: pH: AccuGLASS 0-14
ORP: -1500 to +1500 mV

Percent Linearity Over pH Range:

	GPLR Hemi Bulb	Flat Bulb
1-2 pH	94%	93%
2-12 pH	99%	98%
12-13 pH	97%	95%
13-14 pH	92%	-

Operating Temperature: 0° to 85°C (32° to 185°F)
Automatic temperature compensation 0° to 85°C (32° to 185°F), Temperature compensation is not required for 399 ORP when used with Models 1060, or 1181 ORP

Maximum Pressure: 790 kPa [abs] (100 psig) at 65°C (see Graph 1 below)

Flow Rate: up to 2 ft/sec

Materials of Construction: Tefzel, glass, ceramic, & Viton

Materials of ORP: Platinum

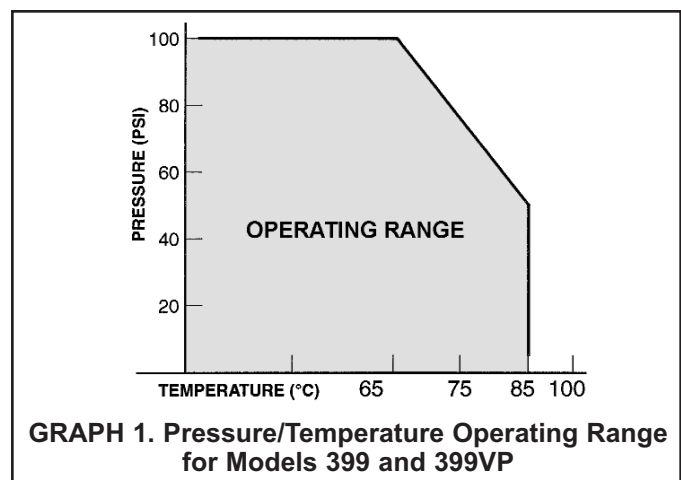
Process Connections: 1 in. MNPT, 2 places

Integral Cable: 10 or 32 ft cable with integral preamp (remote preamp) 10 ft cable with remote preamp

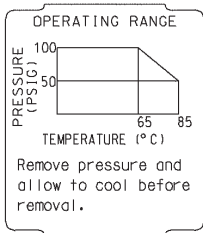
VP8 Cable: use PN 24281-00

Weight/Shipping Weight: 0.45 kg/0.9 kg (1 lb/2 lb)

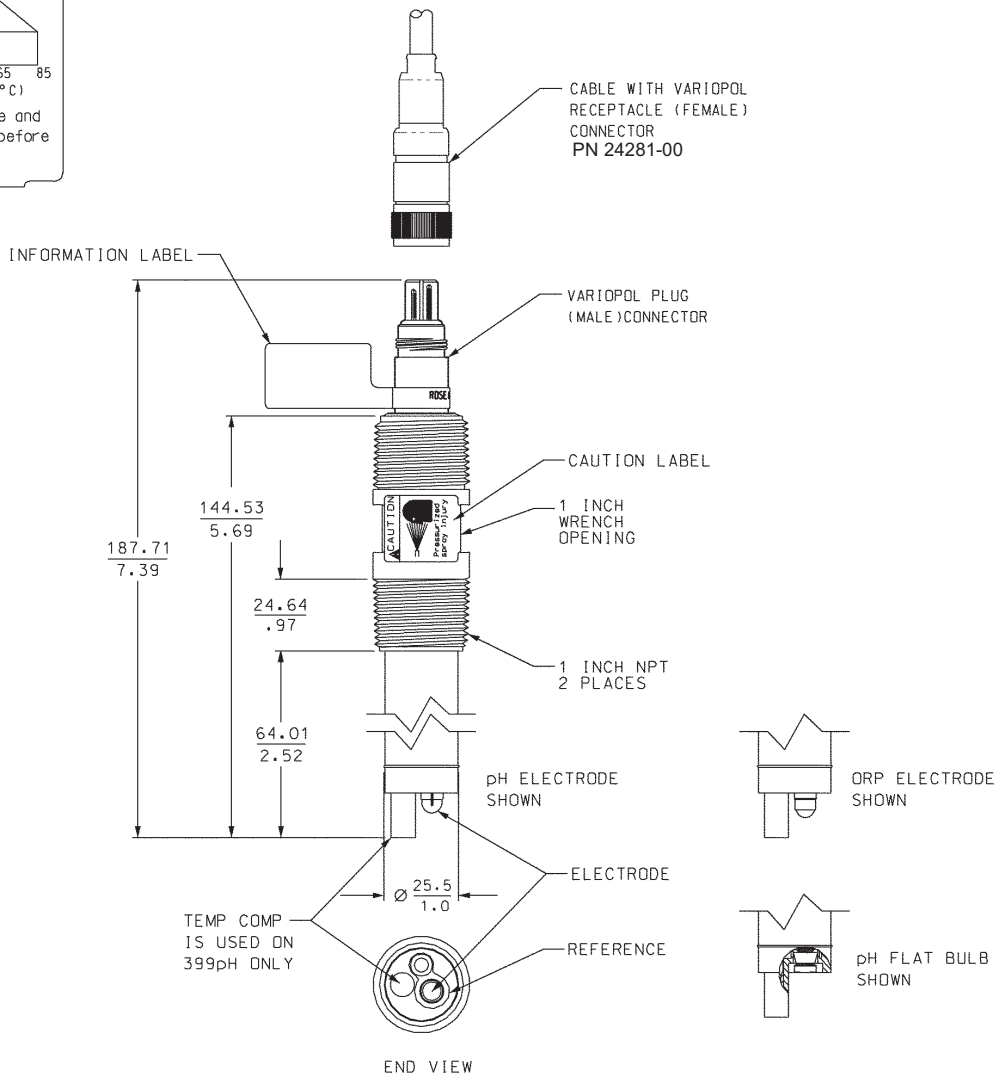
- High pH glass provides greater accuracy over 12.5 pH
- HF glass provides improved resistance to hydrofluoric acid up to 300 ppm



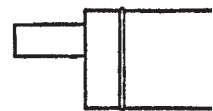
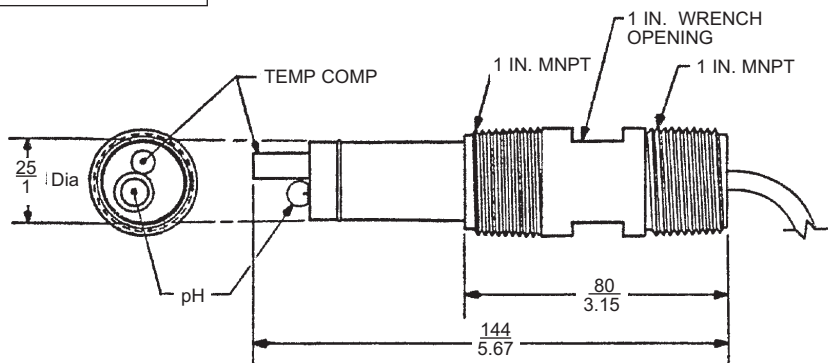
DIMENSIONAL DRAWING FOR MODEL 399VP



CAUTION LABEL SHOWN ON SENSOR BACK VIEW



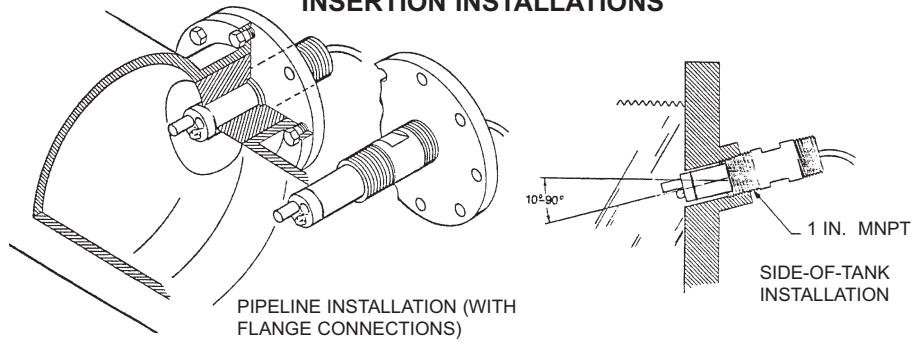
DIMENSIONAL DRAWINGS FOR MODEL 399



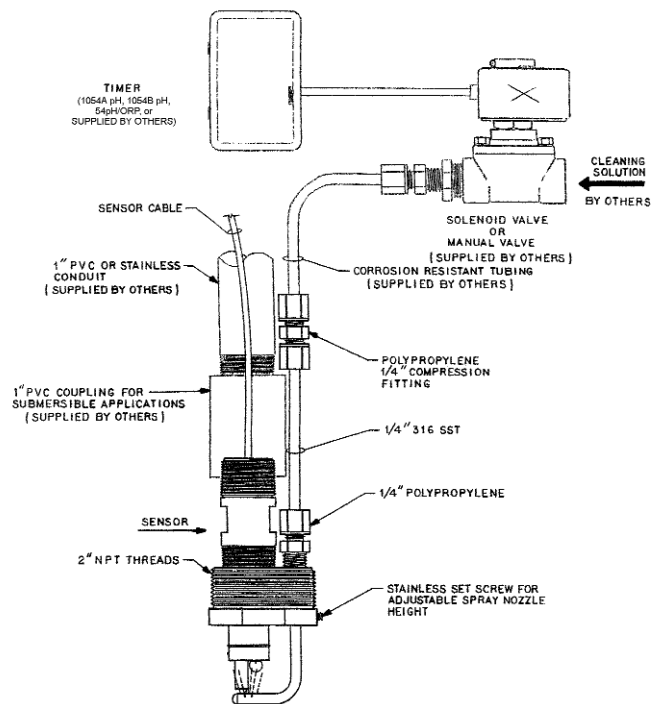
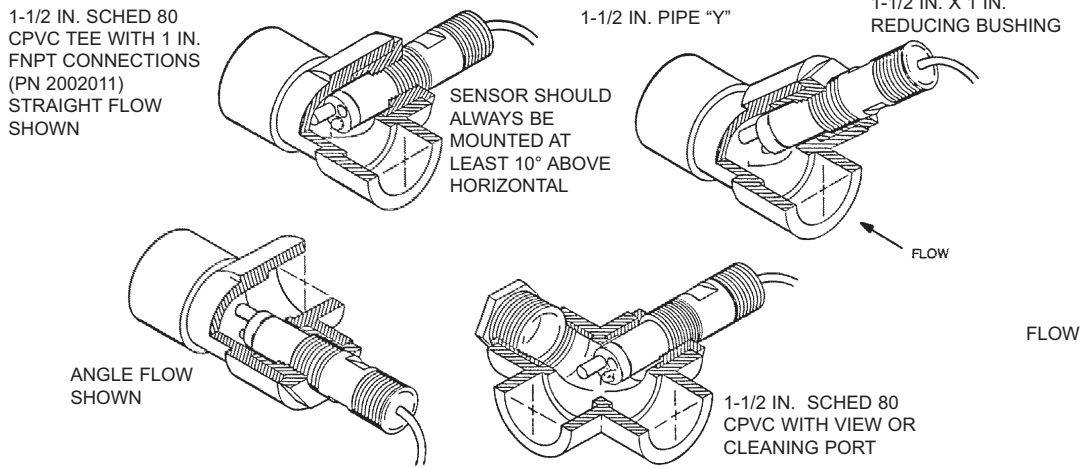
Option -71
Flat bulb sensor

INSTALLATIONS AND ACCESSORIES SPECIFICATIONS

INSERTION INSTALLATIONS

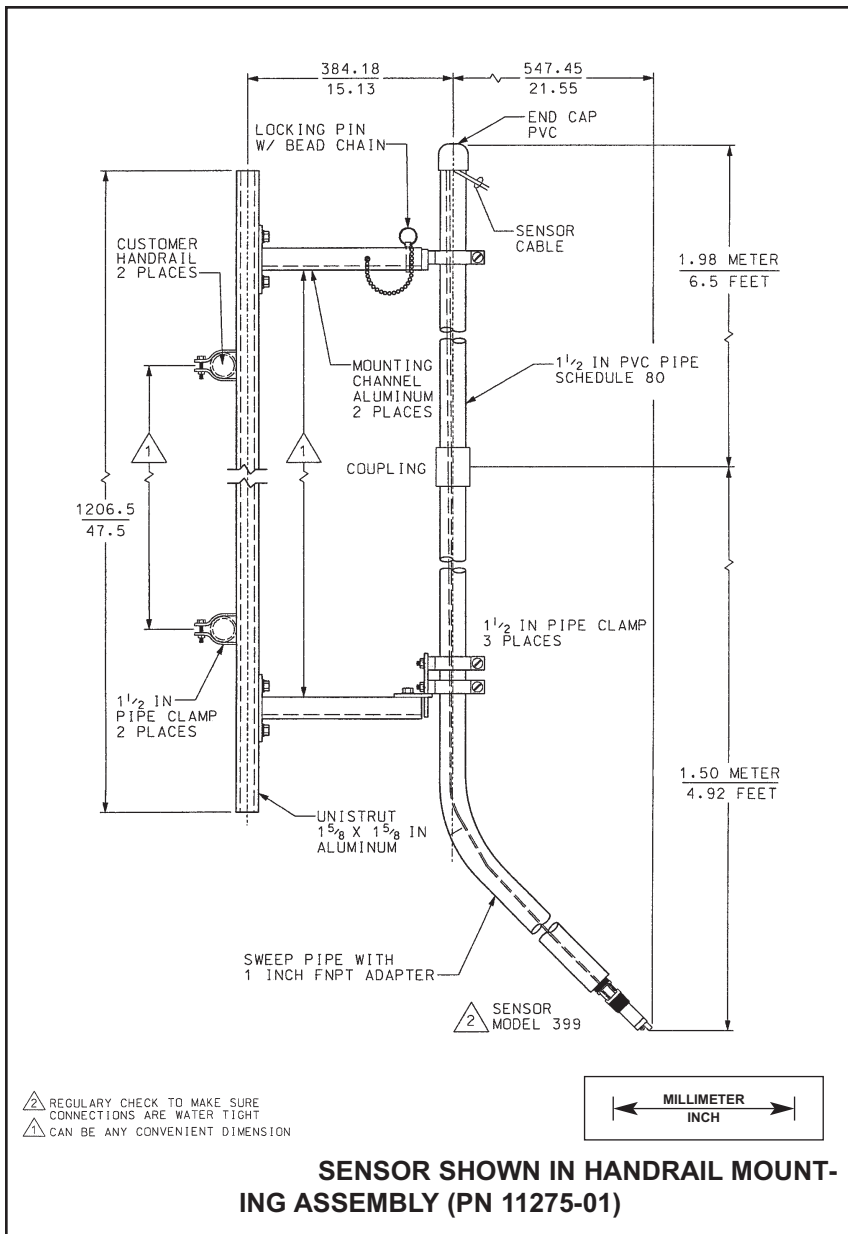


FLOW THROUGH INSTALLATION



399 with Jet Spray Cleaner (PN 12707-00) for Submersion Installations

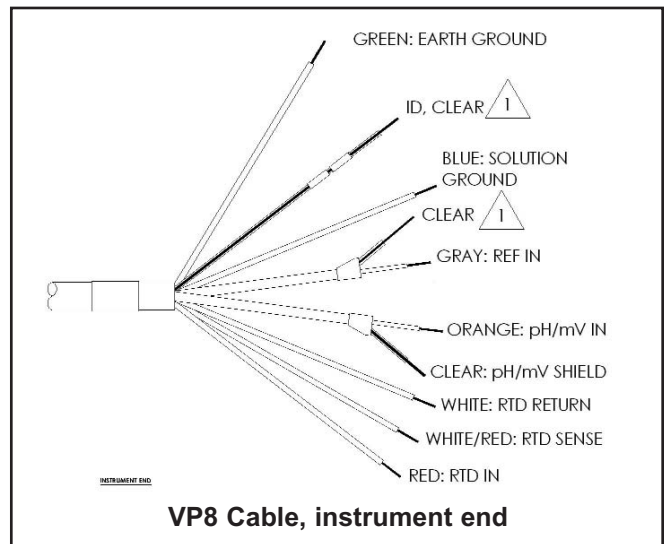
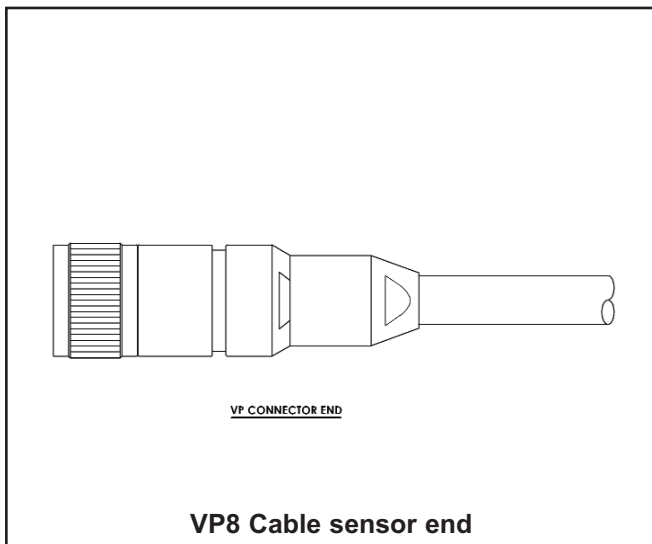
This accessory is especially useful for keeping the sensor clean in dirty ponds or tanks. It can be mounted using the Handrail Mounting Assembly or a similar submersion accessory.



Tee PN 915240-03, -04, or -05. Tee is available with 3/4 in., 1 in., or 1-1/2 in. NPT process connection threads.



Side view of Tee PN 915240-03, -04, or -05 with Model 399 or 399VP shown in middle of process flow.



ORDERING INFORMATION

The **Model 399 pH/ORP Sensor** is available with custom glass electrodes housed in a molded Tefzel body with 1 in. MNPT threads suitable for insertion, submersion or flow through installation. The sensor includes a general purpose hemi bulb pH electrode (flat bulb optional) or a platinum ORP electrode and a double junction gel filled reference electrode. The Model 399 pH is available with an hermetically sealed SMART preamplifier (-10, -14, -34) options SMART is the standard preamplifier option. The Model 399 ORP is only available with an integral preamplifier. Automatic temperature compensation is standard with the Model 399 pH, but is not required on the Model 399 ORP (except when used with the Model 1054A ORP Microprocessor Analyzer). Variable cable lengths are available for both the 399 pH and 399 ORP.



The Model 399 insertion/submersion sensor with integral cable is offered with or without a built-in preamplifier (SMART).

MODEL 399 GENERAL PURPOSE pH SENSOR	
Code	399 pH (GPLR hemi bulb) Preamplifier/Cable (Required Selection)
01	10 ft cable with integral preamp for Models 1181pH and 1050
05	32 ft cable with integral preamp for Models 1181pH and 1050
07	10 ft cable with integral preamp for Model 1054A/B and 2081 pH
08	32 ft cable with integral preamp for Model 1054A/B and 2081 pH
02	10 ft coax cable for remote preamp, 3K ohm TC (Models 1181, 1050, and 1003)
04	10 ft cable for remote preamp, Pt100 TC (Solu Cube)
09	10 ft coax cable for remote preamp, Pt100 TC (Model 1054A/B)
12	20 ft cable for Model SCL-P (Formerly pH201)
13	100 ft cable for Model SCL-P (Formerly pH201-Z100)
09	10 ft coax cable for remote preamp, Pt100 RTD
10	10 ft cable with integral SMART for Models 54e, 81, 1055, 3081, 4081, 5081, and Xmt
14	32 ft cable with integral SMART preamp for Models 54e, 81, 1055, 1056, 1057, 3081, 4081, 5081,6081 and Xmt
30	ORP sensor 32 ft cable with integral preamp for Models 1181OR and 1060
32	ORP sensor 32 ft cable with integral preamp for Model 1054A/B ORP
33	ORP sensor 20 ft cable for for remote preamp for Models SCL-Q, 54e, 81, 1055, 3081, 4081, 5081, and Xmt
34	ORP sensor 32 ft cable with SMART preamp for Models 54e, 81, 1055, 1056, 1057, 3081, 4081, 5081, 6081 and Xmt
Code	Specialized Glass Types (optional - choose one)
73	High pH (improved accuracy above 12.5 pH)
15	HF Resistant (up to 300 ppm)
71	GPLR Flat bulb (for abrasives)
Code	Option -62 only available with oprion -09
—	no selection
62	Cable prep'd wo, BNC for wiring to Models: 54, 81, 2081, 3081, 4081, 5081, XMT, 1055
Code	Specialized Reference Fills - valid only with standard hemi glass (optional - choose one) Not available with (-15, -71, -73)
—	no selection
301	Low ionic strength
302	Triple reference for improved resistance to poisoning ions (sulfide & heavy metals)
303	Low temperature storage (below freezing)
399	-14 -73 EXAMPLE

Examples of pH sensing tip offerings



Standard Hemi Bulb Tip



Optional Flat Bulb Tip

ORDERING INFORMATION

The Model 399VP pH/ORP Sensor has similar features to Model 399. The Model 399VP is SMART enabled (-70) and offered with a Variopol (VP) connector. A mating VP cable must be purchased separately. A remote preamplifier must be used if non-SMART option is selected, in case the distance to the analyzer exceeds 15ft. SMART amplifier is the standard option. VP8 cable is required for SMART communication.



The Model 399VP insertion/submersion sensor with VP (Variopol) Connector.

A Variopol cable is required for all new installations. See below for cable selection. VP8 (8 pin) connector requires VP8 cable. The VP8 cable assembly will work with VP6 (6 pin) sensor connector.

MODEL 399VP GENERAL PURPOSE pH SENSOR	
Code	Temperature Compensator (GPLR hemi bulb) (Required Selection)
02	3K ohm TC (Models 1181, 1050, and 1003)
09	Pt100 TC (Models 1054, 2054, 2081, 54, 81, 1055, 1056, 1057, 3081, 4081, 5081, 6081 and Xmt)
33	ORP
Code	Glass Type and preamplifier option (optional - choose one; not valid with special application codes)
15	HF Resistant
71	GPLR Flat bulb
73	High pH
Code	Special Applications - valid with only standard hemi glass (optional - choose one)
302	Heavy reference poisoning ions (triple reference junction)
303	High temperature spiked or Low temperature storage
399VP	-09 -71 EXAMPLE

FOR FIRST TIME 399 OR 399VP* INSTALLATIONS, WE RECOMMEND USING THE FOLLOWING GUIDE:

<p>1. Mounting Accessories (optional)</p> <ul style="list-style-type: none"> PN 23242-02, Mounting adapter kit, 1/2 in. MNPT process connection, 1 in. x 3/4 in. sensor adapter PN 915240-03, PVC flow through tee, 3/4 in. NPT process connection PN 915240-04, PVC flow through tee, 1 in. NPT process connection PN 915240-05, PVC flow through tee, 1-1/2 in. NPT process connection PN 24091-00, Acrylic low flow cell PN 2002011, 1-1/2 in. CPVC tee with 1-in. FNPT connection PN 9320057, Pipe mount union, 1 in. x 1 in. PVC PN 11275-01, Sensor handrail assembly <p>2. Junction Boxes (optional)</p> <p>Remote Junction Boxes (to extend sensor to analyzer distances)</p> <ul style="list-style-type: none"> PN 23555-00, includes preamplifier for Models 54e, 81, 3081, 4081, 5081, and Xmt PN 22719-02, NEMA 4X, Weatherproof junction box for cable extension PN 23309-03, use with 1181 and 1050 compatible preamplifier PN 23309-04, use with 1054A/B, 2081 compatible preamplifier <p>3. Preamplifiers (used to amplify signal when mounting sensor further than 15 ft from the analyzer)</p> <ul style="list-style-type: none"> PN 22698-02, Plug in preamplifier, 1181/1050 compatible (use with junction box PN 23309-03) PN 22698-03, Plug in preamplifier, 1054/1054A/1054B/2081 compatible (use with junction box PN 23309-04) <p>4. Extension cables (used with remote junction boxes)</p> <ul style="list-style-type: none"> PN 23646-01, 11 conductor cable, shielded, prepped PN 9200000, 4 conductor cable, shielded, unprepped <p>5. Other optional accessories</p> <ul style="list-style-type: none"> PN 12707-00, Jet spray cleaner PN 2001492, Stainless steel tag, specify marking (formerly Code -11) PN 9210012, Buffer solution, 16 oz, 4.01 pH PN 9210013, Buffer solution, 16 oz, 6.86 pH PN 9210014, Buffer solution, 16 oz, 9.18 pH PN R508-8OZ, Standard, 474 mV, 8 oz, (for ORP only)

* Also requires mating VP cable — see 399VP Ordering Information.

ACCESSORIES

PART NUMBER	DESCRIPTION
23645-06	15 ft cable with mating VP6 connector, prepped with BNC on analyzer end
23645-07	15 ft cable with mating VP6 connector, prepped without BNC on analyzer end
24281-00	15 ft. cable with mating VP8 connector
24281-01	25 ft. cable with mating VP8 connector
24281-02	2.5 ft. cable with mating VP8 connector
24281-03	50 ft. cable with mating VP8 connector
24281-04	100 ft. cable with mating VP8 connector
24281-05	4 ft. cable with mating VP8 connector
24281-06	10 ft. cable with mating VP8 connector
24281-07	20 ft. cable with mating VP8 connector
24281-08	30 ft. cable with mating VP8 connector
915240-03	Process tee with NPT connection threads
22719-02	Junction box
12707-00	Jet cleaner
23242-02	Insertion adapter
24091-00	Low flow cell



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