3300, 3400 and 3500

PERpH-X™ High Performance pH and ORP Sensors

- SMART preamplifier stores calibration and other data
- High Temperature Design increases sensor life when used in elevated temperature applications
- Fast, Accurate, & Stable Measurement
- Rugged, Versatile Design for mounting versatility
- Long Lasting Rebuildable Reference
- Quick Connect Cable or Integral Cable
- VP8 Connector Cable in multiple lengths

3300HT
(shown with process connector sold separately.)
155 °C at 400 psig

3400HT
(shown with retraction kit sold separately.)
155 °C at 400 psig

3500VP
120 °C at 100 psig

Features and Applications

The Rosemount Analytical PERpH-X ™ (1) high performance pH sensors incorporate SMART technology and design innovations that prolong the life of the sensor in various applications.

The SMART preamplifier option becomes enabled when used with the 56, 1056, and 1057 analyzers. 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, and manufacturing information.

Design innovations include improved durability of the AccuGlass™ (2) pH glass electrode, increased stability of the reference electrode and overall reliability of the mechanical design. The resulting sensors live longer, respond faster and drift less, thereby minimizing maintenance and lowering the total cost of ownership.

The AccuGlass pH glass electrode provides exceptional resistance to thermal degradation, even at temperatures of 155 °C in the 3300 and 3400 sensors. This translates into less breakage from thermal stress or shock and improved speed of response for fast and accurate measurements and calibrations even after months of service. The PT100 RTD used for temperature compensation is embedded inside the glass electrode, surrounded by the internal electrode to provide precise compensation when the temperature changes. The beneficial traits of near theoretical response, even at extreme values, and minimal thermal hysteresis carry over from previous AccuGlass designs. A removable slotted tip cap protects the glass bulb from direct impacts while in service and during calibration.

(1) PERpH-X is a trademark of Rosemount Analytical.
(2) AccuGlass is a trademark of Rosemount Analytical.

Most pH measurements fail due to reference electrode issues. The most common problems are fouled and poisoned electrolytes or coated and clogged reference junctions. The PERpH-X™ sensors feature an enhanced double junction reference electrode that excels in harsh applications. The specially designed porous Teflon® liquid junction has a large surface area that provides a stable contact to the solution and helps resist coating in dirty applications. The large surface area and high porosity also minimize junction potentials allowing accurate measurements without the need of an additional process standardization. The KCl based reference electrolyte is a chemically inert viscous gel that can stand up to the harshest chemicals and is unaffected by thermal or pressure cycling. The internal reference junction is a small diameter, low porosity ceramic liquid junction designed to minimize poisoning or the depletion of the primary reference cell maximizing the overall life of the sensor. (This design combines the best traits of both liquid junctions, the accuracy of a high porosity junction with the longevity of a low porosity junction.)

The PERpH-X pH sensor's reference electrode can be rebuilt if the reference junction coats or fouls in the application. Replacing a clogged reference junction and recharging the electrolyte will rejuvenate most failed sensors extending the useful life of the sensor in harsh applications. The porous Teflon junction is easily replaced by simply screwing off the sensor's front protective cap and removing the junction. With the junction removed, the electrolyte can be rinsed out and replaced with one of the various electrolytes available in the SOLUTIONS kits.

PERpH-X pH Sensor Solution Kits

Features and Applications

There are no perfect pH sensors, but the PERpH-X is moving closer.

The large variety of process applications makes it impossible for one sensor to excel everywhere. The reference electrode accounts for nearly all pH measurement failures. Errors such as noisy and drifting readings or slow and inaccurate calibrations are typically caused by the coating, fouling or poisoning of the reference electrode.

The PERpH-X sensor family was designed to expand application flexibility. The PERpH-X sensor features a rebuildable double junction reference cell so that one sensor can succeed in a variety of processes by using different reference electrolytes. No need to buy different sensors, just different electrolytes. Simply unscrew the sensor cap to remove the porous Teflon Liquid Junction. The junction can then be cleaned and reinstalled or replaced with one treated for a specific process. With the function removed, the reference is easily replaced with a specific electrolyte that optimizes the sensor for the process. The aim is to keep the Porous Teflon Liquid Junction from coating or fouling in the first place.

Six different SOLUTIONS are available as electrolyte kits:

- High Temperature Kit
- Bio-Film Resistant Kit
- Poisoning Resistant Kit
- Oil Resistant Kit
- Metals Resistant Kit

Each kit uses a specific chemistry formulated to extend the life of the reference electrode in its targeted application. While these SOLUTIONS extend the life of the electrode in the target applications, they only last so long before they are exhausted. The PERpH-X reference chamber should be refilled on a regular basis in order to maintain the highest level of performance. Each electrolyte kit contains enough reference gel for five refills.

High Temperature Solution Kit

This is the standard electrolyte that is used in all PERpH-X sensors. It is suitable for highly acidic, basic or oxidative solutions and of course high temperature. It is the base electrolyte from which each of the following are formulated.

Bio-Film Resistant Solution Kit

This kit is targeted at the water applications where bio-films and algae grow on the sensor, such as treated effluent outfalls, aeration basins, cooling towers or influent water from lakes or rivers. While safe for human contact, this electrolyte inhibits the growth of bacteria and algae on the sensor.

Poisoning Resistant Solution Kit

Chemicals that poison pH sensors typically attack the silver wire inside the electrode. These are primarily sulfides, mercaptans and cyanides. This kit targets these chemicals and should be used in any application containing sulfides. Refineries, Pulp Manufacturing, Mining and Waste Water treatment are suitable applications.

Oil Resistant Solution Kit

This kit is targeted at any water based system where light oils and greases foul the sensor. Refineries, Food Processing and many industrial waste treatment processes contain oils that foul the porous reference junction of most electrodes. This kit minimizes the fouling and allows the Porous Teflon® Liquid Junction to be replaced when it eventually does foul instead of replacing the complete pH ORP sensor.

Scaling Resistant Solution Kit

This kit targets applications where the precipitation of calcium magnesium salts like gypsum or water hardness coat over the electrode. Applications include limestone scrubbers in Power Plants, lime treatment in sugar processing and other processes.

Metal Resistant Solution Kit

This kit targets applications where the chloride in the reference electrolyte would react with the process. These are typically metal processing applications, hence the name. The electrolyte in this kit is not KCl based, as are all of the others, but instead uses potassium nitrate. Applications in the Metal, Mining and the Chemical Processing industries are the most common. The PERpH-X pH™/ORP sensor solution kits consist of a Porous Teflon Liquid Junction (PTLJ) treated in the specific electrolyte, an EPDM O-ring kit and a syringe of the reference electrolyte capable of recharging the reference five times. Viton® or Kalrez® O-ring kits can also be ordered separately.

The successful measurement of pH requires more than just a great pH glass electrode or a great reference electrode, it requires that these electrodes are built into a sensor that can withstand the demanding environments present in Chemical Processing Industries. The 3300/3400 pH/ORP sensors accomplish this through the use of a molded Ryton® body housed in a titanium tube. The 3500P uses only the molded Ryton body, no titanium tube. The chemically resistant construction of both versions is further enhanced by the choice of either EPDM, Viton or Kalrez o-rings.

The PERpH-X High Performance pH/ORP sensors were not only evaluated in high temperature applications but in numerous chemically aggressive, dirty, and fouling applications. This design provides superior performance in most applications including pulp stock, lime slurries, scrubbers, carpet dyeing and waste neutralizations containing organic solvents.

SMART Preamplifier and Cables

The PERpH-X pH Sensors are offered with SMART preamplifier enabled configurations: (-70) for the 3300HTVP/ 3400HTVP and (-01) for 3500P/3500VP. SMART capabilities of the sensors become enabled when used with SMART 56, 1056, and 1057 analyzer.

The PERpH-X pH Sensors are available with either an integral cable or quick disconnect VP8 cable (8 pin) connector. The mating VP8 cable must be purchased separately. VP8 cables are available in various lengths. Standard integral cable length is 15 ft or 25 ft. wiring directly to the analyzer or junction box. Various integral cable lengths can be ordered as special options.

The PERpH-X Sensors are compatible with Rosemount Analytical 56, 1056, 1057, 1066, and 5081 instruments. Most other manufacturers instruments that use PT100 RTDs and do not require an integral preamplifier are also compatible.

***3500VP**. Insertion/Submersion Sensor with VP connector and mating VP cable*

Performance and Physical Specifications

Sensor Type: PERpH-X
3300HT/HTVP
3400HT/HTVP
3500P/3500VP

Measured Range:
pH range: 0 – 14 pH
ORP range: -1500 mV to 1500 mV

Percent Linearity Over pH Ranges:

pH Range	HT Series
0–2 pH	94%
2–12 pH	99%
12–13 pH	97%
13–14 pH	92%

Performance and Physical Specifications (continued)

Operating Temperature:
3300HT/3400HT without preamplifier: 5 °C to 155 °C (41 °F to 311 °F);
3300HTVP SMART enabled pre-amp up to 100 °C (212 °F)
3400HTVP SMART enabled pre-amp up to 145 °C (293 °F)
3500P/3500VP: 5 °C to 120 °C (41 °F to 248 °F)

Storage Temperature:
3300HT/3400HT -10 °C to 70 °C (14 °F to 138 °F)
3500P/3500VP: -10 °C to 50 °C (41 °F to 122 °F)

Maximum Process Pressure:
3300HT/3400HT: 400 psig (2859 kPa [abs]).
CRN rating: 200 psig at room temperature.
3500P/3500VP: 100 psig (790 kPa [abs])
CRN rating: 40 psig at room temperature.

Maximum Pressure at Retraction or Insertion (Model 3400HT only): 64 psig (542 kPa [abs]) Code 21 35 psig (343 kPa [abs]) Code 25

Materials: Titanium, Ryton, Teflon® glass, and user specified o-ring material

Reference Electrode: Double junction with replaceable process side electrolyte and Teflon junction

Temperature Sensor: Platinum RTD 100 Ohm

Process Connections:
3300/3400 must use 1 inch compression process connector (PN 23166-00 or 23166-01).
3400HT can be inserted through a ball valve
3500P/3500VP 1 inch MNPT, Front and Rear facing Threads

Integral Cable: 15 ft integral is standard, optional 9.5 in. on 3400HT only.
3500P with (-01) option: 25ft. prepped ends
3500P with (-02) option: 15ft. prepped ends

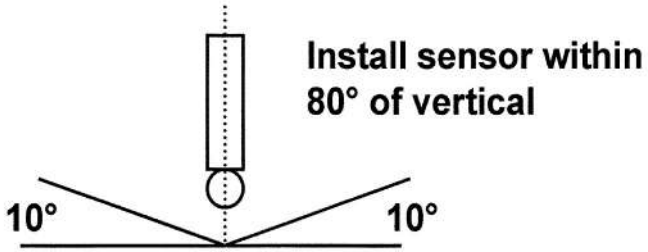
VP8 Cable: use PN 24281-00 is 15 ft and standard.
See page 15 for other lengths and part numbers.

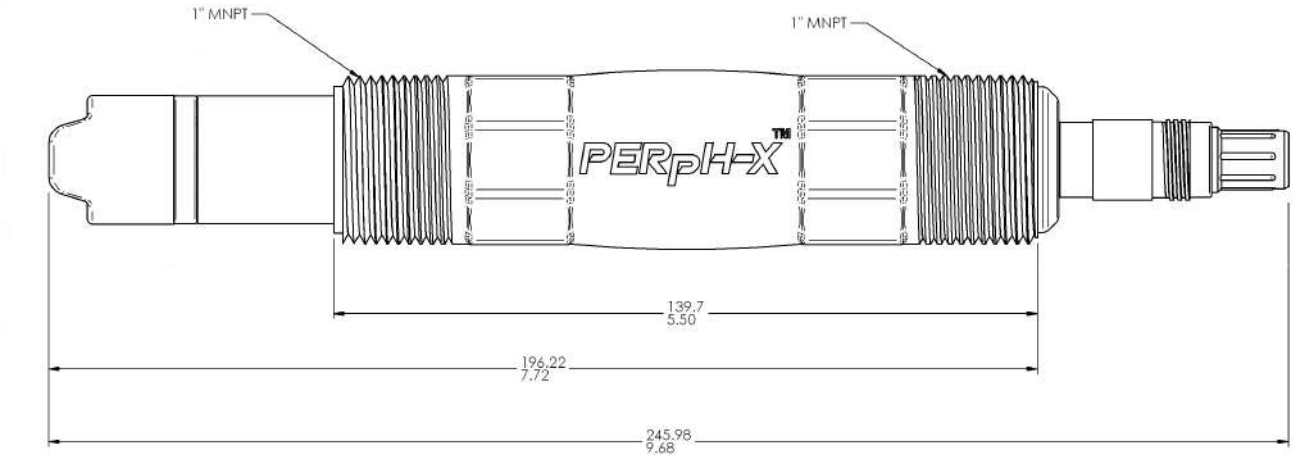
Weight/Shipping Weight:
3300HT sensor:
1 lb/2 lb (0.5 kg/0.9 kg)

3400HT sensor:
Code 21; 2 lb/3 lb (0.9 kg/1.4 kg)
Code 25; 3 lb/4 lb (1.4 kg/1.8 kg)

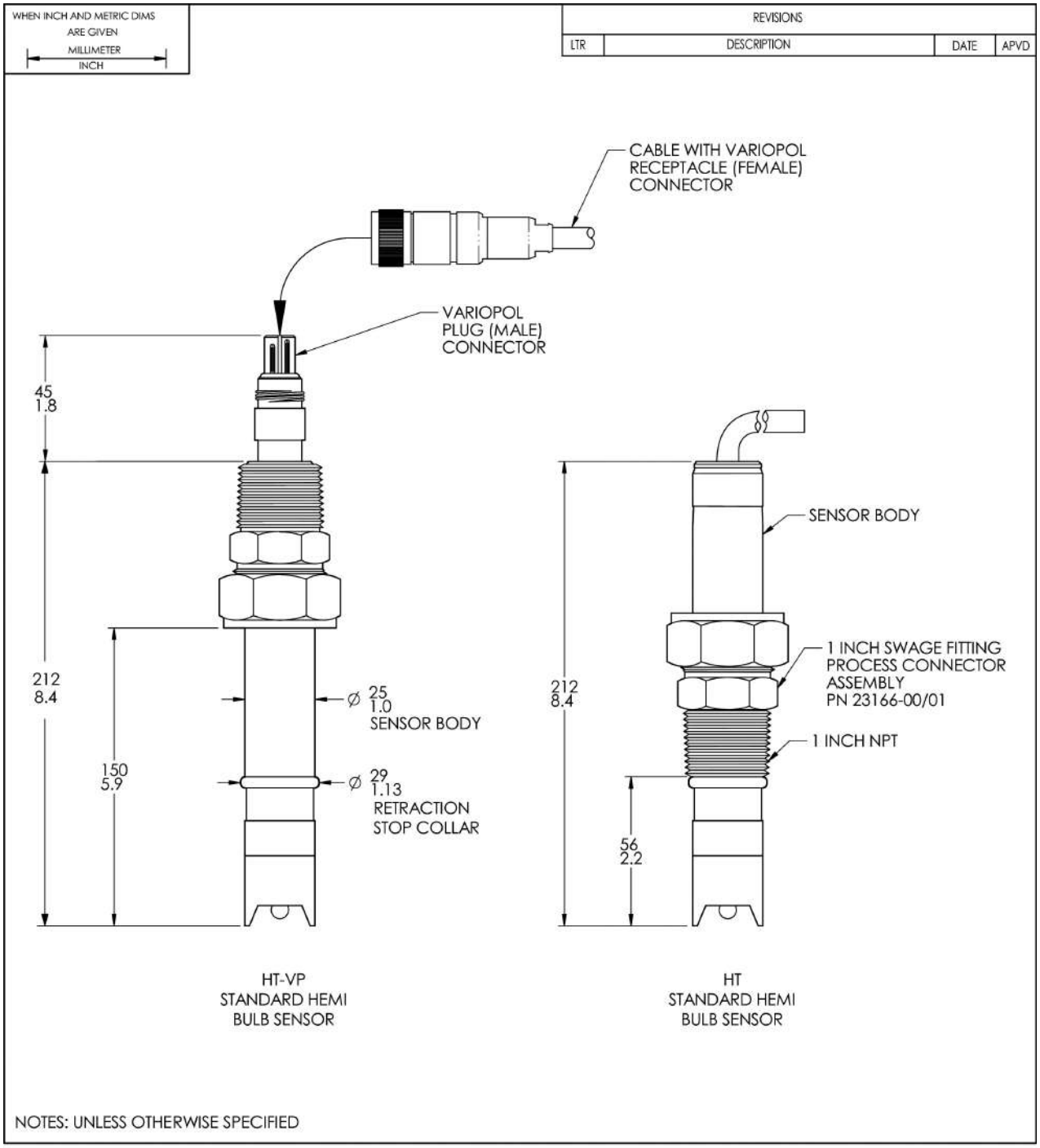
3500P sensor:
1 lb/2 lb (0.5 kg/0.1 kg)

Hazardous Location Approvals:





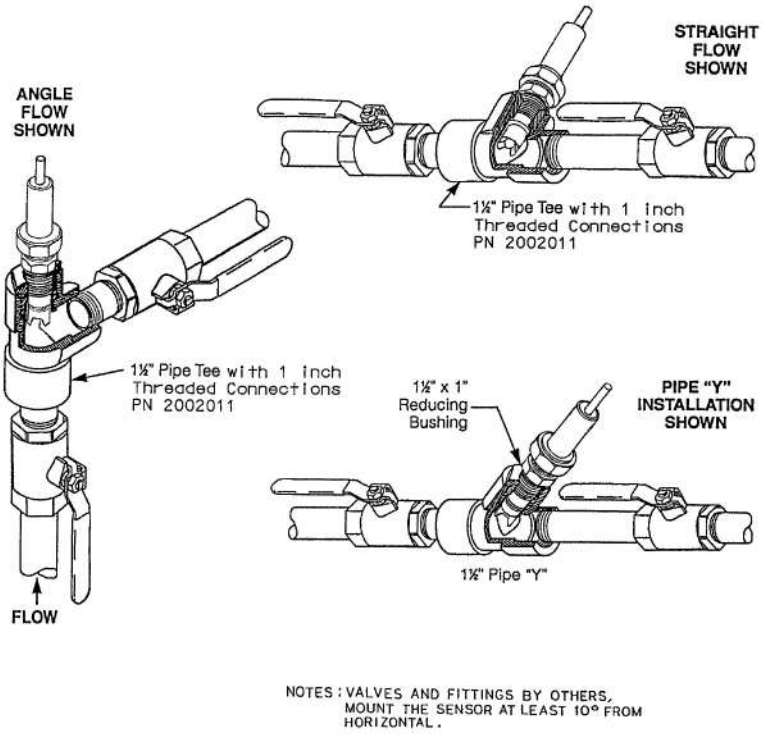
Dimensional Drawing for the 3500VP



Dimensional Drawing - 3300HT and 3300HTVP Insertion/Submersion Sensor

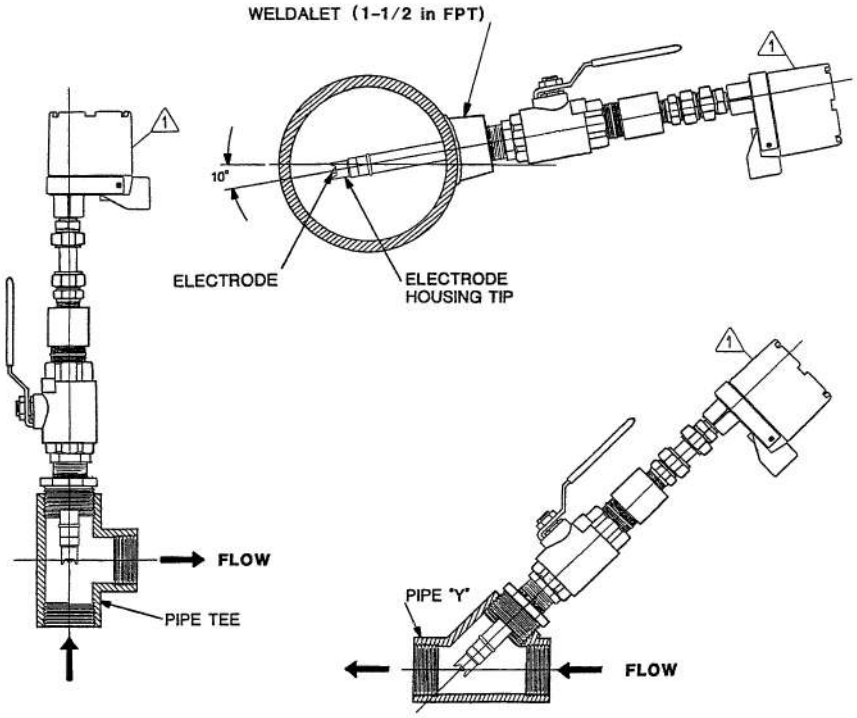
The process connector can be placed onto 3300HT with the threads facing down for insertion mounting into a tee or the threads facing up for a submersion pipe mount connection.

Note: Unless Otherwise Specified.



Recommended Flow-Through and Insertion Installation for the 3300HT

1–½ inch Pipe Tee (PN 2002011) with 1 inch threaded connections

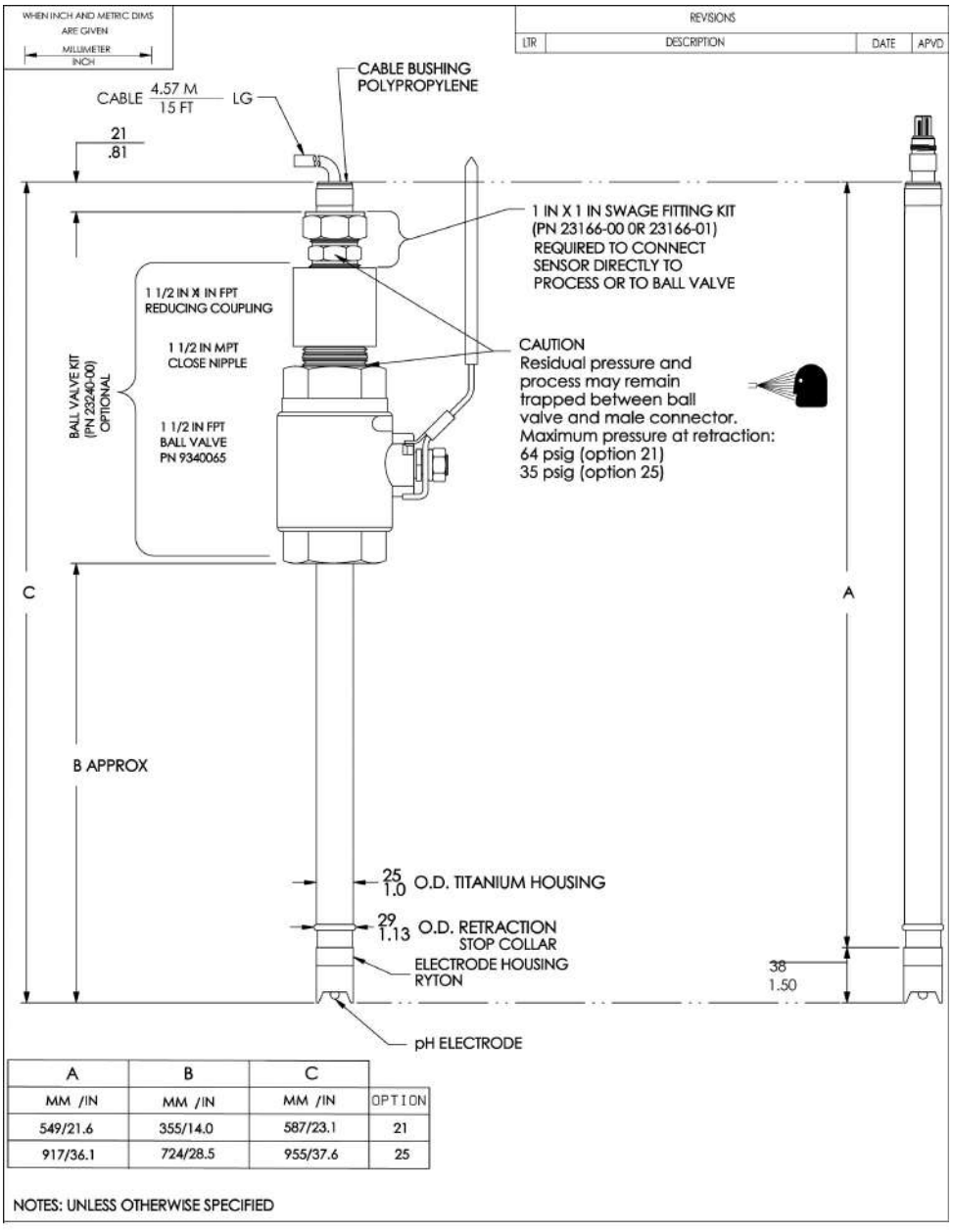


Typical Mounting Details - 3400HT Retraction Version

Note: Sensor must be mounted at an angle between 10° and 90° above the horizontal. Pipe tees and weldalets provided by customer.

Ball Valve Kit (PN 23240-00) used with the 3400HT and 3400HT VP retractable sensor

A process connector (PN 23166-00 or -01) must be used to connect the sensor to Ball Valve Kit 23240-00. Process connector can be purchased separately.



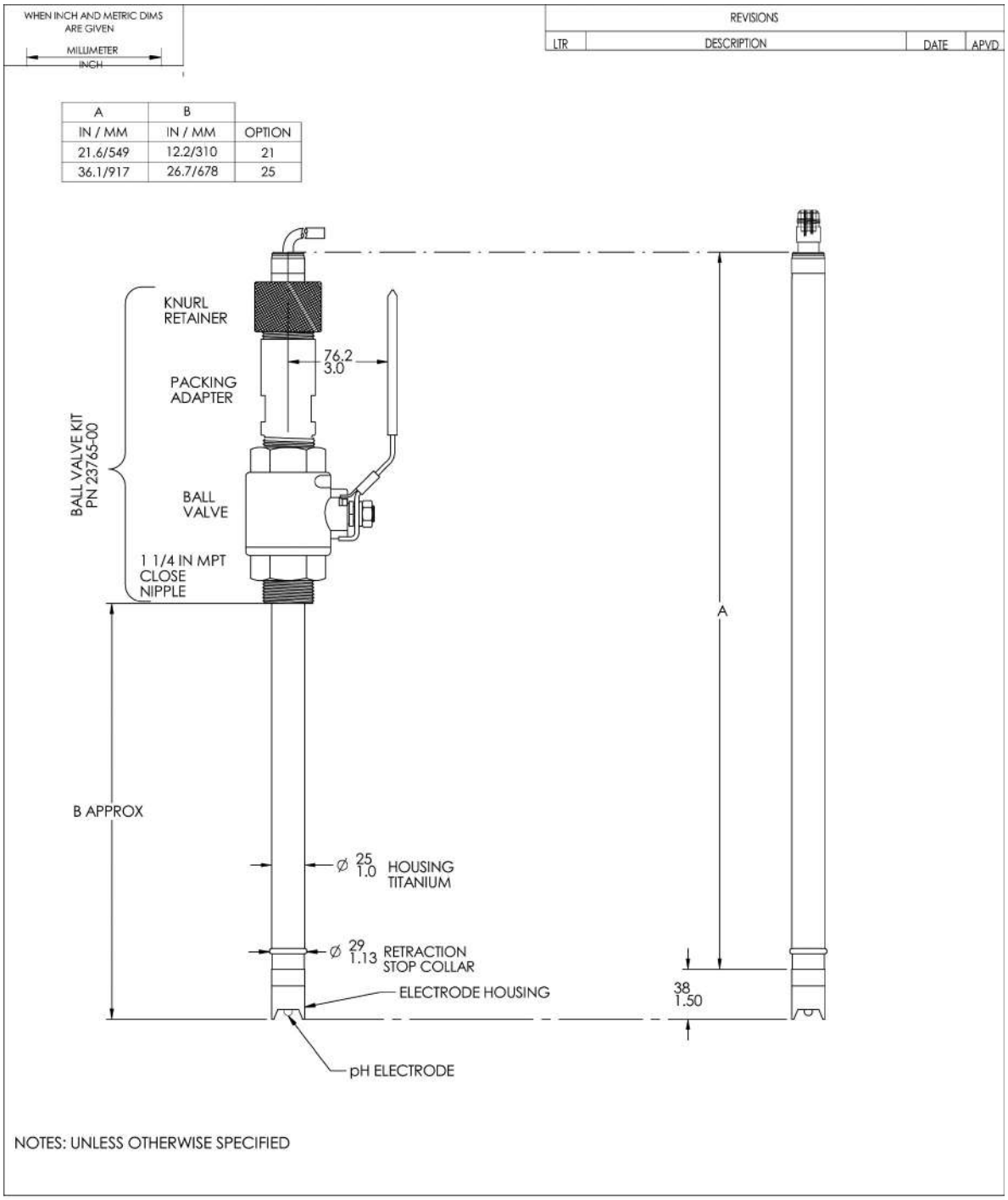
A	B	C	
MM /IN	MM /IN	MM /IN	OPTION
549/21.6	355/14.0	587/23.1	21
917/36.1	724/28.5	955/37.6	25

Dimensional Drawings of 3400HT and 3400HT VP with and without 1–½ in. Ball Valve Kit PN 23240-00

For the ball valve installation shown, the ball valve kit (PN 23240-00) and 1 in. x 1 in. process connector (PN 23166-00 or 23166-01) must be purchased separately.

Note: Add five (5) inches to length of sensor if mounting a sensor-head junction box onto the sensor.

Ball Valve Kit PN 23765-00 contains a 1¼" full port ball valve, 1¼" close nipple, and a retraction kit (PN 23796-00) with carbon graphite packing for easy sensor insertion and removal. Retraction kit PN 23765-00 is also sold separately.

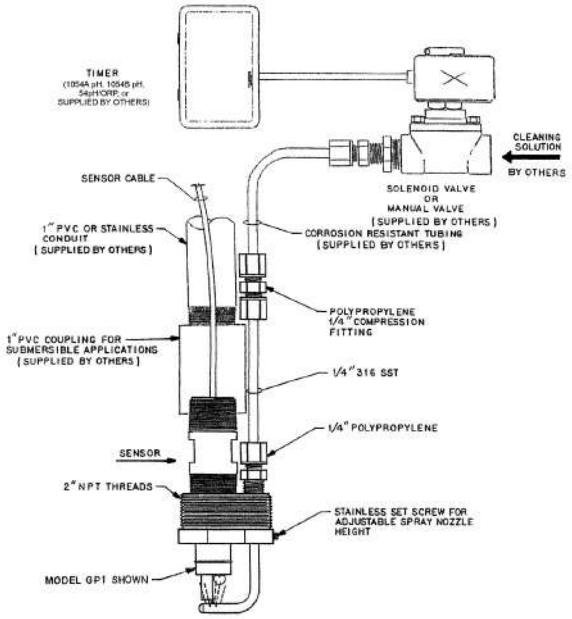


Dimensional Drawing – 3400HT with 1¼" Ball Valve Kit PN 23765-00

Note: Add five (5) inches to dimension A if mounting a sensor head junction box onto the sensor.

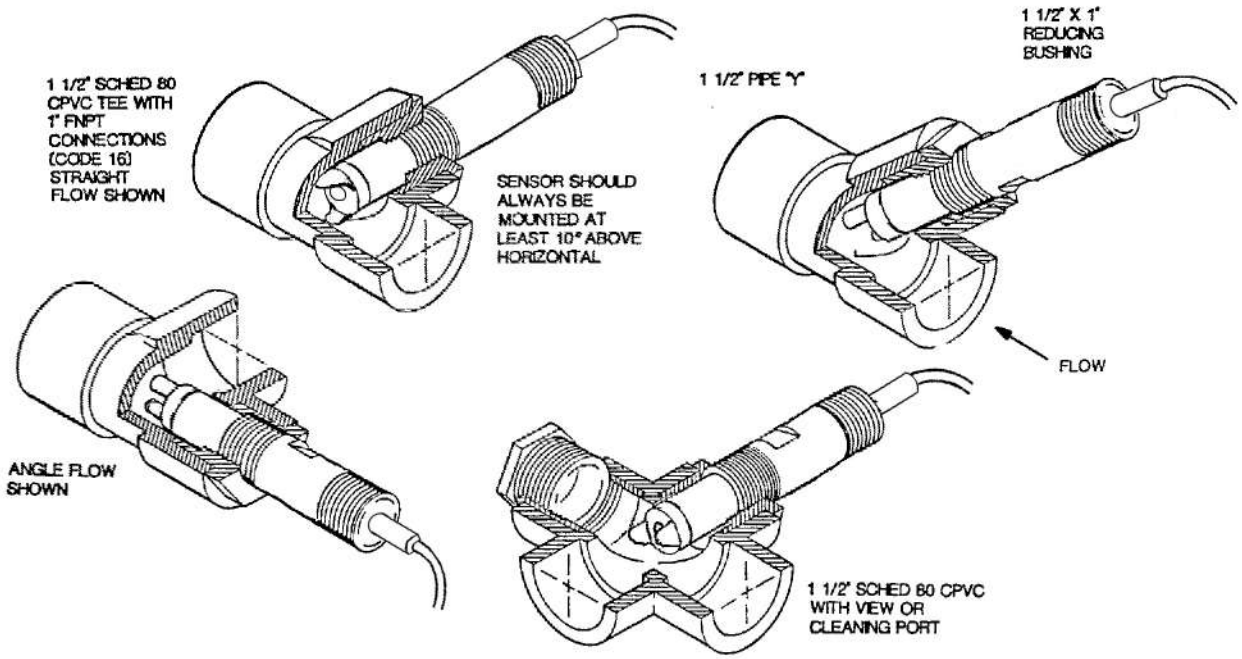
Jet spray cleaner

Jet spray cleaner with 3500VP sensor

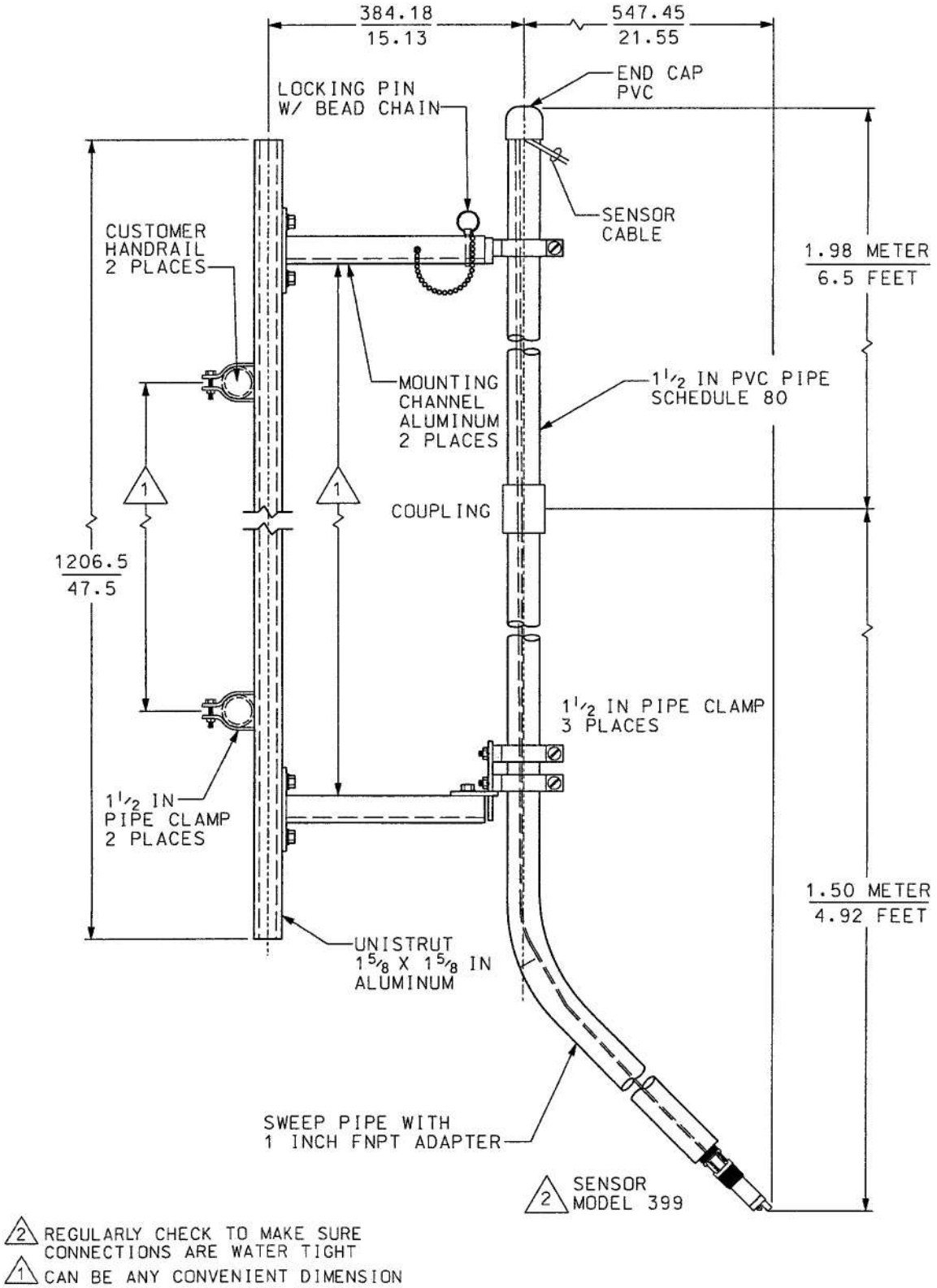


3500P with Jet Spray Cleaner (pn 12707-00) for Submersion Installations

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.

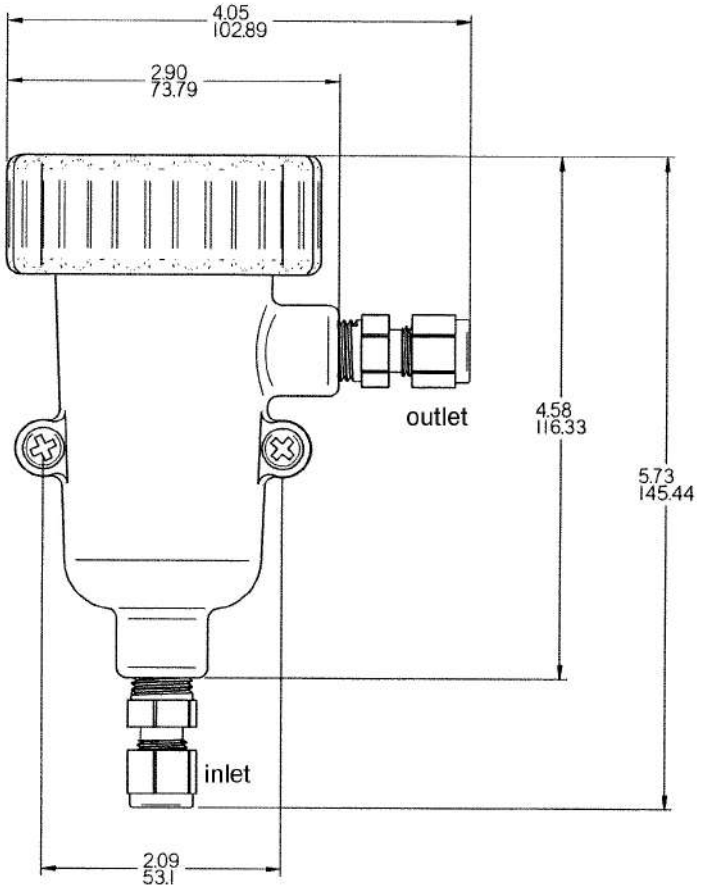


3500P Flow Through Installations



3500P and 3500VP Submersion Installation Using the Handrail Mounting Assembly (PN 11275-01)

All parts shown are supplied; sensor is sold separately.



Low Flow Cell Assembly (PN 24091-00) for use with the 3500 Sensor

Ideal for tapping into existing pipe lines or for minimal process flow requirements.

Metal Process Connector PN 23166-xx (xx = 00 for 316 SST and xx = 01 for Titanium) can be used for insertion or submersion connection to 1-inch tee fittings. It also must be used to connect the 3400HT to ball valve PN 23240-00 or directly to the process.

The metal process connector gives the sensor various insertions depths, depending on where the user locates the compression fitting. Also the threads can be switched to face the cable end of the sensor for connection to submersion pipes.

Ordering Information - 3300HT & 3300HTVP

The 3300HT pH/ORP Sensor is designed for use at high temperatures and is fabricated with a Ryton® body. The sensor assembly is housed in a titanium tube and requires a process connector (PN 23166-00 or 23166-01, ordered separately) for installation.

The sensor includes a hemi glass pH electrode bulb, a Teflon reference junction, and a Pt100 RTD for temperature compensation.

Two wiring configurations are available: Variopol connector (3300HTVP), and 15 foot integral cable for connecting directly to an analyzer or transmitter (3300HT). A junction box kit with preamplifier (ordered separately) is required if the sensor cannot be installed within 15 feet of the analyzer/transmitter. When used with integral preamp SMART option is standard (option 70). VP8 cable is required for SMART communication.

3300HT 3300HTVP	Insertion/submersion sensor Insertion/submersion sensor/ VP connector*
CODE	**Measuring electrode type (Required Selection)**
10	GPHT hemi glass, General Purpose High Temperature (0–14 pH)
12	ORP
CODE	**O-ring material (Required Selection)**
30	EPDM
31	Viton®
32	Kalrez®
CODE	**Preamplifier Option (required selection for 3300HTVP, not available for 3300HT)**
–	No Preamplifier
70	SMART Preamplifier
3300HTVP	**-10 30 EXAMPLE**

For first time model 3300HT insertion or submersion installations, Rosemount Analytical recommends using the following guide:

	Weight / Shipping Weight
1. Process Connector Accessories (required for all first time installations with 1-inch process Weight/Shipping Weight connection threads) Choose one: PN 23166-00, 316 SST, 1 in. x 1 in. NPT process connector, with EPDM o-ring PN 23166-01, Titanium, 1 in. x 1 in. NPT process connector, with EPDM o-ring Choose one (optional process connector o-rings) PN 9550220, Kalrez o-ring, 2–214 PN 23238-00, VIon o-ring, 2–214	0.5 lb (0.3 kg)/1.0 lb (0.5 kg) 0.5 lb (0.3 kg)/1.0 lb (0.5 kg) 0.1 lb (0.05 kg)/1.0 lb (0.5 kg) 0.1 lb (0.05 kg)/1.0 lb (0.5 kg)
2. Remote Junction Boxes (optional, recommended for sensor to analyzer distances of more than 15 ft) Choose one: PN 23555-00 includes preamplifier for 54e, 1055, 1056, 5081, Xmt	1.3 lb (0.6 kg)/2.0 lb (1.0 kg)
3. Extension cables (used with remote junction boxes) Choose one: PN 23646-01, 11 conductor, shielded, prepped PN 9200273, 11 conductor, shielded, unprepped	0.5 lb/ft (0.3 kg/ft)/ 1.0 lb/ft (0.5 kg/ft)
4. VP* Connector Cable (required for first time installations of the 3300HTVP sensor) PN 24281-00 15' VP8 cable See accessories for more VP8 cables with various lengths.	1.3 lb (0.6 kg)/2.0 lb (1.0 kg)

* A mating VP connector cable is required for all 1st time installations. See Accessories for more information.

Ordering Information - 3400HT & 3400HTVP

The 3400HT pH/ORP Sensor is designed for use at high temperatures and is fabricated with a Ryton® body. The sensor assembly is housed in a titanium tube and requires a process connector (PN 23166-00 or 23166-01, ordered separately) for installation.

The sensor can be used in a ball valve (ordered separately) for hot tap (retractable) applications. The sensor includes a hemi glass pH electrode bulb, a Teflon® reference junction, and a Pt100 RTD for temperature compensation. Three wiring configurations are available: Variopol connector (3400HTVP), 9.5 inch lead for sensor head junction box mounting (-61), and 15 foot integral cable for connecting directly to an analyzer or transmitter(-62). Junction box kits with preamplifiers (ordered separately) are required if the sensor cannot be installed within 15 feet of the analyzer/transmitter. When used with integral preamp SMART option is standard (option 70). VP8 cable is required for SMART communication.

3400HT 3400HTVP	Retractable sensor Retractable sensor / vp connector*
CODE	**Measuring electrode type (Required Selection)**
10	GPHT hemi glass, General Purpose High Temperature (0–14 pH)
12	ORP
CODE	**Sensor Length (Required Selection)**
21	21 in. Titanium Tube
25	36 in. Titanium Tube
CODE	**O-ring material (Required Selection)**
30	EPDM
31	Viton®
32	Kalrez®
CODE	**Cable length (required selection for 3400HT, not available for 3400HTVP)**
61	9.5 in. Cable no BNC (for use with sensor head junction boxes)
62	15 ft. Cable, no BNC (for wiring directly to transmitter/analyzer/junction box)
CODE	**Preamplifier Option (required selection for 3400HTVP, not available for 3400HT)**
–	No Preamplifier
70	SMART Preamplifier
3400HT	**-10 -21 -30 -62 EXAMPLE**

For first time model 3300HT insertion or submersion installations, Rosemount Analytical recommends using the following guide:

Accessories

	Weight/Shipping Weight
1. Retractable Mounting	
A. Choose one (required for all first time installations without ball valves or with 1-½ in. ball valve):	
PN 23166-00, 1 in. MNPT process connector, Stainless Steel with EPDM O-ring	0.5 lb (0.3 kg)/1.0 lb (0.5 kg)
PN 23166-01, 1 in. NPT process connector, Titanium with EPDM O-ring	0.5 lb (0.3 kg)/1.0 lb (0.5 kg)
PN 23796-00, Retraction Kit, 31655T, for use with a 1¼" full port ball valve (supplied by others)	
B. Choose one (Optional; Process Connector O-rings):	
PN 9550220, O-ring, Kalrez, 2–214	0.1 lb (0.05 kg)/1.0 lb (0.5 kg)
PN 23238-00, O-ring, Viton, 2–214	0.1 lb (0.05 kg)/1.0 lb (0.5 kg)
C. Choose one:	
PN 23240-00, 1–½ in. ball valve assembly, 316 SST (process connector required)	6.0 lb (3.0 kg)/7.0 lb (3.5 kg)
PN 23765-00, 1–¼ in. ball valve assembly, 316 SST	6.0 lb (3.0 kg)/7.0 lb (3.5 kg)
2. Junction Boxes (Optional; Choose either Sensor Head or Remote)	
A. Sensor Head Junction Boxes (used with 9.5 in. cable length sensor) Choose one:	
PN 23709-00; includes preamplifier for 54e, 1055, 5081, Xmt	3.3 lb (1.5 kg)/4.0 lb (2.0 kg)
B. Remote Junction Boxes (used with 15 ft cable length sensor) Choose one:	
PN 23555-00; includes preamplifier for 54e, 1055, 1056, 5081, Xmt	1.3 lb (0.6 kg)/2.0 lb (1.0 kg)
3. Extension Cables - Choose one:	
PN 23646-01, 11 conductor, shielded, prepped	0.1 lb/ft (0.05 kg/ft)/1.0 lb/ft (0.5 kg/ft)
PN 9200273, 11 conductor, shielded, unprepped	0.1 lb/ft (0.05 kg/ft)/1.0 lb/ft (0.5 kg/ft)
4. VP* Connector Cable (required for first time installations of the 3400HTVP sensor)	
PN 24281-00 15' VP8 cable	1.3 lb (0.6 kg)/2.0 lb (1.0 kg)
See accessories for more VP8 cables with various lengths.	

* A mating VP connector cable is required for all 1st time installations. See Accessories for more information.

Ordering Information - 3500P & 3500VP

The 3500P Sensor is a versatile sensor platform for measuring pH or ORP. A platinum PT100 RTD is used for temperature compensation. The rugged Ryton® body and rebuildable reference electrode construction with front and rear facing 1" MNPT threads allows use in either insertion or submersion applications. The 3500P uses an integral cable, 25 ft., with SMART preamplifier (-01) and 15 ft. without (-02).

The 3500VP Sensor is a versatile sensor platform for measuring pH or ORP. A platinum PT100 RTD is used for temperature compensation. The rebuildable reference electrode and rugged Ryton body construction with front and rear facing 1" MNPT threads allow use in either insertion or submersion applications.

The 3500VP uses the VP8 connector and it requires a cable assembly purchased separately. SMART option (-01) is available. VP8 cable is required for SMART communication.

The SOLUTIONS Kits optimize the sensor's performance by keeping the porous Teflon® reference from coating and the electrolyte from fouling in the first place. Six different SOLUTIONS are available as electrolyte kits: the High Temperature Kit, the Bio-Film Resistant Kit, the Poisoning Resistant Kit, the Oil Resistant Kit, the Scaling Resistant Kit and the Metals Resistant Kit. Each kit contains a treated porous Teflon reference junction and a specially formulated electrolyte to extend the life of the reference electrode in its targeted application.

3500P 3500VP	High Performance pH sensor High Performance pH sensor/VP Connector*
CODE	**Electrolyte Selection**
HT	High Temperature default choice
BF	Bio-film Resistant
PR	Poisoning Resistant
OR	Oil Resistant
SR	Scaling Resistant
MR	Metal Resistant
CODE	**Preamplifer/Cable (Required Selection)**
01	Integral preamplifier, SMART capable standard, 25 ft. Cable (5 °C to 85 °C submersion) (insertion up to 120 °C at 100 psig)
02	Without integral Preamplifier, 15 ft. Cable
CODE	**Measuring Electrode Type (Required Selection)**
10	GPHT hemi glass bulb
12	ORP
CODE	**Reference Type (Required Selection)**
21	Double Junction
CODE	**O-ring material (Required Selection)**
30	EPDM
31	Viton®
32	Kalrez®

3500-HT -02 -12 -21 -32 EXAMPLE

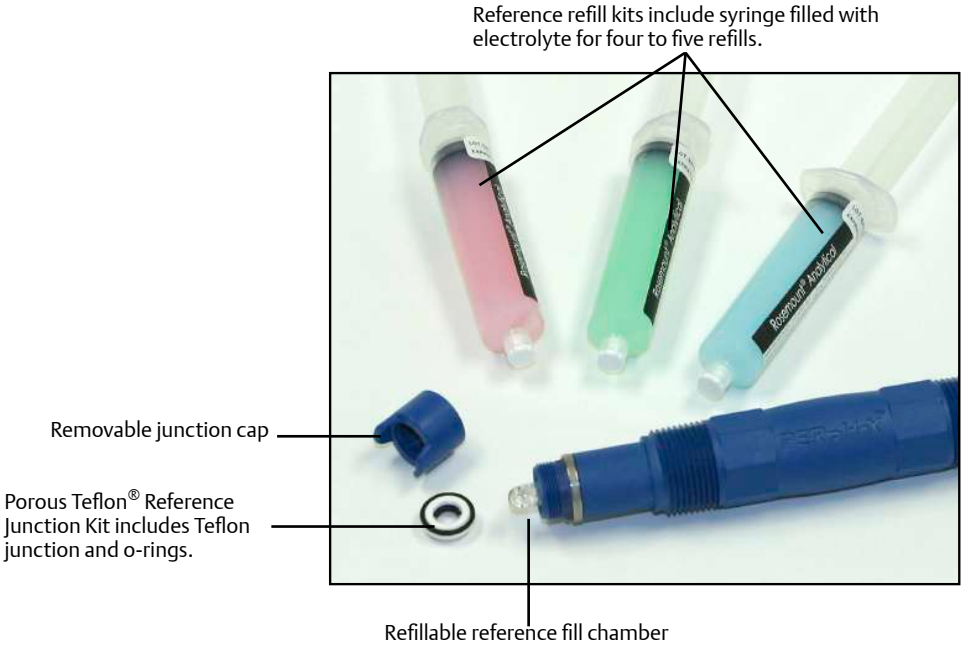
Accessories

Part Number	Description
23555-00	Junction Box with Preamplifier for 54e, 3081, 4081, 5081, XMT, 1055, 1056
915240-03	PVC flow through Tee, ¾ in. NPT process connection
915240-04	PVC flow through Tee, 1 in. NPT process connection
915240-05	PVC flow through Tee, 1–½ in. NPT process connection
2002011	CPVC flow through Tee, 1–½ in. NPT process connection
11275-01	Sensor handrail assembly
24091-00	Acrylic low flow cell (operating temperature < 125 °F)
12707-00	Jet Spray Cleaner

* A mating VP connector cable is required for all 1st time installations. See Accessories for more information.

Accessories (continued)

Part Number	VP Connector Cables-Use for 1st time Installation of a 3300HTVP, 3400HTVP or 3500VP Sensor
24281-00	15 ft. (5 m) cable with mating VP8 connector
24281-01	25 ft. (8 m) cable with mating VP8 connector
24281-02	2.5 ft. (0.8 m) cable with mating VP8 connector
24281-03	50 ft. (15 m) cable with mating VP8 connector
24281-04	100 ft. (30 m) cable with mating VP8 connector
24281-05	4 ft. (1.2 m) cable with mating VP8 connector
24281-06	10 ft. (3 m) cable with mating VP8 connector
24281-07	20 ft. (6 m) cable with mating VP8 connector
24281-08	30 ft. (9 m) cable with mating VP8 connector
	Calibration Solutions
9210012	Buffer solution, 4.01 pH, 16oz
9210013	Buffer solution, 6.86 pH, 16oz
9210014	Buffer solution, 9.18 pH, 16oz
R508-8OZ	ORP solution, 460 mv ± 10 at 20 °C
	Solution Kits-contain everything needed to rebuild the reference electrode. Included is one Teflon junction, replacement o-rings, and a syringe with reference electrolyte.
24231-00	High Temperature (HT) Solution Kit (0 °C to 145 °C, 293 °F) w/EPDM o-rings
24231-01	Bio-Film Resistant (BF) Solution Kit (0 °C to 60 °C, 140 °F) w/EPDM o-rings
24231-02	Poisoning Resistant (PR) Solution Kit (0 °C to 100 °C, 212 °F) w/Viton® o-rings
24231-03	Oil Resistant (OR) Solution Kit (0 °C to 100 °C, 212 °F) w/Viton o-rings
24231-04	Scaling Resistant (SR) Solution Kit (0 °C to 100 °C, 212 °F) w/EPDM o-rings
24231-05	Metals Resistant (MR) Solution Kit, KNO3 (0 °C to 145 °C, 293 °F) w/EPDM o-rings



Solution kits contain a syringe, Teflon reference junction, and 0-rings

	Porous Teflon® Reference Junction Kits-include one Teflon junction and listed o-rings. Use these replacements when reference junction becomes dirty and clogged.
24238-00	HT Porous Teflon Liquid Junction (EPDM O-rings)
24239-00	HT Porous Teflon Liquid Junction (Viton O-rings)
24240-00	HT Porous Teflon Liquid Junction (Kalrez O-rings)
24238-01	BF Porous Teflon Liquid Junction (EPDM O-rings)
24238-02	PR Porous Teflon Liquid Junction (Viton O-rings)
24238-03	OR Porous Teflon Liquid Junction (Viton O-rings)
24238-04	SR Porous Teflon Liquid Junction (EPDM O-rings)
24238-05	MR Porous Teflon Liquid Junction (EPDM O-rings)
	Refill Kits-include one syringe with 30cc of electrolyte refill. Use these kits when the reference junction is clean and reusable. Four to five refills per syringe.
9210392	HT Refill Kit, 30 cc Syringe (4-5 refills per syringe) (0 °C to 145 °C, 293 °F)
9210426	BF Refill Kit, 30 cc Syringe (4-5 refills per syringe) (0 °C to 60 °C, 140 °F)
9210425	PR Refill Kit, 30 cc Syringe (4-5 refills per syringe) (0 °C to 100 °C, 212 °F)
9210423	OR Refill Kit, 30 cc Syringe (4-5 refills per syringe) (0 °C to 100 °C, 212 °F)
9210424	SR Refill Kit, 30 cc Syringe (4-5 refills per syringe) (0 °C to 100 °C, 212 °F)
9210422	MR Refill Kit, 30 cc Syringe (4-5 refills per syringe) (0 °C to 145 °C, 293 °F)
	Replacement o-rings for Teflon junction
24250-00	Viton® O-ring kit
24251-00	Kalrez® O-ring Kit
24270-00	EPDM O-ring Kit

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