



Innovative Sensors, Inc.



Continuous On-Line Industrial Measurement

Process pH Sensors

- *Patented Plunger pH Electrode Design*
- *Patented Porous Teflon® Liquid Junction*
- *Integral Unity Gain and Differential Preamplifiers*
- *Solution Ground to Facilitate Diagnostics*
- *Proprietary pH Glass Formulations*
- *Improved Temperature Response*
- *New TOP68 Quick Disconnect Cable System*



Product Portfolio

Innovative Sensors, Inc.

Innovative Sensors, Inc. (ISI), an ISO 9001 Company, is recognized for its consistent quality and strives for continuous improvement in its manufacturing operations. ISI has pursued and is achieving a "Best Value" manufacturing strategy. What this means to our customers is reduced process variability through automation of the glass blowing process and automatic test equipment to ensure each electrode we ship performs to its design specifications. Attention to detail coupled with our patented pH electrode performance technology provides reliable measurement in critical applications found throughout the plant water cycle.

ISI Performance Technology

- Patented Plunger¹ pH electrode design permits 360° mounting. Measuring electrode temperature cycled from -5° to 150°C (23 to 302°F)
- Patented Porous² Teflon® liquid junctions provide a chemically inert, non-fouling, low impedance reference cell.
- User friendly designs permit insertion, submersion or flow through installations with standard, off-the-shelf NPT plumbing fittings.
- Integral unity gain and differential preamplifiers provide a noise free pH signal output to most process analyzers and transmitters.
- Solution ground is available for analyzers and transmitters featuring pH glass and reference cell diagnostics or differential input preamplifiers.
- pH sensors are also available to solve ground loop problems typically found in plating baths or other tank applications.
- Proprietary pH glass formulations meet demanding applications requiring steam sterilization, measurement at low temperatures, high pH ranges or HF neutralization.
- Re-positioning the temperature compensator in the pH bulb improves temperature response and provides improved accuracy for temperature display.
- The new TOP68 quick disconnect cable connector provides the reliability of fixed cable and ease of use. The IP68 environmental rating protects the high impedance pH electrode signal from moisture resulting from condensate build up in submersion pipes or in hose-down cleaning applications found in the Food & Beverage industry.

pH Glass Membrane	GP	J	SS	T	HF
Optimum Range	2 to 10 pH	1 to 14 pH	2 to 12 pH	2 to 11 pH	0 to 12 pH
Temperature Range	-5° to 100°C 23° to 212°F	-5° to 135°C 23° to 275°F	-5° to 135°C 23° to 275°F	-20° to 50°C -4° to 122°F	-5° to 110°C 23° to 230°F
pH Glass Impedance in Megohms @ 25° C	150	375	450	25	375
Typical Applications	Water and Wastewater Coagulation Flocculation Acid / Caustic Neutralization	Chemical Processes High Temperature High pH Lowest Sodium Error	Pharmaceutical & Biotech Steam Sterilizable Fermentation	Power Utility & Semiconductor Boiler Feed Water High Purity Water	Metals & Mining HF Neutralization

¹ United States Patent No. 4,333,812

² United States Patent No. 4,128,468

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Total Operation Protection

IP68 Environmental Rating



Applications

- Ideal for use in all industrial applications
- Suitable for all 12mm electrochemical industrial and laboratory sensors
 - * pH/ ORP/ Selective Ion
 - * Conductivity
 - * Oxygen, Ozone, Chlorine

Benefits

- Waterproof, Corrosion Resistant
- Keyed Assembly
- Ease of use
- Reliability of Fixed Cable
- Suitable for Autoclaving
- Steam Sterilization

IP68 Environmental Rating

The New TOP68 Quick Disconnect is the result of a two-year investment in design and field evaluation. An IP68 rating is achieved with only two O-ring seals. The design eliminates O-ring torque to maintain integrity of the seals. Other connectors, utilizing as many as four O-ring seals, achieve only an IP67 rating. The IP68 rating requires submersion at 1.0 m (3.28 ft.) water column at 50°C (122°F) for 7 days (168 hrs.)

Salinity Test

The TOP68 was immersed in a Potassium Chloride (KCl) solution along with other widely used quick disconnect systems. After one or two days all other quick disconnect systems failed. The TOP68 systems continued to operate perfectly, ending the 20-day evaluation.

Specifications

Environmental Rating	IP68
Temperature Rating	-15°C to 130°C (5°F to 266°F)
Pressure Rating	15.0 bar (217.5 psig)
Materials of Construction	Glass Reinforced PPS (Ryton®), Viton® O-Rings
Contacts	Gold Plated Nickel
Insulation	PFA
Number of Contacts Available	2 Pole, 4 Pole or 6 Pole
Process Connection	Pg 13.5 Gland Fitting

pH Sensors

Process pH sensors are suitable for submersion, insertion or flow installations. All sensors feature the plunger electrode and porous Teflon® double junction reference cells. Double junction reference cells extend the service life in process applications containing sulfides (H₂S), metals (pb, Hg, Ag) and in sugar processing. Select automatic temperature compensation and other options as required.

Models 11, 12, 15, 16, 17, 18, 21 and 22	Specifications
Body Material	Ryton®
O-Rings	Viton®
Measuring Range	0 to 14 pH
Temperature Range	0° to 80°C (32° to 176°F) Standard Version 0° to 110°C (77° to 230°F) High Temp Version
Pressure Range	0 to 6.9 bar (0 to 100 psig) Standard Version 0 to 10.3 bar (0 to 150 psig) High Temp Version
Drift	< 2.0 mV/week
Response Time @ 25°C	95% of reading in 10 seconds
Asymmetry Potential	7.0 pH ± 0.2 pH
Theoretical Slope	± 59.16 mV / pH unit @ 25°C (77°F)
Sodium Error	< 0.05 pH in 0.1 Molar Na ⁺ Ion @ 12.8 pH
pH Glass Bulb Impedance @ 25°C	150 Megohms

Model 11 pH sensor features a protective pH electrode guard and provides an insertion length of 23.0mm (0.9"). Sensors with protective guards are recommended to reduce the risk of accidental breakage, or to deflect foreign objects in flowing streams. The Model 15 provides 1.0" MNPT process connections.

Model 11 and 15 Ordering Information	Description
M - 11	Process pH Sensor with Protective Guard Double Junction Reference Cell, KCl/AgCl and KNO ₃ 3/4" MNPT Process Connections 23.0 mm (0.9") Insertion Length 4.5m (15 ft.) Cable with BNC M - 11 with 1.0" MNPT Process Connections

Options	Description
T68	TOP68 Quick Disconnect
AMP	Integral Unity Gain Preamp
ORP	Platinum ORP electrode
HT	For continuous high temperature use, >80°C (176°F)
HpH	For continuous high pH use, > 11.0 pH
PT100	Temperature Compensation, 100 Ohm RTD
PT1000	Temperature Compensation, 1000 Ohm RTD
3KTC	Temperature Compensation, 3000 Ohm Thermister
SG	Solution Ground

M - 11 - AMP - PT100	Example Order Number
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Model 21 pH sensor features a protective pH electrode guard and provides a longer insertion length of 58.4mm (2.3"). The Model 17 provides 1.0" MNPT process connections.

Model 21 and 17 Ordering Information	Description
M - 21	Process pH Sensor with Protective Guard Double Junction Reference Cell, KCl/AgCl and KNO ₃ 3/4" MNPT Process Connections 58.4 mm (2.3") Insertion Length 4.5m (15 ft.) Cable with BNC M - 21 with 1.0" MNPT Process Connections

Options	Description
T68	TOP68 Quick Disconnect
AMP	Integral Unity Gain Preamp
ORP	Platinum ORP electrode
HT	For continuous high temperature use, >80°C (176°F)
HpH	For continuous high pH use, > 11.0 pH
PT100	Temperature Compensation, 100 Ohm RTD
PT1000	Temperature Compensation, 1000 Ohm RTD
3KTC	Temperature Compensation, 3000 Ohm Thermister
SG	Solution Ground

M - 21 - T68 - PT100	Example Order Number
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Model 12 pH sensor features a concave probe design with a short insertion length of 12.7mm (0.5"). Concave probe designs tend to be self-cleaning and are recommended for flow applications containing suspended solids. Select a flat probe design for viscous or fibrous solutions such as pulp stock applications. The Model 16 provides 1.0" MNPT process connections.



Model 12 and 16 Ordering Information	Description
M - 12	Process pH Sensor with Concave Probe Design Double Junction Reference Cell, KCl/AgCl and KNO ₃ 3/4" MNPT Process Connections 12.7 mm (0.5") Insertion Length 4.5m (15 ft.) Cable with BNC
M - 16	M - 12 with 1.0" MNPT Process Connections
Options	Description
T68	TOP68 Quick Disconnect
AMP	Integral Unity Gain Preamplifier
HT	For continuous high temperature use, >80°C (176°F)
HpH	For continuous high pH use, > 11.0 pH
PT100	Temperature Compensation, 100 Ohm RTD
PT1000	Temperature Compensation, 1000 Ohm RTD
3KTC	Temperature Compensation, 3000 Ohm Thermister
FLAT	Flat pH Electrode
SG	Solution Ground
M - 12 - HpH - PT100	Example Order Number

Model 22 pH Sensor features a concave probe design and a longer insertion length of 48.3mm (1.9"). The Model 18 provides 1.0" MNPT process connections.



Model 22 and 18 Ordering Information	Description
M - 22	Process pH Sensor with Protective Guard Double Junction Reference Cell, KCl/AgCl and KNO ₃ 3/4" MNPT Process Connections 48.3 mm (1.9") Insertion Length 4.5m (15 ft.) Cable with BNC
M - 18	M - 22 with 1.0" MNPT Process Connections
Options	Description
T68	TOP68 Quick Disconnect
AMP	Integral Unity Gain Preamplifier
ORP	Platinum ORP electrode
HT	For continuous high temperature use, >80°C (176°F)
HpH	For continuous high pH use, > 11.0 pH
PT100	Temperature Compensation, 100 Ohm RTD
PT1000	Temperature Compensation, 1000 Ohm RTD
3KTC	Temperature Compensation, 3000 Ohm Thermister
FLAT	Flat pH Electrode
SG	Solution Ground
M - 22 - HT - PT100	Example Order Number

pH Sensors

Model 10 pH sensor is designed for use in general purpose water applications. Typical applications include potable water, cooling towers, fresh and salt-water aquariums, and surface water such as lakes and rivers including fish farms. The large volume single junction reference cell coupled with the non-fouling porous Teflon® liquid junction assures a long life in general service.

Model 10

Body Material
O-Rings
Measuring Range
Temperature Range

Pressure Range
Drift
Response Time @ 25°C (77°F)
pH Glass Bulb Impedance @ 25°C (77°F)

Specifications

Ryton®
Viton®
0 to 14 pH
-5° to 80°C (23° to 176°F) Standard Version
25° to 110°C (77° to 230°F) High Temp Version
0 to 6.9 bar (0 to 100 psig)
< 2.0 mV/week
95% of reading in 10 seconds
80 Megohms (Standard Version)
150 Megohms (High Temp Version)

Model 10 Ordering Information

M-10

Description

General Purpose pH Sensor with Protective Guard
Single Junction Reference Cell
Process Connections 1/2" MNPT
Insertion Length 16.5mm (0.65")
3.3m (10 ft.) Cable with BNC

Options

ORP
HT
PT100
PT1000
3KTC
M-10-PT100

Description

Platinum ORP Electrode
For continuous high temperature use >80°C (176°F)
Temperature Compensation, 100 Ohm RTD
Temperature Compensation, 1000 Ohm RTD
Temperature Compensation, 3000 Ohm Thermister

Example Order Number



The Model 25 pH sensor features 1/2" MNPT threads for insertion, peripheral porous Teflon® liquid junction, double junction reference cell, solution ground, 3.3M (10.0 ft.) cable with BNC connector. Typical applications include wastewater treatment, cooling towers, plating baths and general industrial service.



Model 25	Specifications
Body Material	Ryton®
O-Rings	Viton®
Measuring Range	0 to 14 pH
Temperature Range	-5° to 121°C (23° to 249°F)
Maximum Pressure @ 25°C	6.9 bar (100 psig)
Drift	< 2.0 mV/week
Response Time @ 25°C	95% of reading in 10 seconds
pH Glass Bulb Impedance @ 25°C	150 Megohms
Reference Cell	Double Junction
Model 25 Ordering Information	Description
M - 25	General Purpose pH Sensor Double Junction Reference Cell Solution Ground 1/2" MNPT Process Connection 38.1 mm (1.5") Insertion Length 3.3m (10 ft.) Cable with BNC Connector
Options	Description
T68	TOP68 Quick Disconnect
ORP	Platinum ORP Electrode
PT100	Temperature Compensation, 100 Ohm Platinum RTD
PT1000	Temperature Compensation, 1000 Ohm Platinum RTD
3KTC	Temperature Compensation, 3000 Ohm Thermister
M - 25 - PT100	Example Order Number

pH Sensors

The Model 35 pH sensor features ease of use in a twist lock design. The sensor includes porous Teflon® liquid junction, double junction reference cell, solution ground and 3.3M (10.0-ft.) cable with BNC Connector. Typical applications include wastewater treatment, cooling towers, plating baths and general industrial service.



Model 35

Body Material

O-Rings

Measuring Range

Temperature Range

Maximum Pressure

Drift

Response Time @ 25°C

pH Glass Bulb Impedance @ 25°C

Specifications

Ryton® with 316 SS pins

Viton®

0 to 14 pH

-5° to 70°C (23° to 158°F)

6.9 bar (100 psig)

< 2.0 mV/week

95% of reading in 10 seconds

150 Megohms

Model 35 Ordering Information

M - 35

Description

Twist lock pH Sensor

Double Junction Reference Cell

Solution Ground

3.3m (10ft.) Cable with BNC

Options

T68

ORP

PT100

PT1000

3KTC

M - 35 - 3KTC

Description

TOP68 Quick Disconnect

Platinum ORP Electrode

Temperature Compensation, 100 Ohm Platinum RTD

Temperature Compensation, 1000 Ohm Platinum RTD

Temperature Compensation, 3000 Ohm Thermister

Example Order Number

Model 35 Accessories

Z8150

Z8155

Z8150

Description

3/4" MNPT Mounting Adapter

1.0" MNPT Mounting Adapter

Example Order Number

The Model 40 pH sensor is a retractable pH sensor designed for installation through a 1.0" full port ball valve. The sensor includes the extension tube, cable and connector. The 500 mm (20.0") sensor is unique in that a ruler is marked on the tube to measure the insertion depth. A locking ring is provided to ensure the proper insertion depth is maintained. Features include a recessed pH bulb to protect the sensor on insertion.



Specifications

<p>Model 40 Body Material O-Rings Measuring Range Temperature Range Maximum Pressure Drift Response Time @ 25°C pH Glass Bulb Impedance @ 25°C</p>	<p>Specifications Ryton®, 316 SS Tube Viton® 0 to 14 pH -5° to 70°C (23° to 158°F) 6.9 bar (100 psig) < 2.0 mV/week 95% of reading in 10 seconds 375 Megohms</p>
<p>Model 40 Ordering Information M - 40</p>	<p>Description Retractable pH Sensor with recessed pH bulb Double Junction Reference Cell Process Connection 1.0" full port ball valve Insertion Length 380mm (15.0") 3.3m (10 ft.) High Temperature Cable with BNC Connector</p>
<p>Options ORP FLAT PT100 PT1000 3KTC SG M - 40 - PT100</p>	<p>Description Platinum ORP Electrode Flat pH Electrode Temperature Compensation, 100 Ohm Platinum RTD Temperature Compensation, 1000 Ohm Platinum RTD Temperature Compensation, 3000 Ohm Thermister Solution Ground Example Order Number</p>
<p>Model 40 Accessories Assembly</p>	<p>Description Installation hardware. Includes Barrel Housing, Tube Seal, Compression Nut and Depth Locking Ring. (Does not include ball valve)</p>
<p>M - 40 - Assembly</p>	<p>Example Order Number</p>

pH Sensors

The **Model 50 Ground Loop pH sensor** features a self-powered differential preamplifier to protect against ground loops, which can lead to pH offsets, drift, instability and may shorten sensor life. Typical applications include plating baths and other tank applications.

The **Model 55 Solution Ground pH sensor** provides a solution ground to accommodate pH analyzers and transmitters featuring pH glass electrode and reference cell diagnostics or differential input preamplifiers.

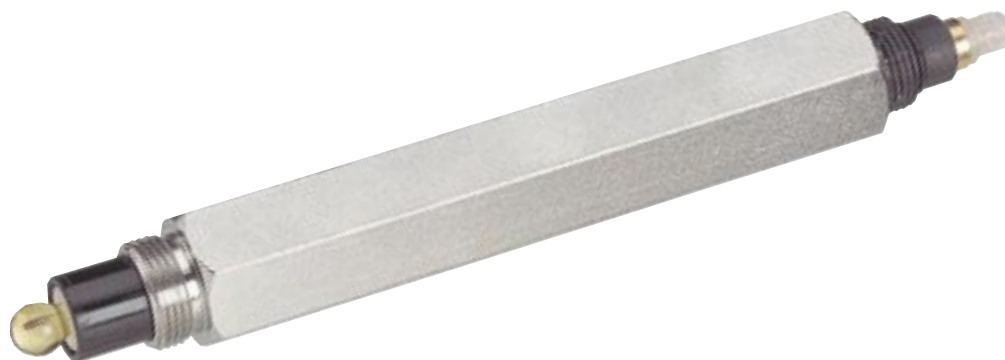
Model 50 and 55	Specifications
Body Material	Ryton®, 316 SS Tube
O-Rings	Viton®
Process Connections	3/4" MNPT
Insertion Depth	145 mm (5.75")
Measuring Range	0 to 14 pH
Temperature Range	-5° to 130°C (23° to 266°F)
Maximum Pressure @ 25°C	10.3 bar (150 psig)
Drift	< 2.0 mV/week
Response Time @ 25°C	95% of reading in 10 seconds
pH Glass Bulb Impedance @ 25°C	M - 50, < 1.0 Megohm M - 55, 375 Megohms

Model 50 and 55 Ordering Information	Description
M - 50	Ground Loop pH Sensor Double Junction Reference Cell, KCl/AgCl and KNO ₃ Differential preamplifier Solution Ground 3/4" Process Connections 146mm (5.75") Insertion Length 6.1m (20.0 ft.) Cable with BNC Connector
M-55	Solution Ground pH Sensor without Differential preamplifier
Options	Description
T68	TOP68 Quick Disconnect
1.5	38mm (1.5") Insertion Length
ORP	Platinum ORP electrode
PT100	Temperature Compensation, 100 Ohm Platinum RTD
PT1000	Temperature Compensation, 1000 Ohm Platinum RTD
3KTC	Temperature Compensation, 3000 Ohm Thermister
M - 50 - T68 - PT100	Example Order Number



The HPW pH sensor is designed to meet ASTM standard D5128-90 guidelines for successful measurement of pH in high purity water. Sensor features include a stainless steel housing, TOP68 quick disconnect cable connector, differential preamplifier, low impedance glass pH electrode and porous Teflon® double junction reference cell with KCl/AgCl and KNO³ electrolyte.

The HPW measurement system includes a stainless steel flow cell, temperature compensator and 3.3m (10 ft.) of cable. The HPW sensor should be considered when measuring pH in aqueous solutions having a conductance of less than 100 uS/cm. Typical applications include boiler feed water and reverse osmosis units.



Model HPW	Specifications
Body Material	316 SS
O-Rings	Viton®
Process Connections	1/4" 316 SS Tube
Measuring Range	0 to 14 pH
pH Glass Bulb Impedance @ 25°C	< 5.0 Megohms
Sample Conditioning Requirements	Description
Optimum Flow Rate ¹	250 to 300 ml/min
Optimum Pressure ¹	Not to Exceed 1.72 bar (25 psig)
Optimum Temperature ¹	25°C (77°F)

¹ For successful measurement flow, pressure and temperature should remain constant.

Model HPW Ordering Information	Description
HPW	High Purity Water pH Sensor 316 Stainless Steel Flow Cell Temperature Compensator 3.3m (10 ft.) TOP68 Cable
Options	Description
PT100	Temperature Compensation, 100 Ohm Platinum RTD
PT1000	Temperature Compensation, 1000 Ohm Platinum RTD
3KTC	Temperature Compensation, 3000 Ohm Thermister
HPW - PT100	Example Order Number

HPW Accessories	Description
HPW - pH	Replacement pH Sensor
HPW - FC	316 SS Flow Cell
HPW - CA	3.3m (10 ft.) Cable
HPW - TC-PT100	Temperature Compensation, 100 Ohm Platinum RTD
HPW - TC-PT1000	Temperature Compensation, 1000 Ohm Platinum RTD
HPW - TC-3KTC	Temperature Compensation, 3000 Ohm Thermister
HPW - pH	Example Order Number



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