BARBEN ANALYTICAL

Performance Series pH/ORP Sensors

Industrial Process Control & Monitoring

- **Patented Axial Ion Path® Reference**
- **Specialized pH Glass Formulations and ORP Electrodes**
- **Proprietary Low-Noise, High Temperature Signal Cable**
- **Sensors are Compatible with Most Major Manufacturer's Analyzers**
- **Industrial Mounting Options**
- **Industry Leading Pressure and Temperature Ratings**
- **NEW O-ring and Seal Options: Viton® Extreme™, EPDM & FFKM**

Axial Ion Path® Reference
- Patented design increases sensor life, accuracy and reliability
- High resistance to poison: Reduced calibration offset error
- Large surface area reference junction eliminates plugging issues
- Eliminates error due to fluctuating pressure
- No exotic gel or polymer electrolyte which may be incompatible with the process

Specialized Electrode Glass Formulations & Styles
- High accuracy and lifespan in strong acids and bases
- Coating resistant glass electrode reduces fouling
- Silica resistant option to eliminate bonding to glass
- Ruggedized hemispherical and flat glass options resist breaking

Proprietary Sensor Signal Cable
- Designed to eliminate measurement fluctuation due to noise
- Chemical and UV resistant
- Highest temperature rating (130°C)

Compatibility with Most Major Vendor's Electronics
- Proven with major vendors of pH analyzers (Rosemount, ABB, Foxboro, E&H, Mettler Toledo, GLI/Hach, Knick)
- Get higher accuracy and longer life in your application by upgrading the sensor

Industrial Mounting Options
- Mounting fittings for sample line installations
- Submersible cleaners and scrubbers
- Ball Valve "Hot Tap" retraction solutions
- Variety of materials for corrosive applications

Highest Pressure & Temperature Ratings
- In-line sensor installation to 2,500 PSIG (172 BAR)
- Quick Change "Nut Lock" to 300 PSIG (20 BAR)
- Retractable "Hot Tap" to 300 PSIG (20 BAR)
- Process temperature to 266°F (130°C)

AMETEK®

Performance Series pH/ORP Sensors

Performance Series

The Barben Analytical Performance Series products are 3rd generation combination pH/ORP electrodes targeted at harsh, industrial measurement applications. High pressures, strong chemicals, and elevated temperatures typically shorten the lifespan of conventional double-junction pH probes. In these applications the Performance Series sensor offers extended sensor lifespan, as well as decreased drift, and longer calibration intervals.

Each sensor is manufactured with our patented Axial Ion Path® reference technology, proprietary Low-Noise & High-Temp Signal Cable along with proprietary ruggedized, high temp and coat resistant glass formulations.

A wide selection of sensor body styles and process fittings in a variety of corrosion resistant materials allow direct replacement of short-lived OEM pH/ORP sensors. Barben Performance Series sensors are compatible with all major manufacturers of pH analyzers and transmitters. Upgrade your analytical measurement without the hassle and expense of replacing costly field instruments.

Typical Process Applications

Many industrial processes shorten pH/ORP sensor lifespan. Barben Performance Series sensors excel in applications that may have the following characteristics:

- **H_2S (Sulfides)[1]**
- **High Ion-Strength Solutions**
- **Ammonia**
- **Heavy Metals [Ag, Pb, Hg][2]**
- **Strong Caustics**
- **Strong Acids**
- **High Cyclic Pressures**
- **High Temperature**
- **Proteins[1]**
- **Organics**
- **Mercaptans[1]**
- **Cyanides[1]**
- **Iodides[1]**
- **Bromines**

NOTES

1. *Chemicals that react with Ag^+ (Silver) and restrict traditional reference junction designs*
2. *Heavy metals which react with Cl^- (Chloride) and reduce the voltage potential of the sensor.*

Standard Sensor Technology

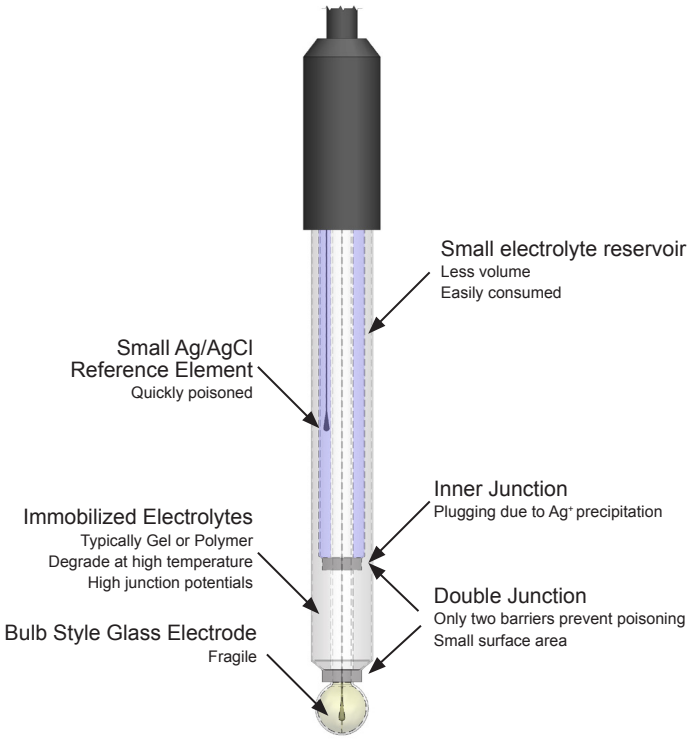


Figure 1

Barben Performance Series Sensor

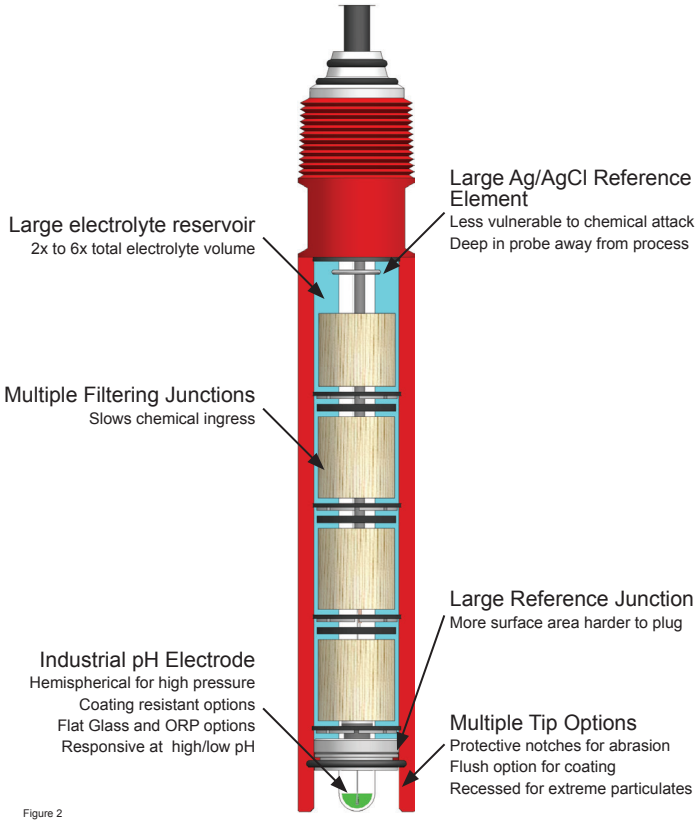


Figure 2

Industry Leading Reference Technology Axial Ion Path®

In 90% of industrial applications the reference cell is the cause of sensor failure. The typical industry standard "double junction" pH sensor (fig. 1) uses reference technology designed to minimize mixing of internal electrolyte and process liquid. This simplistic design is achieved by dividing the reference cell into two chambers, each protected with a porous junction. Once process liquid penetrates each junction, poisoning of the sensor may occur or the measurement signal may be impeded by plugging of the porous junction.

The Barben sensor (fig. 2) has a unique, patented reference cell design which combats these common problems.

Performance Series sensor's reference technology utilizes multiple innovations within the reference cell to greatly extend sensor life.

- Multiple annular wood filtering junctions
- Axial Ion Path® Communication Disks
- Large volume of electrolyte
- Large surface area Ag/AgCl reference element
- Teflon junction

Each sensor uses multiple "solid-state" annular wood filtering junctions. Wood's natural cellular makeup greatly slows the ingress of process liquid into the sensor. Each wood filtering junction chamber is separated by patented Axial Ion Path® communication disks. The communication disk seals each chamber while providing multiple electrolyte paths thus ensuring a reliable measurement signal.

Barben Performance Series sensors contain a much higher volume of KCl electrolyte than typically found in double junction sensors. More electrolyte provides on-going insurance against the leaching effects of fluctuating process pressure and temperature.

An oversized Ag/AgCl reference element is located near the rear of the sensor. This innovation serves two purposes. Distancing the reference element far from the sensor tip keeps it away from process chemicals. Over time, if chemicals such as sulfides were to penetrate within the sensor, then the large reference element is capable of withstanding long-term poisoning while maintaining a stable measurement.

As a final preventative measure, a porous Teflon insert placed at the tip of the sensor provides a large surface area to prevent plugging. Teflon also serves as a great initial barrier to chemical attack. All of these features combine to make the Performance Series sensors the best choice for industrial measurement applications.

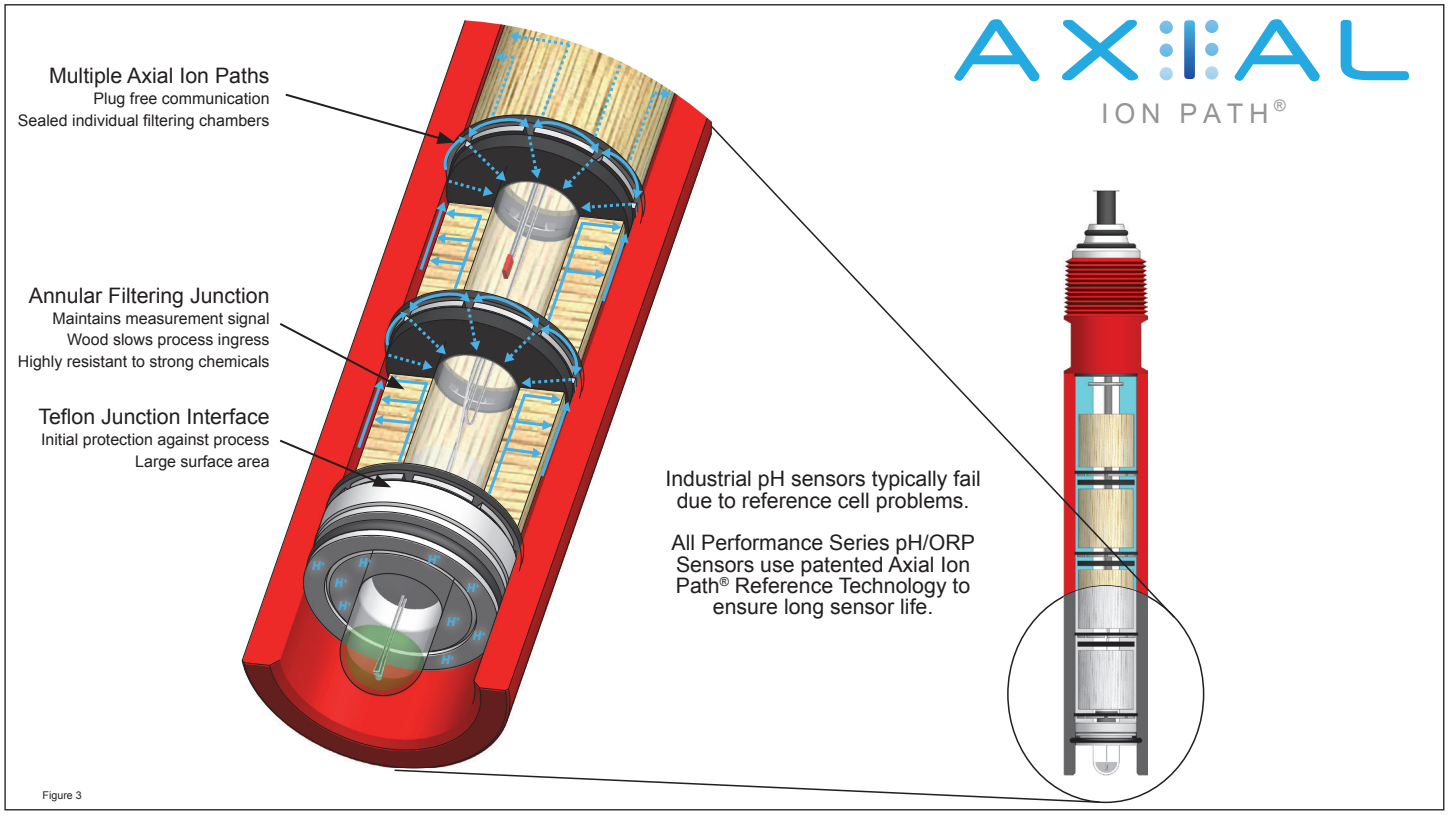


Figure 3

Performance Series pH/ORP Sensors

Low Noise, High Temperature Cable

Since Performance Series sensors are often mounted directly into the process, all products are manufactured with proprietary low-noise, high temperature cable. Competitive designs may use low-temperature cable to reduce signal noise (thus de-rating the sensor). Alternately, when high temperature cable is improperly specified, triboelectric noise can cause signal error. Barben Analytical has developed a proprietary cable that can withstand 130°C (266°F) process temperatures while providing stable pH measurement.

Specialized Glass Formulations and Configurations

Barben glass pH measurement electrodes are designed with unique formulations to prevent coating and scaling. Additional coating resistant options further improve lifespan in strong caustic (NaOH) and silica applications. These specialty glass formulations are manufactured to precision impedance ranges to ensure the best balance between high strength signal, speed of response, structural integrity under high pressure, long life in high temperatures and extreme acid and caustic pH conditions. Unique billet style ORP electrodes completely eliminate glass from the process thus further eliminating potential breakage.

Industrial Grade Mounting Options and Accessories

Barben Analytical provides a comprehensive offering of accessories to ensure convenient, safe and economical installation into your applications. In-line, submersible and hot tap (retractable through a isolation ball valve) are all standard options. In-line sensors with quick change “Nut Lock” adapters, rated to 300 psig, allow for easy access for calibration or maintenance in an isolated sample stream. In-line high pressure housings allow for operations up to 2,500 psig. Hot-Tap or Ball-valve retraction systems, rated to 300 psig allow for direct use into process without the need for sample or bypass lines. We offer hardware in 316 Stainless, Titanium and Hastelloy C-276, sensor bodies in Kynar, CPVC and PEEK and seals in Viton® Extreme™, EPDM, and FFKM (Kalrez) to meet the specific demands of your process.

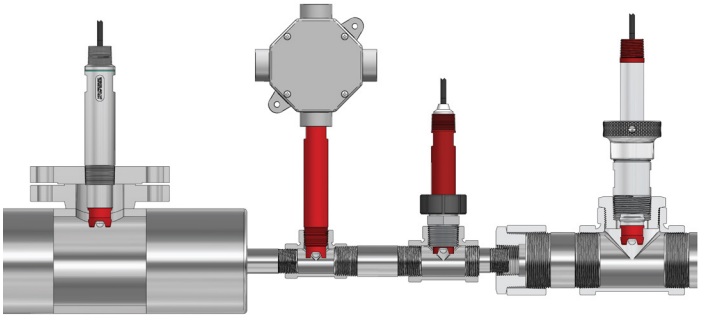
Interconnection with Existing pH and ORP Analyzers

Performance Series sensors are compatible with all major manufacturer’s pH analyzers with voltage input. Temperature compensation options for PT100, PT1000, 3kΩ (Balco), and 8550Ω (Honeywell) ensure full compatibility with existing analyzers. Now you can upgrade your process without replacing your field instrument. Wiring diagrams for many analyzers can be found at BarbenAnalytical.com.

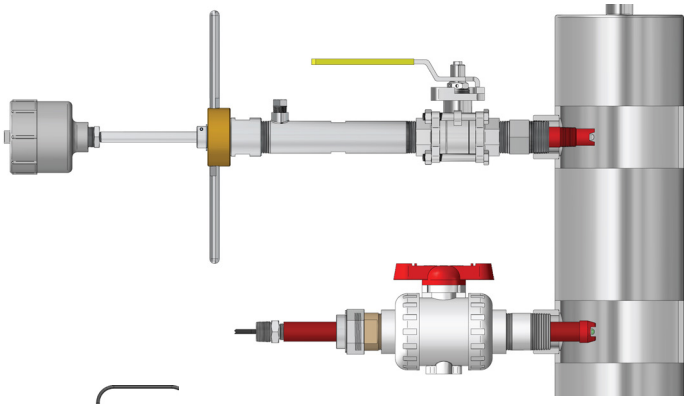
Sensor Selection: Mounting

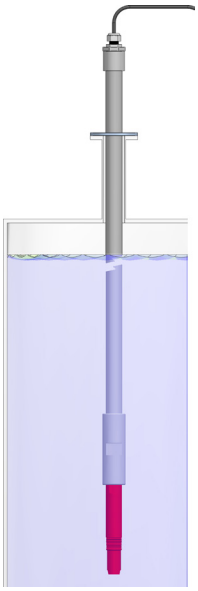
The first consideration when selecting a pH sensor is how will it be mounted into the process. Examples of various process mounting configurations are provided below.

In-line Sensor Mounting: In-line installations are common on sample streams off the main process. Isolation valves should be upstream / downstream of sensor for removal.



Hot Tap Sensor Mounting: Hot Tap refers to the ability to remove the sensor from the process while under pressure. A ball valve is used to isolate the sensor for removal.





Submersible Sensor Mounting: Submersible mounting installations are required when the measurement is needed directly into a tank, reactor vessel or open channel. Typically the sensor must be mounted on a “dip tube” which is the hardware to submerge the sensor in the application.

Sensor Selection: Installation

Mounting Orientation

Sensor mounting for optimum performance should be considered prior to installation. The illustration below shows examples of vertical and horizontal installations.

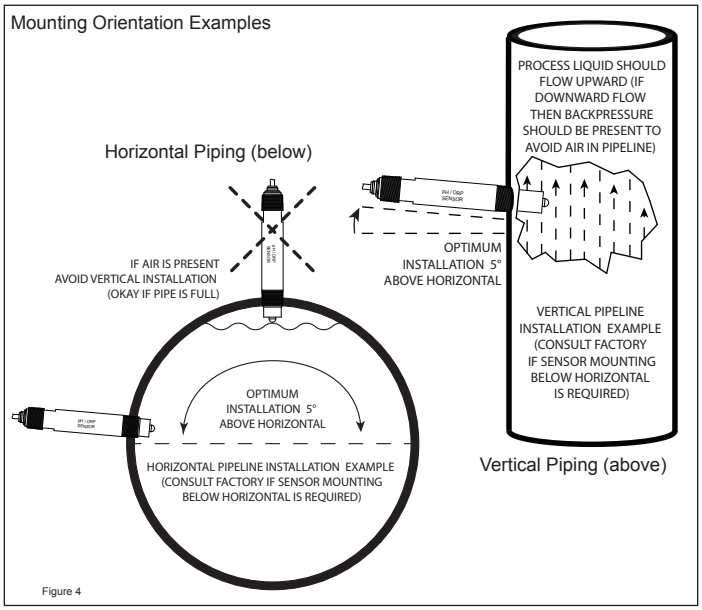


Figure 4

Isolation

pH / ORP sensors require periodic removal for cleaning, calibration, and eventual sensor replacement. Consideration in the piping design should be given as to how to isolate the sensor from the process.

Hot tap retractable sensors are popular since they can be extracted from the flowing process, isolated with a ball valve, and then removed. If a non-retractable sensor is installed then isolation valves need to be installed upstream and downstream.

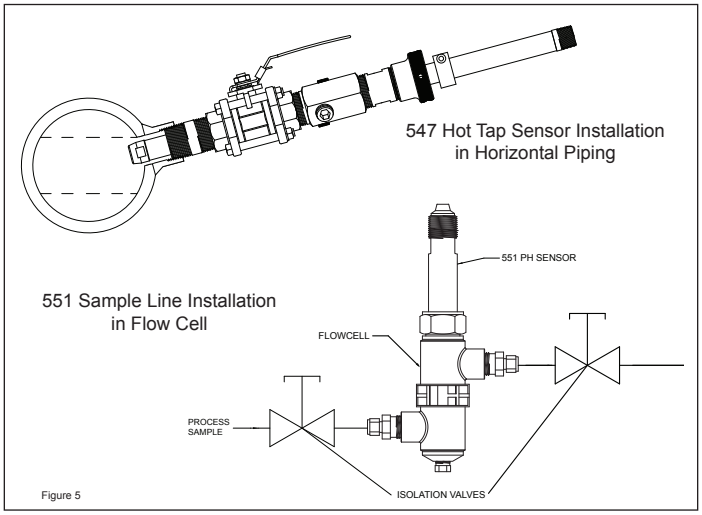


Figure 5

Insertion Depth

The depth that pH / ORP sensor protrudes into the pipeline can greatly affect the measurement. Applications where the sensor tip is recessed can lead to coating and slow response. In high particulate applications abrasion of the electrode can be a concern.

A typical installation goal is to get the sensor tip at least 1/4" (6mm) into the stream. At this depth coating issues lessen and response improves due to flow velocity. 546, 551 and 547 sensors offer a variety of insertion depths. Here are some guidelines.

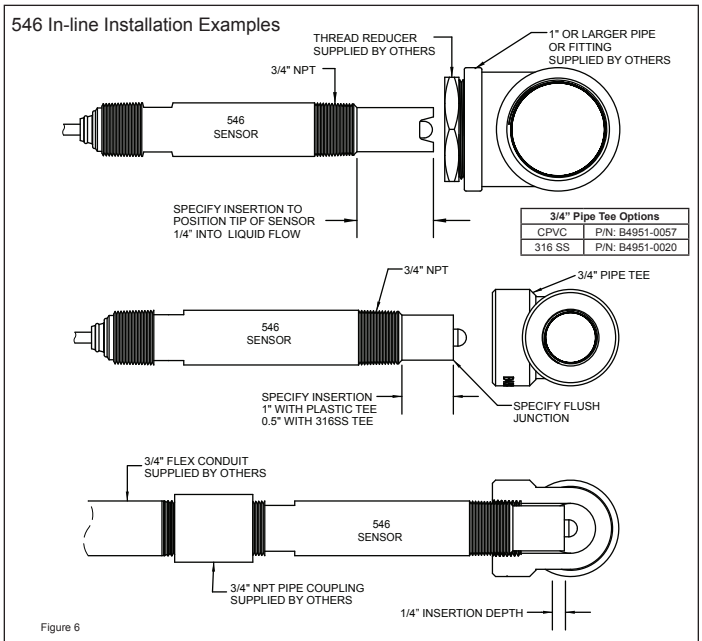


Figure 6

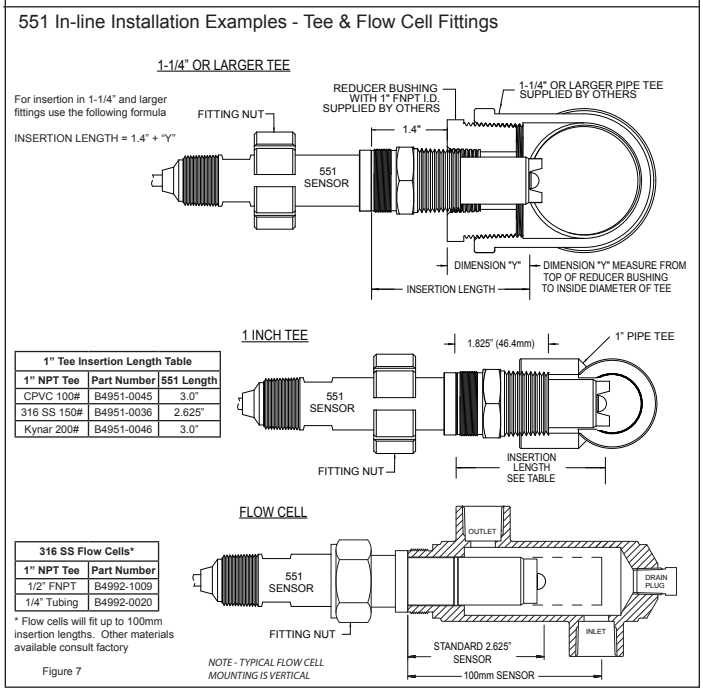


Figure 7

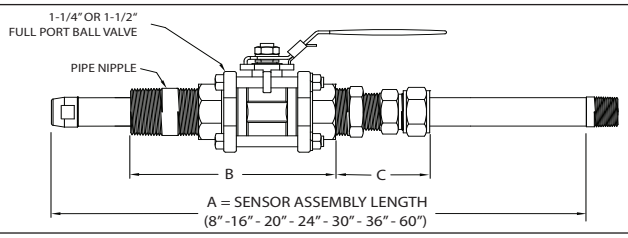
Performance Series
pH/ORP Sensors

547 In-line Sizing Example

Insertion Depth = (A) - (B) - (C)

The insertion depth should exceed any mounting hardware (flange, standoff or thread-o-let) plus the pipe wall thickness by at least 1/4" (6mm) to get the tip of the sensor into the process.

Figure 8



Valve & Nipple	"B" Dim.	Compression Fitting	"C" Dim.
1-1/4" SS Valve	6.5"	Wrench Tight	3.0"
		Hand Tight	3.5"
1-1/2" SS Valve	7.1"	Wrench Tight	3.0"
		Hand Tight	4.5"
1-1/4" Kynar Valve	8.0"	Wrench Tight	3.0"
		Hand Tight	3.5"
1-1/2" Kynar Valve	8.6"	Wrench Tight	3.0"
		Hand Tight	4.5"

Sensor Selection: Electrode Options

Code	Glass Type	Suggested Applications	Recommended Measurement Range	Recommended Temp Range	Maximum Temp Range
R CR	Industrial High Temp (Hemi) Industrial High Temp Coat Resist (Hemi)	Best choice for hi/low pH & high pressure. Coat resistant excels in NaOH. Hemispherical glass.	0 to 14 pH	15 to 100°C 59 to 212°F	15 to 130°C 59 to 266°F
FG CF	Flat Industrial Glass Flat Industrial Glass Coat Resist	Best choice for in-line slurries. Consult if rapid pressure changes are present.	0 to 14 pH	20 to 85°C 68 to 185°F	20 to 130°C 68 to 266°F
PX	Redox (ORP)	Flat Platinum (Pt) Billet. Non-glass. Easy to clean.	0 to ±1500mV	0 to 130°C 32 to 266°F	0 to 130°C 32 to 266°F
E CE	General Purpose General Purpose Coating Resist	Light to medium duty pH electrode for low temperature applications. Not for high pH.	2 to 11 pH	-10 to 40°C 14 to 104°F	-20 to 50°C -4 to 122°F
FA	Antimony (Sb) Non-glass Electrode	Antimony (metal) pH electrode for abrasives or HF acid or low temperature applications.	3 to 11 pH	-20 to 80°C -4 to 176°F	-20 to 80°C -4 to 176°F
FR	Fluoride / HF Acid (Hemi)	Resistant to etching by HF and other strong acids. Hemispherical pH glass.	1 to 14 pH	15 to 100°C 59 to 212°F	15 to 130°C 59 to 266°F
HR	Silica Resistant High Temp (Hemi)	Best choice for extreme pH where silica may coat traditional electrodes. Hemispherical glass.	1 to 14 pH	15 to 100°C 59 to 212°F	15 to 130°C 59 to 266°F
FH	Silica Resistant Flat Glass	Best choice for slurries and heavy fouling where silica may coat traditional glass electrodes.	1 to 14 pH	15 to 85°C 59 to 185°F	15 to 130°C 59 to 266°F

= Most common electrodes

= Special Application (Consult with factory)

Sensor Selection: Additional Options

Temperature Compensation

- PT100 RTD
- PT1000 RTD
- 3.01K Ohm RTD Balco
- 8550 Ohm (Honeywell / Leeds & Northrup)

Sensor Body Material

- Kynar PVDF: *Red, White, or Blue based on model*
- PEEK: *Beige*
- CPVC: *Gray*

Sensor O-Ring Material

- Viton® Extreme™ ETP-600S
- EPDM
- FFKM (perfluoro-elastomer: i.e. Kalrez)

Sensor Tip Examples


Notched Tip
Flat Glass


Flush Tip
Flat Glass


Flush Tip
Redox (ORP)

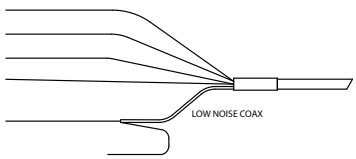

Notched Tip
Hemispherical
Glass


Flush Tip
Hemispherical
Glass

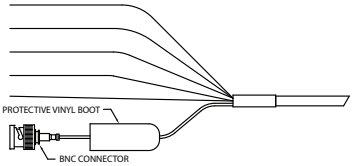
When selecting the sensor tip consider the process. Notches protect against breakage from heavy particulates. Flush tips are effective for soft coatings. For extreme abrasion a recessed tip can be offered *(not shown)*.

Figure 9

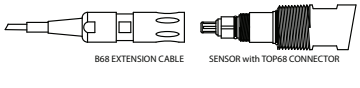
Sensor Wiring Termination Examples



Tinned Leads: This option is commonly specified when the sensor is directly wired to the analyzer



BNC Connector: BNC's offer a low impedance connector to the coaxial wire carrying the pH signal. It is often used when the sensor will connect to an extension cable.

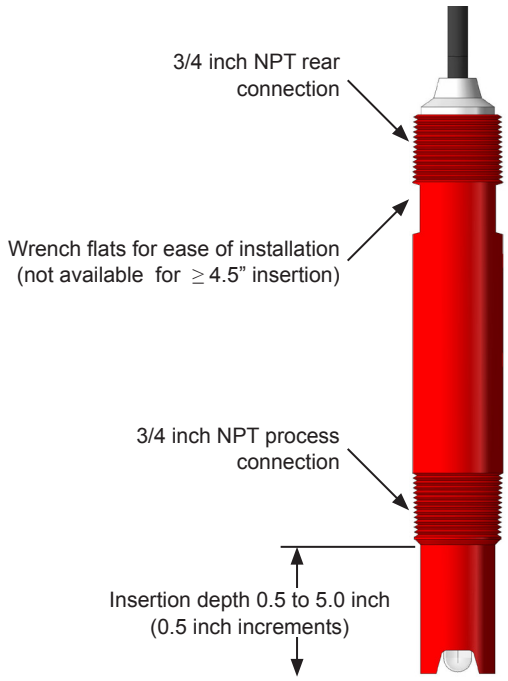


TOP68: The industry standard TOP68 connector provides a quick disconnect option at the sensor.

Figure 10

Model 546
Threaded In-line, Submersible, High Pressure Hot Tap

The versatile Model 546 is suitable for in-line sample stream applications using the 3/4 inch NPT process connection. A similar 3/4 inch NPT connection on the rear of the sensor is used to mount the sensor in submersible and high pressure hot tap installations. With tip lengths from 0.5 to 5.0 inches the 546 sensor can fit through extended pipe nipples and flanges to reach into the process and provide optimum pH/ORP measurement.

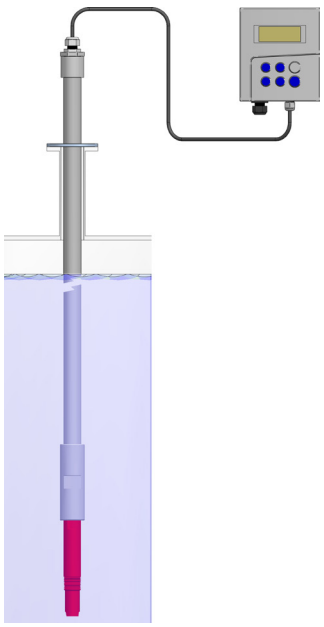


Pressure / Temperature Ratings

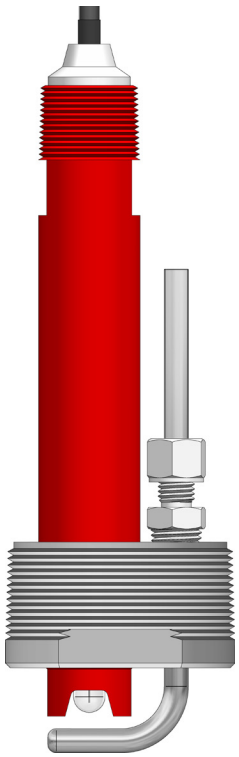
Sensor Material	Installation Type	
	3/4" In-line or Submersible*	High Pressure Hot Tap
Kynar *(red / blue**)*	150 PSIG @ 158°F (70°C) 40 PSIG @ 266°F (130°C)	300 PSIG @ 176°F (80°C) 40 PSIG @ 266°F (130°C)
CPVC *(grey)*	100 PSIG @ 167°F (75°C) 35 PSIG @ 212°F (100°C)	Not Recommended
PEEK *(tan)*	150 PSIG @ 158°F (70°C) 40 PSIG @ 266°F (130°C)	300 PSIG @ 176°F (80°C) 40 PSIG @ 266°F (130°C)

* When using jet cleaner please consult accessories documentation for pressure ratings
** Blue Kynar (used with solution ground) not recommended in high pressure hot tap applications.

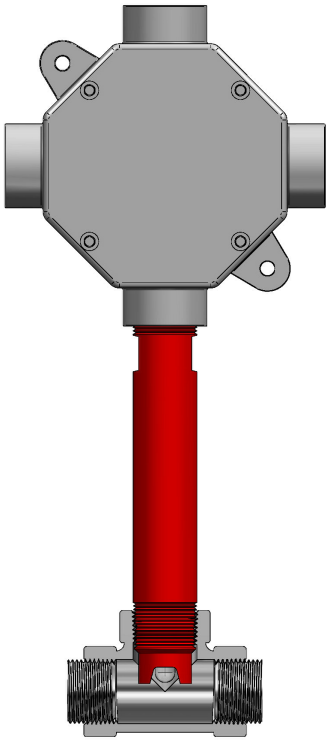
546 Examples



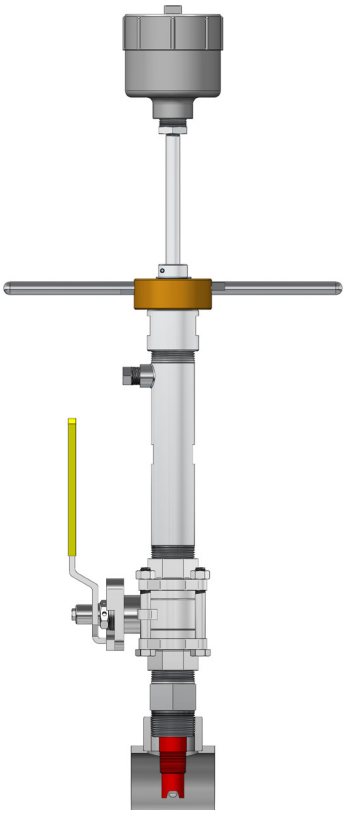
546 Submersible with Dip Tube and Analyzer



546 Submersible with Jet Cleaner (1.5 inch tip required)



546 in-line 3/4 inch pipe tee with optional junction box



546 High Pressure Hot Tap (0.5 inch tip recommended)

Figure 11

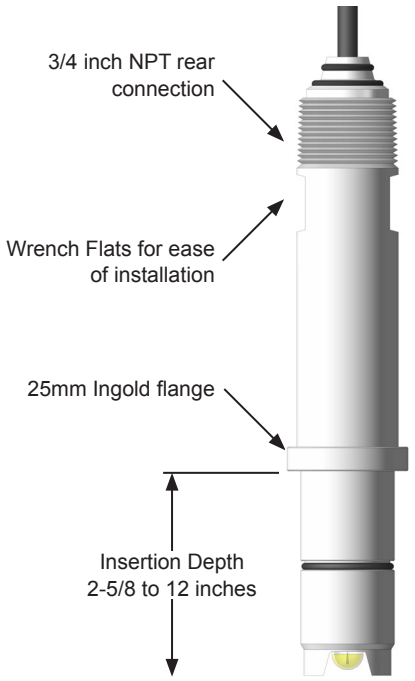
Performance Series
pH/ORP Sensors

546 In-line / Submersible / High Pressure Hot Tap 3/4 inch NPT pH / ORP Sensors

Material	Axial Ion Path	Body	Electrode	Tip	TC	Body Options	Insertion Depth	Cable	Reference Wire	Terminations	
Body Material											
C	CPVC (not available with Solution Ground)										
B	PVDF Kynar										
K	PEEK (not available with Solution Ground)										
	O-Ring Seal Material										
	V	Viton® Extreme™ ETP-600S									
	E	EPDM									
	K	FFKM (perfluoro-elastomer)									
		Body Style									
		546	3/4" MNPT Thread Inline/Submerged, Kynar/PEEK High Pressure for valve insertion available to 300PSIG (Drawings: 2P0001 Cartridge; 2P0007 Installation Examples; 2P0034 Flow Installations)								
			Measuring Electrode								
			R	Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			E	Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CE	Coating Resistant, Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CF	Coating Resistant, Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			CR	Coating Resistant, Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			FA	Antimony Measuring Electrode for Hydrofluoric Acid Applications (3 - 8 pH) -20 to 80°C (-4 to 176°F)							
			FG	Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			FR	Hydroflouric Acid Resistant, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			FH	Silica Resistant Coating, Ruggedized, Flat-glass (1 - 14 pH) 20 to 130°C (68 to 266°F)							
			HR	Silica Resistant Coating, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			PX	Platinum ORP, Flat Solid Billet (0 to +/-1500 mV) 0 to 130°C (32 to 266°F)							
				Tip Configuration with Teflon Liquid Junction							
				FT	Flush no tip protection						
				GT	Flush no tip protection, with Solution Ground (Not for High Pressure)						
				DT	Dual Notch						
				LT	Dual Notch with Solution Ground (Not for High Pressure)						
					Temperature Compensation (TC)						
					N	None					
					B	Balco 3.01K Ohm (2 Wire)					
					C	PT100 RTD (3 Wire)					
					H	Honeywell 8550 ohm (2 Wire)					
					K	PT1000 RTD (3 Wire)					
						Body Options					
						S	Standard Body 546				
						C	High pressure certification, **Kynar/PEEK only**				
							Insertion Depth from small end of front pipe thread to front of body				
							0.5	0.5"			
							1.0	1.0"			
							1.5	1.5"			
							2.0	2.0" (Kynar only)			
							2.5	2.5" (Kynar only)			
							3.0	3.0" (Kynar only)			
							3.5	3.5" (Kynar only)			
							4.0	4.0" (Kynar only)			
							4.5	4.5" (Kynar only, No Wrench Flats)			
							5.0	5.0" (Kynar only, No Wrench Flats)			
								Cable Configuration - High Temperature, Low Noise TPE Jacket			
								JB	Junction Box Preinstalled (for use with B39 Extension cable when complete assembly is specified)		
								T	8" Pigtail - for use with junction box		
								T3	8" Pigtail for High Pressure Hot Tap		
								PH	TOP68 Quick Disconnect Plug Head **(PT100 Temp Compensation Only)**		
								1 to 5	1' to 5' - Standard		
								6 to 15	6' to 15'		
								16 to 30	16' to 30'		
								31 to 100	**Longer lengths available. Consult factory for installation, application and leadtime. For lengths >30 feet, please consider Junction Box, Extension Cable and possible pre-amp.**		
									Reference Wire		
									C	Reference wire on coax shield **(Common with BNC leads used with B39 Ext Cables)**	
									E	Reference on separate wire **(Best choice for direct wiring to analyzers)**	
										Lead Terminations	
										BT	BNC (with tinned wires if sensor has temp comp)
										BL	BNC (with #6 spade lug wires if sensor has temp comp)
										B2	BNC (with Molex for temp comp; use with B39 Ext Cables)
										TT	All tinned lead wires
										LL	All #6 spade lug wires
										PT	TOP68 Quick Disconnect Plug Tail on cable
										PP	All wire ferrules
Mtl	AIP	Body	Elec	Tip	TC	Opt	Depth	Cable	Ref	Term	
B	**V**	**546**	**R**	**DT**	**C**	**S**	**0.5**	**15**	**E**	**TT**	**Typical Sensor Configuration**

Model 551
Quick Change In-line

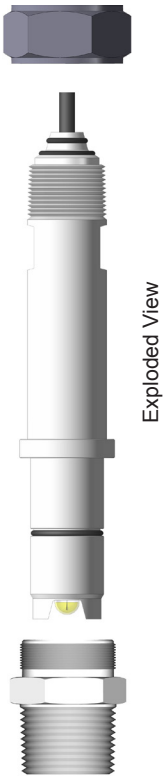
In some in-line applications sensor removal for routine cleaning or calibration becomes difficult due to conduit or cabling. The 551 Quick Change Sensor offers a unique method to extract the sensor through a “Nut Lock” Adapter system. The Nut Lock Adapter threads directly into 1 inch NPT process connections. Sensor length options up to 12 inches allows the sensor to fit through flanges and stand-off piping. The 551 sensor also includes a 3/4 inch rear connection for use in submersible applications.



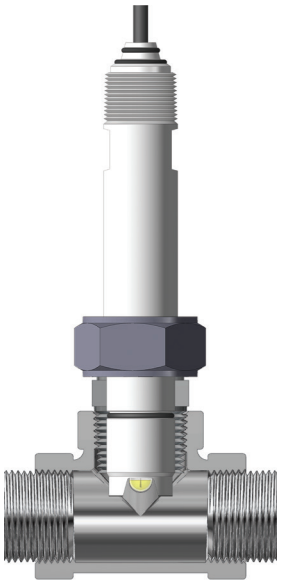
Pressure / Temperature Ratings

Sensor Material	Quick Change Nut Lock Adapter Style		
	Threaded plastic or metal body with hand nut	Threaded metal body with metal hex nut	Plastic body with metal hex nut (flanged or threaded mounting)
Kynar *(White)*	150 PSIG @ 158°F (70°C) 40 PSIG @ 266°F (130°C)	300 PSIG @ 176°F (80°C) 40 PSIG @ 266°F (130°C)	150 PSIG @ 73°F (25°C) 25 PSIG @ 266°F (130°C)
CPVC *(grey)*	100 PSIG @ 167°F (75°C) 40 PSIG @ 212°F (100°C)	100 PSIG @ 167°F (75°C) 40 PSIG @ 212°F (100°C)	150 PSIG @ 73°F (25°C) 50 PSIG @ 212°F (100°C)

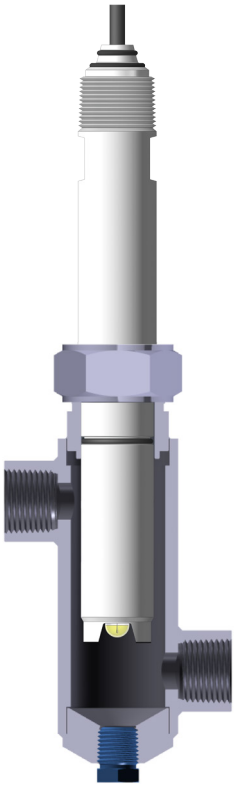
551 Examples



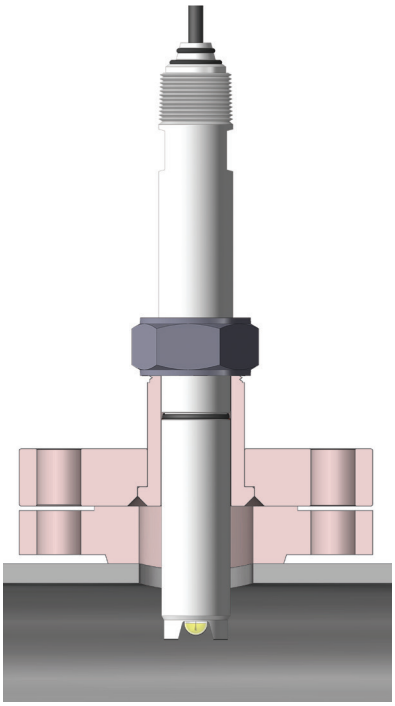
551 with Nut Lock Adapter



551 with Nut Lock Adapter mounted in 1 inch pipe tee (Tee P/N B4951-0036)



551 mounted in flow cell (Flow cell P/N B4992-1009)



551 with Flanged Nut Lock Adapter (P/N B4951-0066)

Figure 12

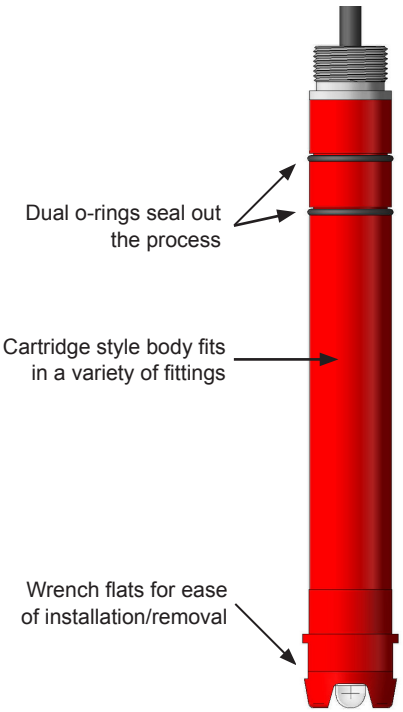
Performance Series
pH/ORP Sensors

551 Quick Change In-line / Submersible pH / ORP Sensors

Material	Axial Ion Path	Body	Electrode	Tip	TC	Body Options	Insertion Depth	Cable	Reference Wire	Terminations	
Body Material											
C	CPVC (not available with Solution Ground)										
B	PVDF Kynar										
	O-Ring Seal Material										
	V	Viton® Extreme™ ETP-600S									
	E	EPDM									
	K	FFKM (perfluoro-elastomer)									
		Body Configuration									
		551	Quick-Change Inline, Kynar available High Pressure to 300PSIG								
			Measuring Electrode								
			R	Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			E	Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CE	Coating Resistant, Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CF	Coating Resistant, Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			CR	Coating Resistant, Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			FA	Antimony Measuring Electrode for Hydrofluoric Acid Applications (3 - 8 pH) -20 to 80°C (-4 to 176°F)							
			FG	Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			FR	Hydroflouric Acid Resistant, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			FH	Silica Resistant Coating, Ruggedized, Flat-glass (1 - 14 pH) 20 to 130°C (68 to 266°F)							
			HR	Silica Resistant Coating, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			PX	Platinum ORP, Flat Solid Billet (0 to +/-1500 mV) 0 to 130°C (32 to 266°F)							
				Tip Configuration with Teflon Liquid Junction							
				FT	Flush with no tip protection						
				GT	Flush with no tip protection with Solution Ground **(150 PSIG max. standard insertion depth only)**						
				DT	Dual Notch						
				LT	Dual Notch with Solution Ground **(150 PSIG max. standard insertion depth only)**						
					Temperature Compensation (TC)						
					N	None					
					B	Balco 3.01K Ohm (2 Wire)					
					C	PT100 RTD (3 Wire)					
					H	Honeywell 8550 ohm (2 Wire)					
					K	PT1000 RTD (3 Wire)					
						Body Options					
						S	Standard Body 551				
						C	High pressure certification **(Kynar only)**				
						A	1" MNPT Nut-Lock Adapter - SS316 wetted body & hex nut 300 PSIG Max. (B4954-0022)				
						B	1" MNPT Nut-Lock Adapter - Kynar wetted body with SS316 hex nut 150 PSIG Max. (B4953-0015)				
						D	1" MNPT Nut-Lock Adapter - Titanium Gr. 2 wetted body & SS316 hex nut 300 PSIG Max. (B4954-0036)				
							Insertion Depth from Rib to Front of Body (Not available with solution ground except with "N")				
							N	Standard (2.625" from rib) (only one with solution ground)			
							3.0	3.0"			
							3.5	3.5"			
							4.0	4.0" **(actual insertion depth 3.94")**			
							4.5	4.5" (Kynar Only)			
							5.0	5.0" (Kynar Only)			
							5.5	5.5" (Kynar Only)			
							6.0	6.0" (Kynar Only)			
							6.5	6.5" (Kynar Only)			
							7.0	7.0" (Kynar Only)			
							7.5	7.5" (Kynar Only)			
							8.0	8.0" (Kynar Only)			
							8.5	8.5" (Kynar Only)			
							9.0	9.0" (Kynar Only)			
							9.5	9.5" (Kynar Only)			
							10.0	10.0" (Kynar Only)			
							100	100mm			
							150	150mm (Kynar Only)			
							200	200mm (Kynar Only)			
								Cable Configuration - High Temperature, Low Noise TPE Jacket			
								JB	Junction Box Preinstalled (for use with B39 Extension cable when complete assembly is specified)		
								T	8" Pigtail - for use with junction box		
								PH	TOP68 Quick Disconnect Plug Head **(PT100 Temp Compensation Only)**		
								1 to 5	1' to 5' - Standard		
								6 to 15	6' to 15'		
								16 to 30	16' to 30'		
								31 to 100	**Longer lengths available. Consult factory for installation, application and leadtime. For lengths >30 feet, please consider Junction Box, Extension Cable and possible pre-amp.**		
									Reference Wire		
									C	Reference wire on coax shield **(Common with BNC leads used with B39 Ext Cables)**	
									E	Reference on separate wire **(Best choice for direct wiring to analyzers)**	
										Lead Terminations	
										BT	BNC (with tinned wires if sensor has temp comp)
										BL	BNC (with #6 spade lug wires if sensor has temp comp)
										B2	BNC (with Molex for temp comp; use with B39 Ext Cables)
										TT	All tinned lead wires
										LL	All #6 spade lug wires
										PT	TOP68 Quick Disconnect Plug Tail on cable
										PP	All wire ferrules
Mtl	AIP	Body	Elec	Tip	TC	Opt	Depth	Cable	Ref	Term	
B	**V**	**551**	**R**	**DT**	**C**	**S**	**N**	**15**	**E**	**TT**	**Typical Sensor Configuration**

Model 547
In-line, High Pressure In-line, Hot Tap Retractable

The Model 547 is a replaceable, cartridge style sensor. It is designed to fit into a variety of sensor holders for direct insertion into the process. When used with a metallic sheath the 547 sensor can provide variable insertion depth for hot tap ball valve installations as well as the ability to withstand pressures up to 2500 PSIG with Barben's high pressure housing assembly.

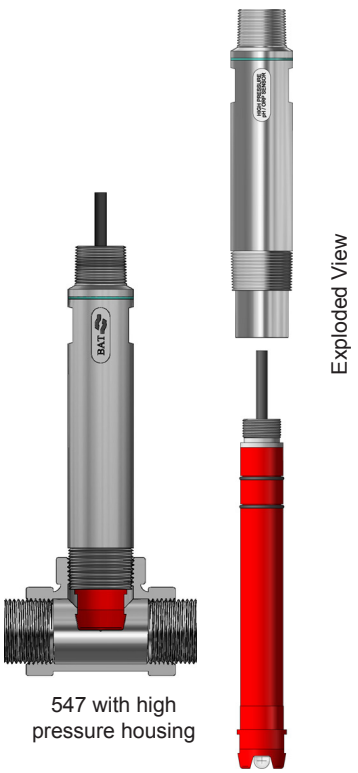


Pressure / Temperature Ratings

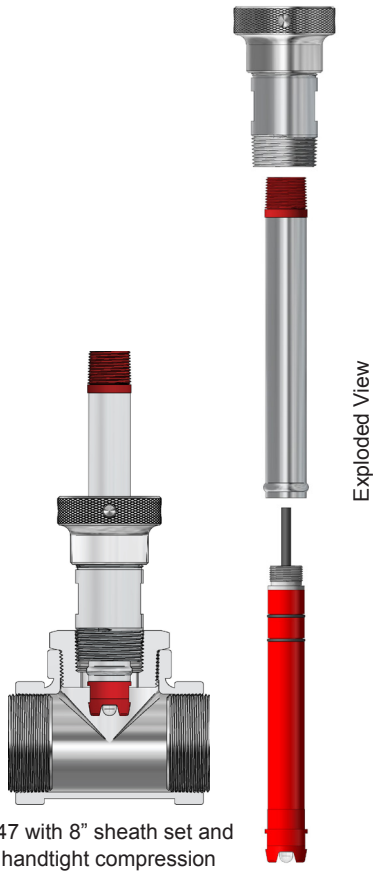
Sensor Material	Installation Type	
	Threaded In-line High Pressure	Retractable
Kynar *(red / blue*)*	2500 PSIG @ 122°F (50°C) 50 PSIG @ 266°F (130°C)	150 PSIG @ 158°F (70°C) 40 PSIG @ 266°F (130°C)
CPVC *(grey)*	Not Recommended	100 PSIG @ 167°F (75°C) 35 PSIG @ 212°F (100°C)
PEEK *(tan)*	2500 PSIG @ 122°F (50°C) 50 PSIG @ 266°F (130°C)	150 PSIG @ 158°F (70°C) 40 PSIG @ 266°F (130°C)

* Blue Kynar rated to 150PSIG @ 158°F (70°C) in threaded in-line high pressure applications.

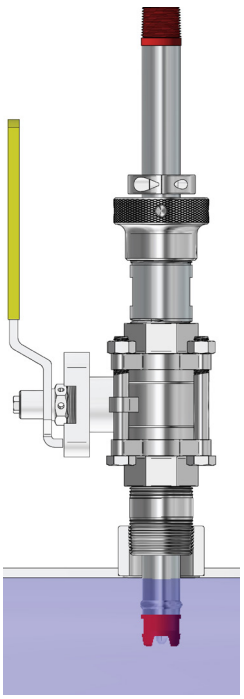
547 Examples

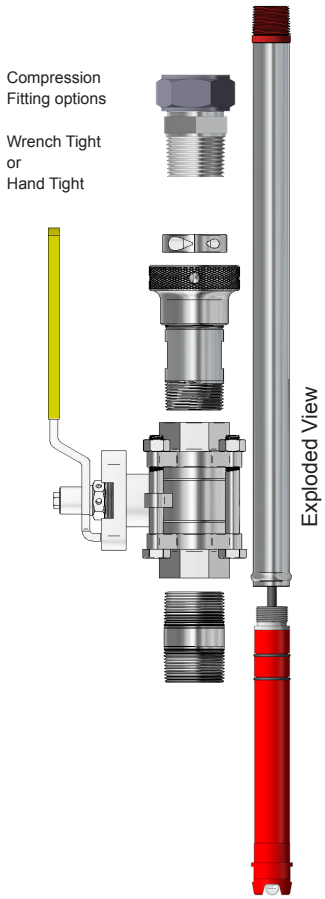


547 with high pressure housing



547 with 8" sheath set and handtight compression fitting





547 with ball valve assembly and handtight compression fitting

Figure 13

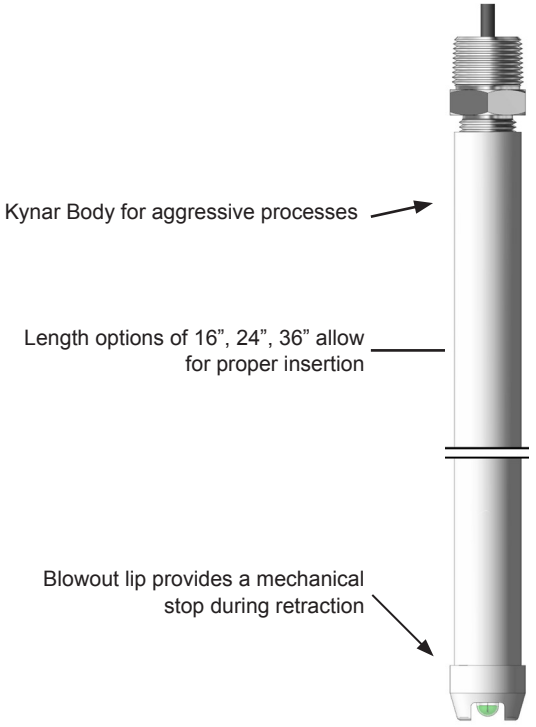
Performance Series
pH/ORP Sensors

547 In-line, High Pressure In-line, Hot Tap Retractable pH / ORP Sensors

Material	Axial Ion Path	Body	Electrode	Tip	TC	Body Options	Insertion Depth	Cable	Reference Wire	Terminations	
Body Material											
C	CPVC (not available with Solution Ground)										
B	PVDF Kynar										
K	PEEK (not available with Solution Ground)										
	O-Ring Seal Material										
	V	Viton® Extreme™ ETP-600S									
	E	EPDM									
	K	FFKM (perfluoro-elastomer)									
		Body Configuration									
		547	Replacement Cartridge, Valve Ins, Flow Cell, Kynar or PEEK avail High Pressure to 2500PSIG								
			Measuring Electrode								
			R	Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			E	Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CE	Coating Resistant, Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CF	Coating Resistant, Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			CR	Coating Resistant, Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			FA	Antimony Measuring Electrode for Hydrofluoric Acid Applications (3 - 8 pH) -20 to 80°C (-4 to 176°F)							
			FG	Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			FR	Hydroflouric Acid Resistant, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			FH	Silica Resistant Coating, Ruggedized, Flat-glass (1 - 14 pH) 20 to 130°C (68 to 266°F)							
			HR	Silica Resistant Coating, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			PX	Platinum ORP, Flat Solid Billet (0 to +/-1500 mV) 0 to 130°C (32 to 266°F)							
				Tip Configuration with Teflon Liquid Junction							
				FT	Flush no tip protection						
				GT	Flush no tip protection, with Solution Ground (Not for High Pressure)						
				DT	Dual Notch						
				LT	Dual Notch with Solution Ground (Not for High Pressure)						
					Temperature Compensation (TC)						
					N	None					
					B	Balco 3.01K Ohm (2 Wire)					
					C	PT100 RTD (3 Wire)					
					H	Honeywell 8550 ohm (2 Wire)					
					K	PT1000 RTD (3 Wire)					
						Body Options					
						S	Standard Body				
						C	High pressure certification, **Kynar/PEEK only**				
						A	8 in. 316 Stainless Steel sheath				
						B	8 in. Titanium Grade 2 sheath				
						D	8 in. Hastelloy C sheath				
						E	16 in. 316 Stainless Steel sheath				
						F	16 in. Titanium Grade 2 sheath				
						G	16 in. Hastelloy C sheath				
						H	20 in. 316 Stainless Steel sheath				
						J	20 in. Titanium Grade 2 sheath				
						K	20 in. Hastelloy C sheath				
						L	24 in. 316 Stainless Steel sheath				
						M	24 in. Titanium Grade 2 sheath				
						N	24 in. Hastelloy C sheath				
						P	30 in. 316 Stainless Steel sheath				
						Q	30 in. Titanium Grade 2 sheath				
						R	30 in. Hastelloy C sheath				
						T	36 in. 316 Stainless Steel sheath				
						U	36 in. Titanium Grade 2 sheath				
						V	36 in. Hastelloy C sheath				
						W	60 in. 316 Stainless Steel sheath				
						X	60 in. Titanium Grade 2 sheath				
						Y	60 in. Hastelloy C sheath				
							Accessory Hardware (Sensor O-Ring Material aboves determines Assessory Hardware Material)				
							N	Standard Replacement Sensor Cartridge			
							1	1" SS316 Wrench Tight Compression Fitting (B4954-0001V, E, K)			
							2	1" SS316 Wrench Tight Compression Fitting + Clean-Cal-Purge Fitting 1-1/4" MNPT			
							3	1" SS316 Wrench Tight Compression Fitting + Clean-Cal-Purge Fitting 1-1/2" MNPT			
							4	1" Titanium Grade 2 Wrench Tight Compression Fitting (B4954-0009V, E, K)			
							5	1" Titanium Grade 2 Wrench Tight Compression Fitting + Clean-Cal-Purge Fitting 1-1/4" MNPT			
							6	1" Titanium Grade 2 Wrench Tight Compression Fitting + Clean-Cal-Purge Fitting 1-1/2" MNPT			
							7	1" Hastelloy C Wrench Tight Compression Fitting (B4954-0002V, E, K)			
							8	1-1/4" SS316 Hand Tight Compression Fitting (B4954-0003V, E, K)			
							9	1-1/4" SS316 Hand Tight Compression Fitting + Clean-Cal-Purge Fitting 1-1/4" MNPT			
							A	1-1/4" SS316 Hand Tight Compression Fitting + Clean-Cal-Purge Fitting 1-1/2" MNPT			
							B	1-1/4" Titanium Grade 2 Hand Tight Compression Fitting (B4954-0005V, E, K)			
							C	1-1/4" Titanium Grade 2 Hand Tight Compression Fitting + Clean-Cal-Purge Fitting 1-1/4" MNPT			
							D	1-1/4" Hastelloy C Hand Tight Compression Fitting (B4954-0004V, E, K)			
							E	1" Kynar (PVDF) Hand Tight Compression Fitting (40PSIG Max)			
							F	1" Teflon Wrench Tight Compression Fitting (40PSIG Max)			
								Cable Configuration - High Temperature, Low Noise TPE Jacket			
								JB	Junction Box (for use with B39 Extension cable when complete assembly is specified)		
								T1	8" Pigtail for (8" assy or High Pressure or SS Flow Cell)		
								T2	8" Pigtail for (16" assy)		
								T3	8" Pigtail for (20" assy)		
								T4	8" Pigtail for (24" assy)		
								T5	8" Pigtail for (30" assy)		
								T6	8" Pigtail for (36" assy)		
								T7	8" Pigtail for (60" assy)		
								1 to 5	1' to 5' - Standard		
								6 to 15	6' to 15'		
								16 to 30	16' to 30'		
								31 to 100	**Longer lengths available. Consult factory for information and leadtime. For lengths >30 feet, please consider Junction Box, Extension Cable and possible pre-amp.**		
									Reference Wire		
									C	Reference wire on coax shield **(Common with BNC leads used with B39 Ext Cables)**	
									E	Reference on separate wire **(Best choice for direct wiring to analyzers)**	
										Lead Terminations	
										BT	BNC (with tinned wires if sensor has temp comp)
										BL	BNC (with #6 spade lug wires if sensor has temp comp)
										B2	BNC (with Molex for temp comp; use with B39 Ext Cables)
										TT	All Tinned Lead wires
										LL	All #6 Spade Lug wires
										PT	TOP68 Quick Disconnect Plug Tail on cable
										PP	All wire ferrules
Mtl	AIP	Body	Elec	Tip	TC	Opt	Depth	Cable	Ref	Term	
B	**V**	**547**	**R**	**DT**	**C**	**S**	**N**	**15**	**E**	**TT**	**Typical Sensor Configuration**

Model 567
All Plastic Hot Tap Retractable

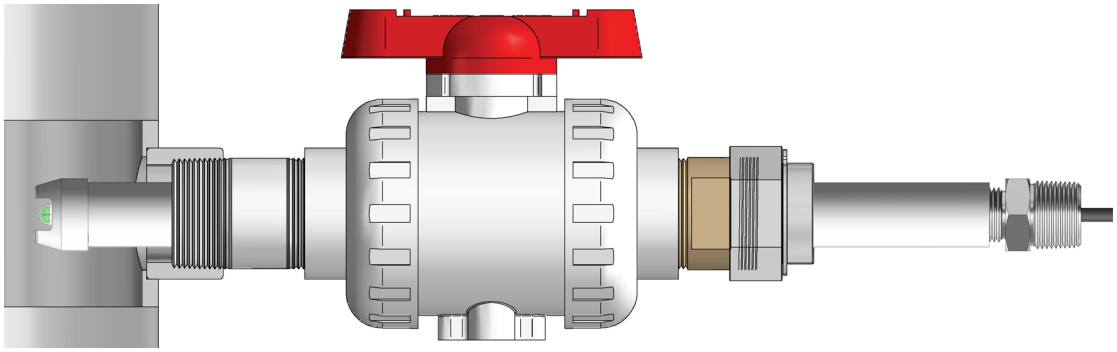
If your piping is corrosion resistant plastic, shouldn't your pH sensor be the same? The Model 567 is specifically designed for use in the most aggressive measurement applications. It is the only "All Plastic" hot tap retractable pH sensor available to the market. The 567 sensor uses a Kynar insertion body thus eliminating the metallic sheath typically used with cartridge style hot tap sensors. Not only can it withstand strong chemicals; the Kynar body provides a great solution in applications that build-up and adhere to metallic parts.



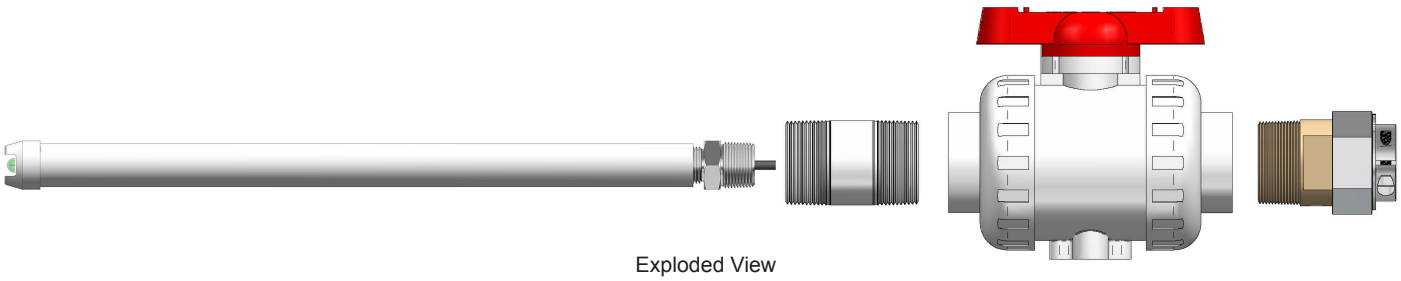
Pressure / Temperature Ratings

Sensor Material	Installation Type	
	Teflon or Kynar Compression Fitting	PEEK Stop Lock Compression Fitting
Kynar *(white)*	40 PSIG @ 167°F (75°C)	100 PSIG @ 167°F (75°C) 35 PSIG @ 212°F (100°C)

567 Examples



Installed in process pipeline



Exploded View

567 All Plastic hot tap sensor with Ball Valve assembly and PEEK Stop Lock Compression Fitting

Figure 14

Performance Series
pH/ORP Sensors

567 All Plastic Hot Tap Retractable pH / ORP Sensors

Material	Axial Ion Path	Body	Electrode	Tip	TC	Body Options	Insertion Depth	Cable	Reference Wire	Terminations	
Body Material											
B	PVDF Kynar Body Industrial pH sensor										
	O-Ring Seal Material										
	V	Viton® Extreme™ ETP-600S									
	E	EPDM									
	K	FFKM (perfluoro-elastomer)									
		Body Configuration									
		567	All plastic (Kynar only) valve insertion								
			Measuring Electrode								
			R	Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			E	Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CE	Coating Resistant, Low Temp Hemi-glass (2 - 11 pH) -20 to 50°C (-4 to 122°F)							
			CF	Coating Resistant, Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			CR	Coating Resistant, Ruggedized, Hemi-glass (0 - 14 pH) 15 to 130°C (59 to 266°F)							
			FA	Antimony Measuring Electrode for Hydrofluoric Acid Applications (3 - 8 pH) -20 to 80°C (-4 to 176°F)							
			FG	Ruggedized, Flat-glass (0 - 14 pH) 20 to 130°C (68 to 266°F)							
			FR	Hydroflouric Acid Resistant, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			FH	Silica Resistant Coating, Ruggedized, Flat-glass (1 - 14 pH) 20 to 130°C (68 to 266°F)							
			HR	Silica Resistant Coating, Ruggedized, Hemi-glass (1 - 14 pH) 15 to 130°C (59 to 266°F)							
			PX	Platinum ORP, Flat Solid Billet (0 to +/-1500 mV) 0 to 130°C (32 to 266°F)							
				Tip Configuration with Teflon Liquid Junction							
				FT	Flush with no tip protection						
				DT	Dual Notch						
					Temperature Compensation (TC)						
					N	None					
					B	Balco 3.01K Ohm (2 Wire RTD)					
					C	PT100 RTD (3 Wire RTD)					
					H	Honeywell 8550 ohm (2 Wire RTD)					
					K	PT1000 RTD (3 Wire RTD)					
						Body Options					
						S	Standard Body (Replacement Sensor)				
						F	1" Kynar (PVDF) Hand Tight Compression Fitting (B4953-0017V)				
						G	1" Teflon Wrench Tight Compression Fitting (B4953-0014V)				
							Insertion Depth				
							16	16"			
							24	24"			
							36	36"			
								Cable Configuration - High Temperature, Low Noise TPE Jacket			
								1 to 5	1' to 5' Hi-temp - Standard		
								6 to 15	6' to 15' Hi-temp		
								16 to 30	16' to 30' Hi-temp		
								31 to 100	**Longer lengths available. Consult factory for information and leadtime. For lengths >30 feet, please consider Junction Box, Extension Cable and possible pre-amp.**		
									Reference Wire		
									E	Reference on separate wire **(Best choice for direct wiring to analyzers)**	
										Lead Terminations	
										TT	All Tinned Leads
										PP	All Wire Ferrules
Mtl	AIP	Body	Elec	Tip	TC	Opt	Depth	Cable	Ref	Term	
B	**V**	**567**	**R**	**DT**	**C**	**S**	**16**	**15**	**E**	**TT**	**Typical Sensor Configuration**

Sensor Replacement
Cross Reference

Because of their improved longevity in harsh processes, Barben Performance Series Sensors allow the user to upgrade their process measurement simply by changing out their existing sensor. Barben pH/ORP sensors are fully compatible with most major manufacturer's analyzers. The cross reference guide below provides some basic guidelines on changing out sensors. Consult technical support for additional information on replacing competitive sensors.

Vendor	Vendor Model	Temperature Compensation	Barben Model	Barben Application Notes
ABB (Formerly TBI)	TB551 Next Step	3kΩ Balco PT100	551	Use standard "N" insertion depth, may require Nut Lock adapter
	TB556 Next Step		546	
	TB557 Next Step		547	547 will fit directly into ABB retractable sheath
	TB561 Next Step		551	
	TB564 Next Step		554	Consult factory on special Barben 554 Sensor
	TB567 Next Step		547	Request use of Barben high pressure sensor housing
Broadley-James	ST924 DynaProbe	3kΩ Balco PT100 PT1000	551	Use standard "N" insertion depth
	ST856 / ST956 DynaProbe		546	Use either 0.5" or 1.0" insertion depth
	ST873 / ST973 DynaProbe		551	Use 551 with Nut Lock Adapter, 547 with 8" sheath and wrench tight compression fitting can also be used
	ST864 DynaProbe		554	Consult factory on special Barben 554 Sensor
	ST857 / ST977 DynaProbe		547	Barben 547 will fit directly into Broadley-James retractable sheath
	ST851 / ST951 DynaProbe		551	Use standard "N" insertion depth. May require Nut Lock adapter
Endress & Hauser	CPF81 / CPF82	PT100	546	1" insertion with notched tip, 0.5" insertion with flush tip
	NOTE - Many E&H Sensor are based on the 12mm (PG13.5) standard. These sensors use adapters to mount into the process. Consult us on application			
Foxboro (Invensys)	PH10 Dolphin (3/4" inline)	3kΩ Balco PT100 PT1000	546	If PH10 uses 1" bushing then consider Barben 551 or 547 with 8" sheath and wrench tight compression fitting
	871A (1" Inline)	PT100 PT1000	551	Foxboro 871A uses 1" NPT process connection. Barben 551 Sensor with Nut Lock Adapter for inline applications
	871PH	PT1000	551	871PH uses a twist lock in-line connection. Consult Barben on fitting size for 551 sensor
Hach	pHD Sensors (DPD, DRD, PD, and RD)	NTC 300 Ω	551	Verify temperature sensor options transmitter can accept
	LCP Sensors (6028)		546	Verify temperature sensor options transmitter can accept, Hach Sensor has 1.5" NPT process connection thus fittings may be needed to mount Barben 546 sensor in process.
	DPC/DRC/PC1/PC2/PC3/RC1 /RC2 Combination Probes	PT1000	546	1" insertion depth
Mettler Toledo	InPro 4501	PT100 PT1000	551	Needs 1" NPT Nut Lock Adapter
	InPro 4550	PT100 PT1000	551	Needs 1" NPT Nut Lock Adapter
	NOTE - Many Mettler Toledo Sensors are based on the 12mm (PG13.5) standard. These sensors use fittings to mount into the process. Consult Barben on application.			
Rosemount	385 / 385+	3kΩ Balco PT100	547	Barben 547 with 16" sheath (Rosemount sheath is Titanium but other materials can be used)
	389		551	Rosemount 389 uses 1" NPT process connection. Barben 551 Sensor with Nut Lock Adapter for inline applications
	3900		551 546	Rosemount 3900 has both 3/4" and 1" threads on sensor body. Select Barben 546 if 3/4" threads are used. Select Barben 551 with Nut Lock Adapter if 1" NPT threads are used
	3300 PERpH-X	PT100	547	Barben 547 with 8" sheath (Rosemount sheath is Titanium but other materials can be used)
	3400 PERpH-X		547	Barben 547 with 24" or 36" sheath (Rosemount sheath is Titanium but other materials can be used)
	3500 PERpH-X		551	Rosemount 3500 uses 1" NPT process connection. Barben 551 Sensor with Nut Lock Adapter for inline applications
	372	PT100	546	Use 546 with 2" insertion depth. This sensor for HF Acid applications thus consider "FR" glass or Antimony electrode
Signet	2714/2715/2716/2717	3kΩ Balco	551	Signet offers additional fittings for in-line mounting
	2774/2775/2776/2777	3kΩ Balco PT1000	546	1" insertion with notched tip, 0.5" insertion with flush tip. Signet offers additional fittings for in-line mounting
	2724 / 2726		546	1" insertion with flush tip, 1.5" with notched tip. Signet offers additional fittings for in-line mounting
	2764/2765/2766/2767	3kΩ Balco PT1000 NTC 300 Ω	551	Signet offers additional fittings for in-line mounting
Yokogawa	FU20	PT1000	546	FU20 probes use a variety of adapters. Consult Barben on how sensor is mounted
	FU24		551	FU24 probes use a variety of adapters. Consult Barben on how sensor is mounted
	PH20		551	PH20 probes use a variety of adapters. Consult Barben on how sensor is mounted
	PH97		547	Barben 547 with 8" or 24" sheath (Yokogawa sheath is Titanium but other materials can be used)

Performance Series
pH/ORP Sensors

Contact Us

Barben Analytical is a leading supplier of analytical measurement technology targeting the industrial marketplace. It is a wholly owned subsidiary of Ametek.

Ametek has nearly 14,000 colleagues at over 120 manufacturing locations around the world. Supporting those operations are more than 80 sales and service locations across the United States and in more than 30 other countries around the world.

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