

# Dissolved Oxygen, pH, and Conductivity

## Steam Sterilizable and Autoclavable Dissolved Oxygen, pH, and Conductivity Sensors:

- Allows for fixed or retractable mounting configurations
- Measures accurately after many Steam-In-Place (SIP) application
- Requires minimal servicing
- Installs easily with quick cable-to-sensor disconnections
- Provides fast and stable readings

## Sensor Mounting hardware designed for typical biotechnology and pharmaceutical processes:

- Meets sanitary requirements
- Offers versatile mounting options
- Accepts sensors of various insertion lengths
- Installs with standard G 1-¼ inch weld-in socket

## Analyzers and transmitters with many options:

- Two or four wire models
- Temperature compensation
- 4–20 mA, HART®, or Fieldbus communications
- Sensor Diagnostic capabilities
- Plantweb alerts
- High/Low alarms
- PID Control
- Various mounting styles
- Enclosures for various safety levels



## Features and Benefits

For many years, Emerson Process Management, Rosemount Analytical has provided quality on-line instruments and sensors used in various industries. This complete line of steam-sterilizable products caters to the most demanding processes used in the Biotechnology, Pharmaceutical, and Food & Beverage industries. Emerson Process Management's instruments and sensors are ideal for pH, dissolved oxygen, and conductivity measurements for batch processes where steam-in-place sterilization is performed. The high-performance

sensors offer a long, stable life while requiring only minimal maintenance. The various mounting accessories have been specifically designed to provide easy sensor access with either fixed weld-in or retractable mounting configurations. All instruments offer a wide variety of features, allowing the user to choose the best analyzer/transmitter for their individual process needs.

## Hx338 Steam Sterilizable and Autoclavable Combination pH Sensor

The **Hx338** sensor provides biotechnology and pharmaceutical processes with the unique **Tri-Triple** reference technology. The Tri-Triple reference is made up of three (3) separate peripheral liquid junctions that make contact with the solution, and then two (2) inner junctions that protect the reference. The first junction eliminates flow sensitivity and maintains a steady reference signal. The three overall reference junctions work together to help maintain a drift-free pH signal and fight poisoning ions (i.e. sulfides, proteins, or sugars), even after numerous sterilization cycles.

This sensor is also excellent for other applications, including chemical reactions or food processing. The Hx338 can be used with the

insertion or Retractable sensor mounting assemblies or similar accessories with a PG 13.5 sensor connection, all of which can be used with a large scale batch processes where steam-in-place sterilization is performed. For smaller batch processes, it can be threaded directly into the top plate and autoclaved if necessary.

The 12mm diameter sensor is offered in five different lengths for various insertion depths. The sensor features a PG 13.5 thread for simple process connection and a single-pole S7 connector plug for quick disconnect from a mating cable. VP8 cable assembly works with both VP6 and VP8 sensor connector (-72).

### Ordering Information

Model Hx338	pH Sensor
CODE	Description
01	120 mm (4.725 in.)
02	225 mm (8.859 in.)
03	325 mm (12.796 in.)
04	400 mm (15.749 in.)
05	425 mm (16.733 in.)

Temperature Compensation	
CODE	Description
72	PT100 with a VP connector (can be ordered with any length sensor)

PN	Cable Accessories
9160494	1 m (3.3 ft), AS7 connector, bare wire on analyzer end
9160495	5m (16.4 ft), AS7 connector, bare wire on analyzer end
9160496	10m (32.8 ft), AS7 connector, bare wire on analyzer end
9160497	1 m (3.3 ft), AS7 connector, BNC on analyzer end
9160498	3m (9.8 ft), AS7 connector, BNC on analyzer end
9160499	5m (16.4 ft), AS7 connector, BNC on analyzer end
9200338	S8 cable, free rotating connector, single connector, single pole 5m
9200339	S8 cable, free rotating connector, single connector, single pole 10m
23645-06	15 ft. (4.6m) cable with mating VP connector with BNC on transmitter end
23645-07	15 ft. (4.6m) cable with mating VP connector with bare wires on transmitter end
24281-00	15 ft. cable with mating VP8 connector
24281-01	25 ft. cable with mating VP8 connector
24281-02	2.5 ft. cable with mating VP8 connector
24281-03	50 ft. cable with mating VP8 connector
24281-04	100 ft. cable with mating VP8 connector
24281-05	4 ft. cable with mating VP8 connector
24281-06	10 ft. cable with mating VP8 connector
24281-07	20 ft. cable with mating VP8 connector
24281-08	30 ft. cable with mating VP8 connector

PN	Mounting Accessories
9160478	Insertion assembly 70mm insertion, use 120 mm sensor
9160477	Retractable assembly 70mm insertion, use 225 sensor
9160484	Service kit for insertion mounting assembly
9160486	Service kit for retractable mounting assembly
9160483	15 degree weld-in socket, G 1-1/4 in. thread, 44 mm
SQ 8940	1.5" Triclamp Insertion Assembly



The Hx338 is a 12mm sensor offered with PG 13.5 threads, a S7 connector plug, and five various insertion lengths.



The AS7 connector cable is offered in various lengths and is terminated with choice of BNC or bare wires.



The Weld-in Socket (see page 18) is used to mount the Pressurized Mounting Assembly into tanks or pipes.



The Retractable Mounting Assembly (see page 16) can be used with Hx338-02 to achieve insertion and removal of the sensor without shutting down the process.

# Hx338 Steam Sterilizable and Autoclavable Combination pH Sensor

## Specifications

**pH Range:** 2 to 12 (0 to 14 for short periods)

**Temperature Range:** -14 to 275° F (-10 to 135° C)

**Maximum Pressure:** 58 psig (600 kPa abs, 4 bar)

**Wetted materials:** Glass, EPDM

**Process Connections:** PG 13.5 threads

**Sensor Lengths:** Choice of 120, 225, 325, 400, or 425 mm

**Cable Connector:** S7 connector plug, single pole, and VP connector.

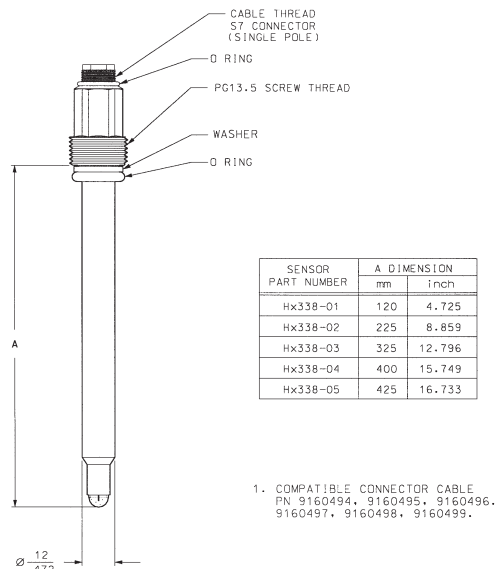
**Cable Compatibility:** any AS7 connector plug, single pole or S8 cable

PN 24281-06 VP8 connector, 10 ft cable

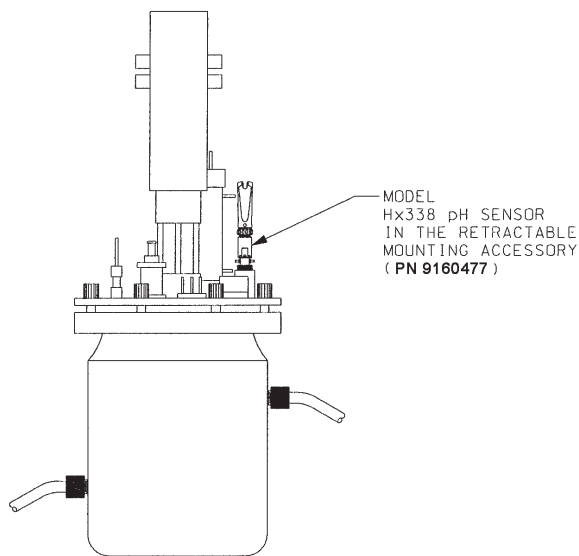
PN 24281-00 VP8 connector 15 ft cable

**Compatible Mounting Accessory:** Insertion or retractable mounting assembly (see pages 15 and 16)

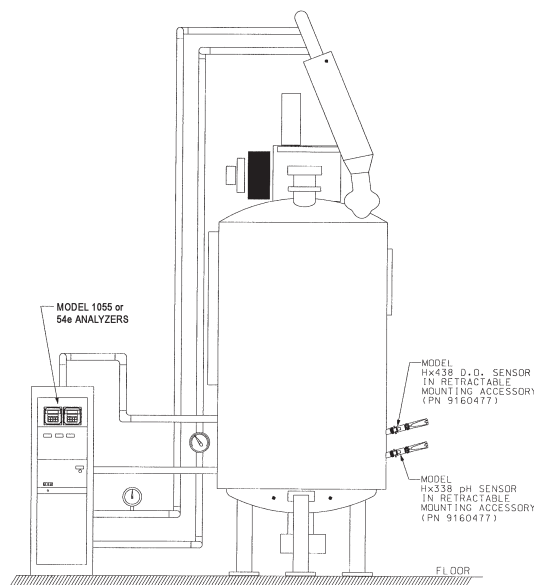
**Compatible Analyzers:** All Rosemount Analytical pH analyzers/transmitters.



Sensor Dimensional Drawing



**Sample Installation Drawing.** A bench top fermentor (bioreactor, 5 L to 50 L) illustrating a top mount plate using the retractable mounting assembly. Sensor can also be mounted directly into top mount plate depending on port design.



**Sample Installation Drawing.** A pilot plant fermentor (bioreactor, 50 L to 500 L) illustrating a side mount configuration using a G 1-1/4 in., 15° weld-in socket and the retractable mounting assembly. Note that these mounting assemblies can also be used with dissolved oxygen sensors.

# Hx348 Steam Sterilizable and Autoclavable Combination pH Sensor

The **Hx348** sensor provides a solution for difficult pH measurements. This combination pH sensor offers the unique Tri-Triple reference technology. The Tri-Triple reference is made up of three (3) separate peripheral liquid junctions that make contact with the solution, and then two (2) inner junctions that protect the reference. The first junction eliminates flow sensitivity and maintains a steady reference signal. The three overall reference junctions work together to help maintain a drift-free pH signal and fight poisonous ions (i.e. sulfides), even after numerous sterilization cycles. Applications for this sensor can be found in the biotechnology, pharmaceutical, and food processing industries. The Hx348 pH sensor is a combination pH sensor that uses an S7 connector plug for quick disconnect from the cable. It is offered in four (4) different insertion lengths in either a disposable or refillable reference design.

The **refillable sensor** is ideal for critical measurements in difficult applications – i.e., sulfides, proteins, and sugars. It is offered with either the Tri-Triple reference junction for use in media containing proteins, or with a single, clog-free, platinum junction for use in media containing sulfides. The special electrolyte has been developed to inhibit reference contamination.

The **disposable sensor** has been developed to allow simplicity of use while still providing a stable pH signal over the long life of the sensor.

Both the refillable and disposable sensors can be used with the pressurized mounting accessory or a similar assembly.

## Ordering Information

Model HX348	pH Sensor
<b>CODE</b>	<b>Sensor Insertion Lengths</b>
01	120 mm (4.73 in.)
02	150 mm (5.91 in.)
03	200 mm (7.88 in.)
04	250 mm (9.85 in.)

CODE	Sensor Design
10	Disposable and pressurizable, Tri- Triple junction, recommended for use in media containing proteins
11	Refillable and pressurizable, single clog-free platinum junction, recommended for use in media containing sulfides.
12	Refillable and pressurizable, Tri-Triple junction, recommended for use in media containing proteins.

PN	Cable Accessories
9160494	1 m (3.3 ft), AS7 connector, bare wire on analyzer end
9160495	5m (16.4 ft), AS7 connector, bare wire on analyzer end
9160496	10m (32.8 ft), AS7 connectore, bare wire on analyzer end
9160497	1 m (3.3 ft), AS7 connector, BNC on analyzer end
9160498	3m (9.8 ft), AS7 connector, BNC on analyzer end
9160499	5m (16.4 ft), AS7 connector, BNC on analyzer end
9200338	S8 cable, free rotating connector, single connector, single pole 5m
9200339	S8 cable, free rotating connector, single connector, single pole 10m

PN	Mounting Accessories
9160479	Pressurized Assembly for 120 mm electrode, 70 mm insertion
9160480	Pressurized assembly for 150 mm electrode, 100 mm insertion
9160481	Pressurized assembly for 200 mm electrode, 150 mm insertion
9160482	Pressurized assembly for 250 mm electrode, 200 mm insertion
9160483	15 degree weld-in socket, G 1-1/4 in. thread, 44 mm
9160485	Service kit for pressurized mounting accessory
9160500	500 ml refill solution for code -11 sensors only
9160505	100 ml refill solution for code -12 sensors only



The Hx348 is offered in four different insertion lengths and can be mounted in process using a Pressurized Mounting Assembly (see page 17).



The AS7 connector cable is offered in various lengths and is terminated with choice of BNC or bare wires.



The Weld-in Socket (see page 18) is used to mount the Pressurized Mounting Assembly into tanks or pipes.

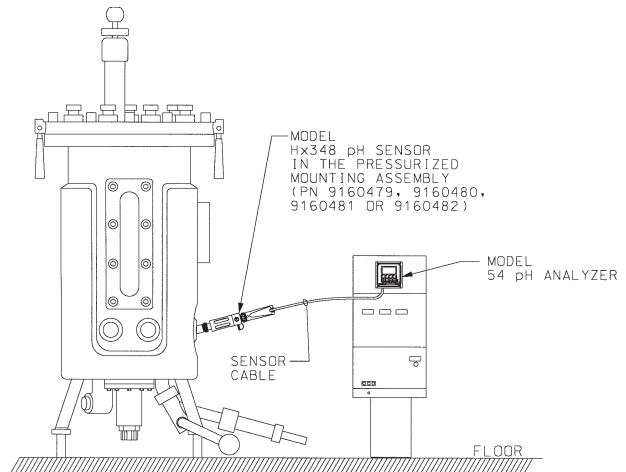


The Pressurized Mounting Assembly (see page 17) is offered in four different insertion lengths and can be used for either the disposable or refillable Hx348 sensor.

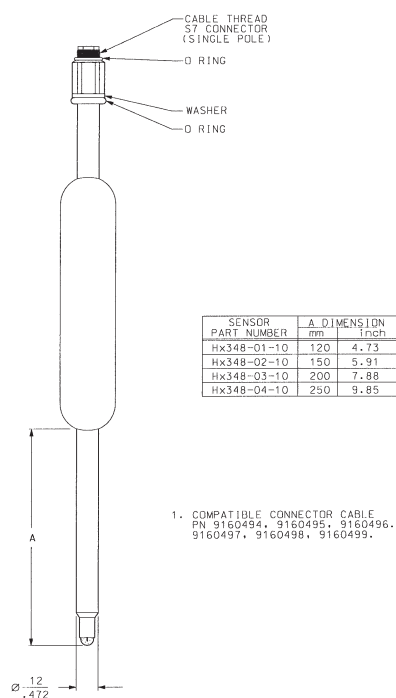
# Hx348 Steam Sterilizable and Autoclavable Combination pH Sensor

## Specifications

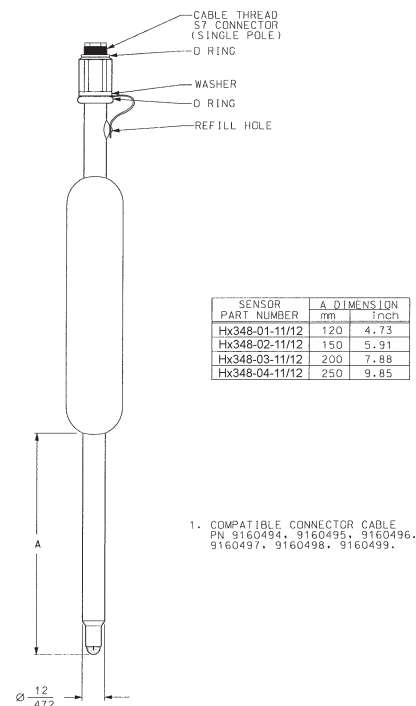
- pH Range:** 2 to 12 (0 to 14 for short periods)
- Temperature Range:** -14 to 275° F (-10 to 135° C)
- Maximum Pressure:** 58 psig (600 kPa abs, 4 bar)
- Wetted materials:** Glass, Viton
- Process Connections:** None
- Sensor Lengths:** Choice of 120, 150, 200, or 250 mm
- Cable Connector:** S7 connector plug, single pole
- Cable Compatibility:** any AS7 connector plug, single pole or S8 cable
- Compatible Mounting Accessory:** Pressurized mounting assembly (see page 17)
- Compatible Analyzers:** All Rosemount Analytical pH analyzers/transmitters.



**Sample Installation Drawing.** Pilot plant fermentor (bioreactor) using the Hx348 and the Pressurized Mounting assembly in a side mount installation.



**Sensor Dimensional Drawing Model Hx348 Non-refillable Sensor.** The Hx348 Disposable Sensor is recommended for typical installations requiring low maintenance.



**Sensor Dimensional Drawing Model Hx348 Refillable Sensor.** The Hx348 Refillable Sensor is recommended for protein- or sulfide-containing media or for feedstocks requiring pressurized, continuous flowing reference.

## 328A Steam Sterilizable and Autoclavable Combination pH Sensor

The **328A's** ceramic body and silicone rubber seals provide excellent chemical resistance to many organic compounds commonly found in biotechnology, pharmaceutical, and food & beverage applications. This double junction sensor is offered with 15 feet of cable and is designed to fit into a standard 25 mm mounting assembly.

The 328A's double junction reference cell resists the effects of electrode poisoning or fouling. Poisoning or fouling can occur when ions or substances such as chlorides, sulfides, and sugars react with the Ag/AgCl reference element. The double junction reference further isolates the reference element from the process to extend the sensor's life.



*328A Sensor and the Standard Mounting Adapter.*

### Ordering Information

The 328A Steam Sterilizable pH Sensor includes combination pH electrode with 15 ft (4.5 m) of special low noise, high temperature coaxial cable; double junction reference, gelled reference electrolyte; and ceramic electrode body. Requires standard insertion mounting hardware for 12mm electrode (PN 22924-00). Integral automatic temperature compensation not available. Compatible with all Rosemount Analytical pH analyzers/transmitters.

Model	328A Steam Sterilizable pH Sensor	
CODE	Cable Termination	
07	Spade	
08	None (bare wires)	
328A	08	EXAMPLE

# 328A Steam Sterilizable and Autoclavable Combination pH Sensor

## Specifications

**Wetted Parts:** Ceramic, silicone, and glass

**Automatic Temperature Compensation:** Temperature compensation is generally not required since most applications operate very near pH 7 (isopotential point). When temperature compensation is required, a separate RTD can be used with compatible instruments.

**Process Connections:** 1-1/4 inch NPSL threaded nut

**Temperature/Pressure Rating:**

50 psig at 266° F (339 kPa abs [3.4 bar] at 130° C)

70 psig at 176° F (475 kPa abs [4.8 bar] at 80° C)

100 psig at 104° F (678 kPa abs [6.8 bar] at 40° C)

**Cable:** 2-conductor, low-noise coax, 15 ft (4.5 m)

**Weight/Shipping Weight:** 100 g/180 g (.2 lb/1.0 lb)

**Performance:** In typical applications, the 328A will perform continuously for up to 50 steam sterilization cycles

**Sensitivity:** ±0.02pH

**Range:** 0-13 pH:

1.67-4.01 pH 96 % linearity

4.01-12.0 pH 99 % linearity

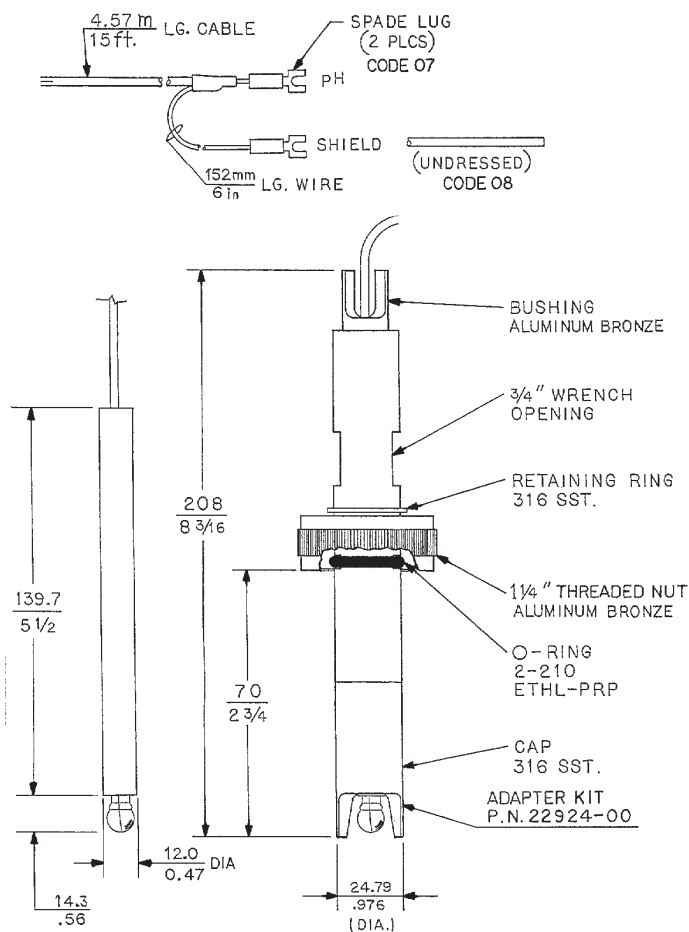
12.0-13.0 pH 97 % linearity

**Repeatability:** ± 0.05 pH

**Recommended Accessories:**

PN 22924-00 - 25 mm Insertion Mounting Adapter Kit

PN 23594-00 - Pack of four (4) o-rings (PN 9550154), 2-210 EP



**Dimensional Drawing of 328A & Standard Mounting Adapter Hardware Kit (PN 22924-00)**



# ENDURANCE™ 403 Conductivity Sensor

The 403 Sanitary Flange Conductivity Sensors are supplied with 1-1/2 inch or 2 inch stainless steel sanitary process connections. Models 403-11/12/13 have a maximum temperature rating of 221° F (105° C) and are suitable for sterilization up to 275° F (135° C). Maximum pressure rating for all models is 250

psig (1825 kPa). The standard 403 sensor has a Pt 1000 RTD and a 10 ft (3.1 m) integral cable. An optional 50 ft (15.2 m) cable is also available. For cable lengths greater than 50 ft (15.2 m), consult the factory.

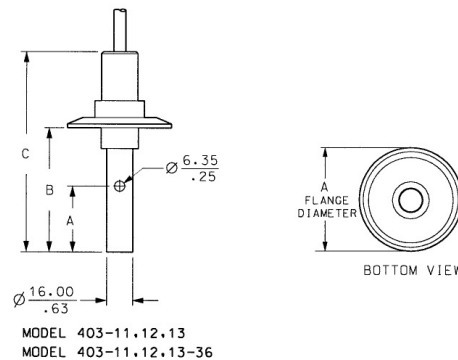
## Specifications

- Cell Constants:** 0.01-cm, 0.1/cm, 1.0/cm
- Temperature Range:** -10 to 135° C (14 to 275° F)
- Maximum Pressure:** 250 psig (1695 kPa abs, 17 bar)
- Wetted Materials:** Titanium, 316 SST, Kel-F (FDA compliant), EPDM (FDA & Class VI compliant)
- Surface Finish:** <16Ra
- Process Connections:** choice of 1-1/2 in. or 2 in. sanitary flange
- Sensor Lengths:** various
- Compatible Analyzers:** All Rosemount Analytical conductivity analyzers/transmitters



403 Sensor

Model 403	Sanitary Conductivity Sensors				
<b>CODE</b>	<b>Cell Constant (required selection)</b>				
11	0.01/cm				
12	0.1/cm				
13	1.0/cm				
<b>CODE</b>	<b>Sanitary Fitting (required selection)</b>				
20	1-1/2 in. Stainless Steel Sanitary Fitting				
21	2 in. Stainless Steel Sanitary Fitting (not available with codes 13 and 14)				
<b>CODE</b>	<b>Temperature Compensation (optional selection)</b>				
-	PT1000 (standard) for 1054BLC, 1054BR, 1054BDC, 1055, 54C, 54eC, 81C, 3081C, and 4081C				
54	For 1054C, 1054A C, 1054B C, 2081C, and 2054C (Pt 100 RTD)				
<b>CODE</b>	<b>Additional Options (Optional Selection)</b>				
36	Extended insertion length (6.0 in. from inside face of flange to end of sensor) [available with option -11 only]				
50	Integral 50 ft cable length				
403	13	20	54	36	EXAMPLE



MODEL NO	A		B		C	
	INCHES	mm	INCHES	mm	INCHES	mm
403-11	1.59	40.39	2.98	75.69	5.02	127.51
403-12	.687	17.45	1.61	40.9	3.65	92.71
403-13	.667	16.94	2.11	53.59	4.17	105.92
403-11-36	1.59	40.39	6.49	166.79	8.37	212.60

MODEL NO	FITTING SIZE (TUBE O.D.)	A FLANGE DIAMETER	
		INCHES	mm
403-( )-20	1 1/2 INCHES	1.98	50.39
403-( )-21	2 INCHES	2.50	63.50

Sensor Dimensional Drawing



## Dissolved Oxygen Sensors: Hx438 and Gx448

Emerson’s team sterilizable dissolved oxygen sensors are designed to exceed industry standards. Other dissolved oxygen sensors used for biopharmaceutical applications have less reliable performance and high maintenance requirements, resulting in high costs and/or short sensor life. The Rosemount Analytical Hx438 and Gx448 sensors are a result of many years of experience in sensor manufacturing and have resolved these problems.

**Unique Design:** Most dissolved oxygen sensors operate by reduction of oxygen at the surface of the cathode. Without protection of the cathode, interferences from other substances may occur. Our Hx438 and Gx448 sensor cathodes are covered with a gas permeable membrane; therefore, the oxygen diffusing through the membrane is completely reduced at the cathode (Clark’s principle). The current between anode and cathode is proportional to the oxygen content of the sample.

The design of the membrane is the key to achieving the highest performance. Unlike the conventional thin membrane design, the Hx438 and Gx448 have a new propriety membrane material. This thick, steel-mesh-reinforced, double-layer membrane enables the sensor to withstand high pressure while maintaining high diffusion rates and short response times.

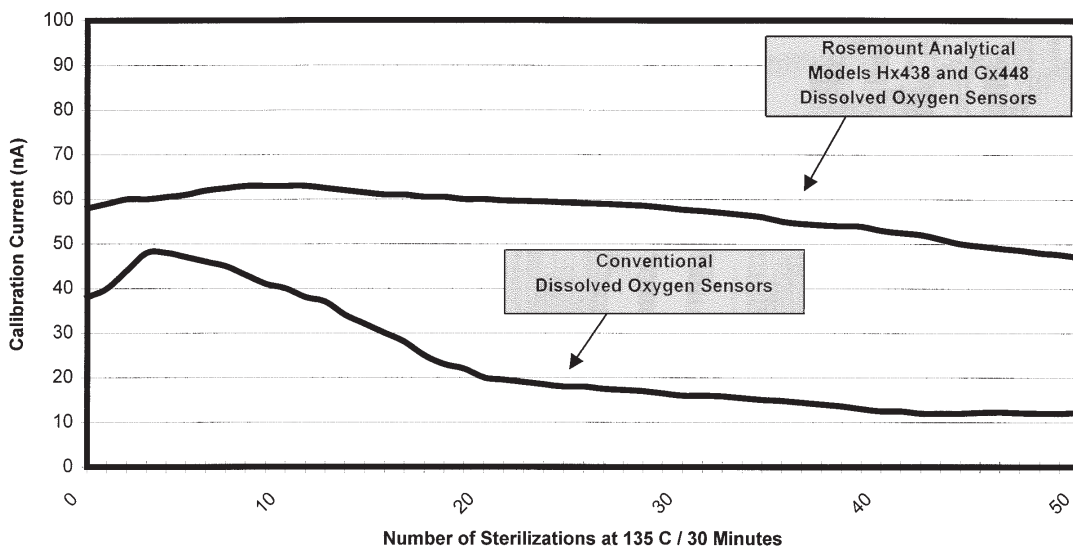
**Fast Response:** The extraordinary performance of the new membrane material leads to short response times, even under critical conditions.

**Longer Life with Less Maintenance:** Due to the unique design of the sensor, maintenance is seldom required. The special double membrane is less sensitive to contamination from protein and other fouling agents. The electrode construction guarantees excellent stability even after numerous sterilizations. The graph shown below illustrates the continuous, stable performance of the Rosemount Analytical dissolved oxygen sensors for up to 50 steam sterilization cycles without any user maintenance. Typically, dissolved oxygen sensors from other manufacturers have to be regenerated or recalibrated after 5 to 10 steam sterilizations.

**Minimal Flow Sensitivity:** Hx438 and Gx448 membrane material and overall design ensure that the flow rate has minimal effect on the sensor’s measurements.

**Short Polarization Time:** The polarization time is the time needed to eliminate all of the oxygen around the cathode before the sensor provides a stable reading at initial start up. The polarization time of Model Hx438 and Gx448 sensors is one third of other conventional steam sterilizable oxygen sensors.

**Autoclavable:** Small fermentors are normally sterilized in an autoclave, which is harmful to the electrical 4-pin connections. With the optional connector cap, autoclaving will not harm the sensor’s connector.



*The Rosemount Analytical dissolved oxygen sensors are low maintenance because the special membrane is designed to repel the contaminants that are typically known to foul conventional sensor membranes. Also, this membrane is sturdy enough to maintain a high calibration current, for up to 50 steam sterilization cycles, without any need for cleaning, recalibration, or regeneration. Generally, users must perform maintenance on conventional oxygen sensors after only 5 to 10 steam sterilization cycles.*

# Hx438 Rebuildable Steam Sterilizable Dissolved Oxygen Sensor

The **Hx438** sensor provides a drift-free signal and maintains its calibration value for up to 50 steam sterilization cycles. It can be used in the biotechnology, pharmaceutical, chemical, and food processing industries. The Hx438 is offered in four (4) different lengths for various insertion depths. It uses a 4-pin connection plug for quick disconnection from the cable. It can

be used with the Insertion or Retractable mounting assembly or similar assemblies typically used with large scale batch processes that perform SIP cleaning. For smaller batch processes, it can be threaded directly into the top plate and autoclaved if necessary.

**NOTE:** For clean-in-place (CIP) applications, consult factory.

## Ordering Information

Model Hx438	Dissolved Oxygen Sensor (12mm diameter)
CODE	Description
01	120 mm (4.725 in.) shaft length
02	210 mm (8.268 in.) shaft length
03	325 mm (12.796 in.) shaft length
04	425 mm (16.733 in.) shaft length

PN	Cable Accessories
9160491	1m (3.3 ft), bare wire on analyzer end
9160492	3 m (9.8 ft), bare wire on analyzer end
9160493	5 m (16.4 ft), bare wire on analyzer end

PN	Mounting Accessories
9160478	Insertion 70 mm insertion, use 120 mm sensor
9160477	Retractable 70 mm insertion, use 210 mm sensor
9160484	Service kit for Insertion mounting assembly
9160486	Service kit for Retractable mounting assembly
9160483	15 degree weld-in socket, G 1-1/4 in. thread, 44 mm
SQ 8940	1.5" Triclamp Insertion Assembly

PN	Servicing Accessories
9160487	Service kit for sensors, includes 3 membranes modules, o-rings, polishing tool, 20 ml electrolyte
9160489	50 ml bottle electrolyte
9160490	Connector cap to protect 4-pin connector while autoclaving
9160600	Service Membrane Kit, FDA syle



The Hx438 is a 12mm dissolved oxygen sensor used for a PG 13.5 threaded connection and is offered in various lengths.



The 4-pin connector cable is offered in three lengths.



The Weld-in Socket (see page 18) is used to mount the Insertion or Retractable Mounting Assembly into tanks or pipes.



The Insertion Mounting Assembly (see page 15) can be used to mount the Hx438-01 into the process tanks or pipes.

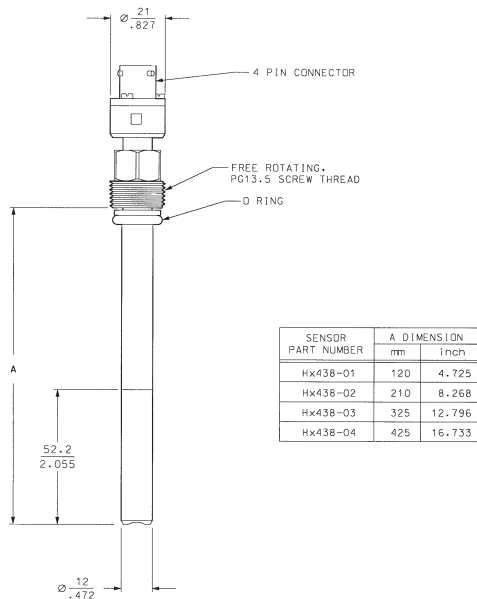


The Retractable Mounting Assembly (see page 16) can be used with the Hx438-02 to achieve insertion and removal of the sensor without shutting down the process.

# Hx438 Rebuildable Steam Sterilizable Dissolved Oxygen Sensor

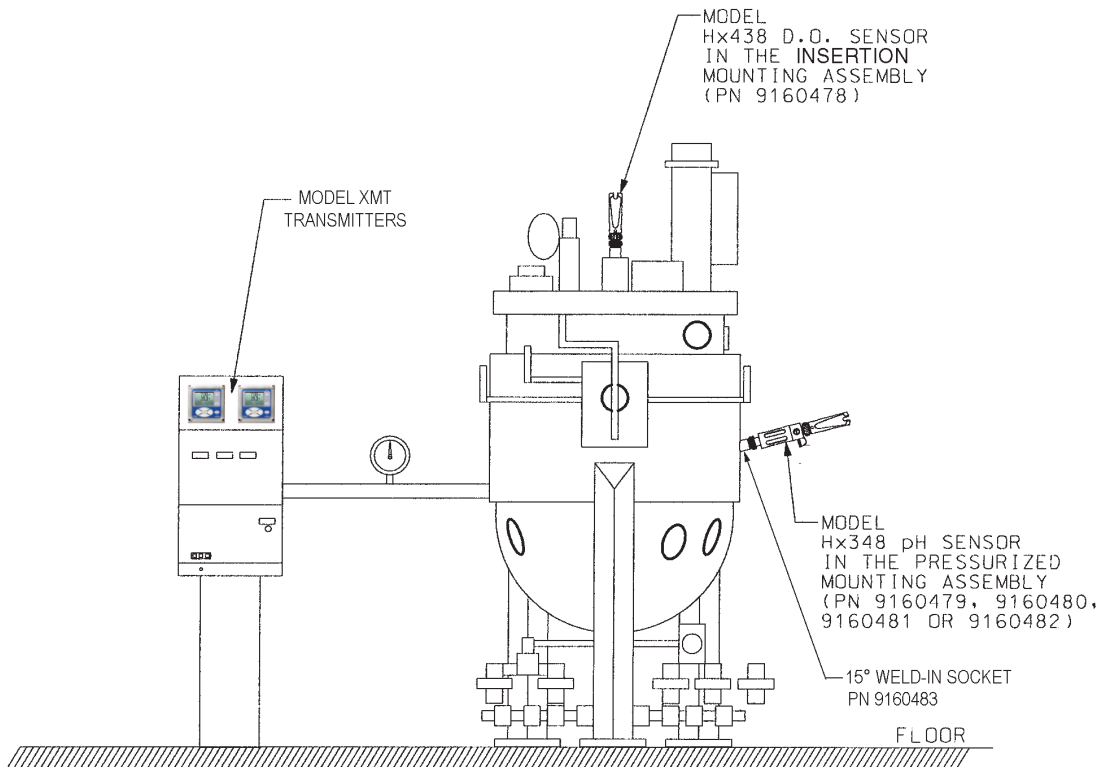
## Specifications

- Temperature Range:** -10 to 140° C (14 to 284° F)
- Maximum Pressure:** 59 psig (400 kPa abs, 4 bar)
- Wetted Materials:** Stainless Steel, EDPM
- Process connections:** PG 13.5
- Sensor Lengths:** Choice of 120, 210, 325, or 425 mm
- Cable Connector:** 4-pin
- Cable Compatibility:** Standard 4-pin Connector Cable
- Compatible Mounting Accessory:** Insertion or Retractable Mounting Assembly (see pages 15 and 16)
- Compatible Analyzers:** Rosemount Analytical 56, 1056, 5081A, and 1066
- Measurement Range:** 0 to 20 ppm, 0 to 250 % saturation, depending on instrument
- Temperature Compensation:** 22K NTC



SENSOR PART NUMBER	A DIMENSION	
	mm	inch
Hx438-01	120	4.725
Hx438-02	210	8.268
Hx438-03	325	12.796
Hx438-04	425	16.733

**Sensor Dimensional Drawing**



**Sample Installation Drawing.** Production Size (500 L to 20,000 L+) Fermentor (or Bioreactor, typically maximum up to 5000 L) with combination of top plate and side mounting using Hx438 and Hx348 in various mounting assemblies.

# Gx448 Rebuildable Steam Sterilizable Dissolved Oxygen Sensor

The **Gx448** sensor provides a drift-free signal and maintains its calibration value for up to 50 steam sterilization cycles. It can be used in the biotechnology, pharmaceutical, chemical, and food processing fields. The Gx448 is offered in three (3) lengths for various insertion depths. It uses a 4-pin connection plug for a quick disconnection from the cable. The cable-to-sensor

connection is water-tight and is protected by the standard cable protection cap.

It can be mounted directly into the G 1-1/4 inch weld-in socket using a connector nut.

## Ordering Information

Model Gx448	Dissolved Oxygen Sensor (25 mm diameter)
CODE	Description
01	100 mm (3.94 in.)

PN	Cable Accessories
9160491	1 m (3.3 ft), bare wire on analyzer end
9160492	3 m (9.8 ft), bare wire on analyzer end
9160493	5 m (16.4 ft), bare wire on analyzer end

PN	Mounting Accessories
9160504	15 degree weld-in socket, G 1-1/4 in. thread, 61 mm for -01 and -03 options
9160483	15 degree weld-in socket, G 1-1/4 in. thread, 44 mm for -02 option

PN	Servicing Accessories
9160487	Service kit for sensors, includes 3 membranes modules, o-rings, polishing tool, 20 ml electrolyte
9160489	50 ml bottle electrolyte
9160490	Connector cap to protect 4-pin connector while autoclaving



The Gx448 can be mounted directly into the G 1-1/4 inch weld-in socket. The cable protection cap is a standard item on this sensor model.



The 4-pin connector cable is offered in three lengths.



The Weld-in Socket (see page 18) is used to mount the Gx448 directly into the process tanks or pipes.



Gx448 shown without the cable protection cap

# Gx448 Rebuildable Steam Sterilizable Dissolved Oxygen Sensor

## Specifications

**Temperature Range:** -10 to 140° C (14 to 284° F)

**Maximum Pressure:** 59 psig (400 kPa abs, 4 bar)

**Wetted Materials:** Stainless Steel, EDPM

**Process connections:** G 1-1/4 in. thread

**Sensor Lengths:** 100 mm

**Cable Connector:** 4-pin

**Cable Compatibility:** Standard 4-pin Connector Cable

### Compatible Mounting Accessory:

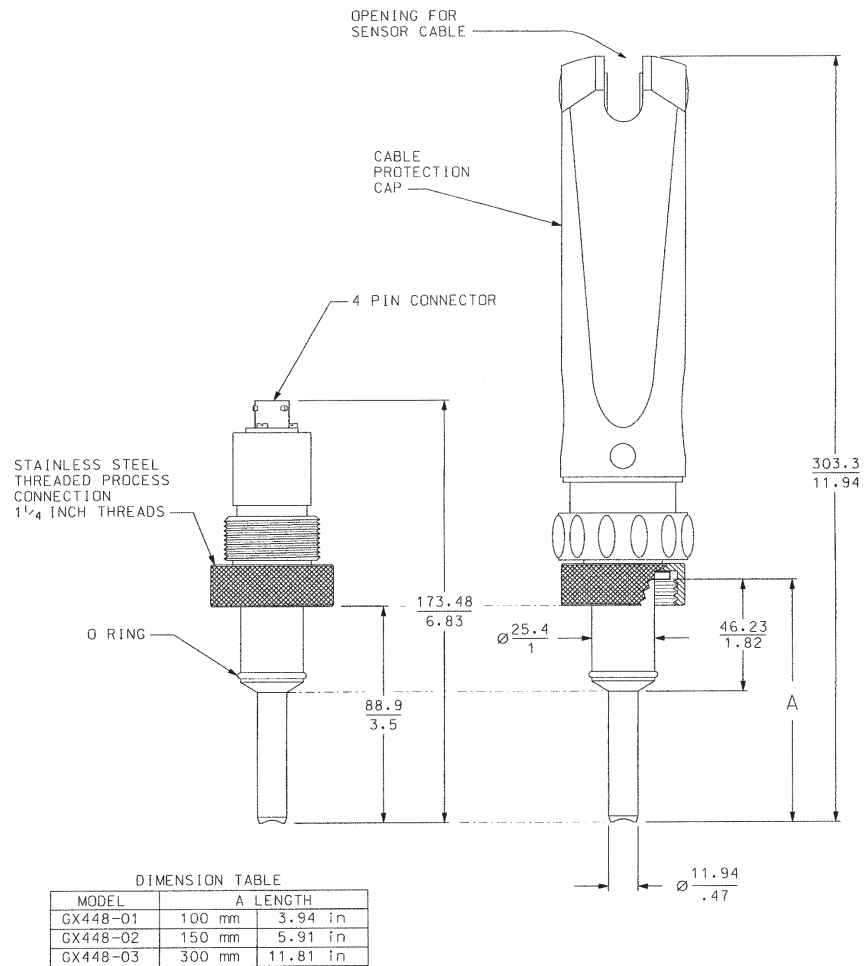
G 1-1/4 in weld-in socket, 61 mm, PN 9160504 (see page 18) for -01 and -03 options

G 1-1/4 in weld-in socket, 44 mm, PN 9160483 (see page 18) for -02 option

**Compatible Analyzers:** Rosemount Analytical 54eA, 1055, 5081A, and Xmt-A

**Measurement Range:** 0 to 20 ppm, 0 to 250 % saturation, depending on instrument

**Temperature Compensation:** 22K NTC



Sensor Dimensional Drawing

# Sensor Mounting Hardware for Hx338 and Hx348 pH Sensors and Hx438 Dissolved Oxygen Sensor

Rosemount Analytical mounting hardware offers many unique features and was designed with input from valued customers. The practical construction of the Insertion, Retractable, and Pressurized mounting assemblies makes daily use safe and easy.

### Cable-to-Sensor Electrical Connection Protected

The integrity of the electrical connection between the sensor and cable is maintained by the unique cable guard system. This design is the newest industry standard and allows the user to remove the sensor and cable easily without threading the cable through older standard hardware with rubber plugs. When the cable guard system cap is installed on the mounting hardware, seals are pressed onto the cable and held secure, protecting the electrical connection from dirt and moisture. The unique design of the cable guard system is a standard feature on the Insertion, Retractable, and Pressurized mounting assemblies.

### Constructed for Safe Use:

The Retractable and Pressurized mounting assemblies have unique safety features to accommodate many biopharmaceutical and industrial applications.

### Retractable Mounting Assembly:

The retractable assembly allows the sensor to be inserted or removed by pressing a single button. This special construction prevents the user from inserting the hardware without the sensor. This feature protects the process media from accidentally being contaminated by the surrounding conditions and prevents the process from escaping from the tank or pipe.

### Pressurized Mounting Assembly:

The pressurized assembly uses a slow pressure release system. When the assembly's lever is turned, the pressure is slowly released. This lever can be turned 90 degrees for easy sensor access. The rounded seals guarantee that the hardware is completely pressure tight and the integrated manometer helps control the pressure, thus avoiding the risk of overpressurizing and damaging the sensor. The glass cylinder is polymer coated, making it shatter-proof.

### Sensor Protection from Process Solids:

All new Rosemount Analytical mounting assemblies have a sensor protection system. This design protects the electrode-measuring tip from possible damage from solid components of the sample, e.g. undissolved reagents of ice. The Insertion or Pressurized assemblies use three rugged pins for sensor protection, and the Retractable assembly uses a

protective cage, both of which allow turbulent flow around the electrode and therefore minimize the risk of clogging.

### Withstands Harsh Environments:

The materials of construction were selected with respect to rugged industrial environments. All wetted parts are made of stainless steel (type: 1.4571; AISI/SAE 316 Ti; B.S. 320 S17), o-rings are Viton, and the cable guard system is fiber-reinforced Polycarbonate.



*The glass was forced to break at 150 bar (far above any needed pressures) and the glass still remains intact.*



# Insertion Mounting Assembly

The Rosemount Analytical Insertion Mounting Assembly (PN 9160478) is the best selection for all biopharmaceutical and standard industrial applications. It is designed for the installation of 120-mm sensors with PG 13.5 threads, for either pH or dissolved oxygen measurement. It is easily mounted into

G 1-1/4 inch sockets and the Viton o-rings can be changed without special tool. The practical cable guard system protects the electrical connection from dirt and moisture.

## Specifications

**Mechanical Connection:** G-1-1/4 in.

**Total Length:** 215 mm

**Maximum Diameter:** 57 mm

**Materials of Construction:** 316L SS/DIN 1.4435, EPDM

**Surface Finish:** < 16 micro inch Ra

**Temperature Range:** -10 to 140 °C (14 to 284° F)

**Maximum Pressure:** 6 bar (87 psi)

**Insertion Length:** 70 mm

**Compatible Sensors:**

Hx338-01 pH (see page 2)

Hx438-01 Dissolved Oxygen (see page 10)

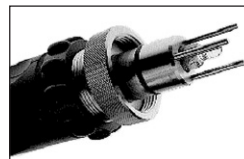
All electrodes with PG 13.5 threads and 120 mm length

**Mounting accessory needed for installation:**

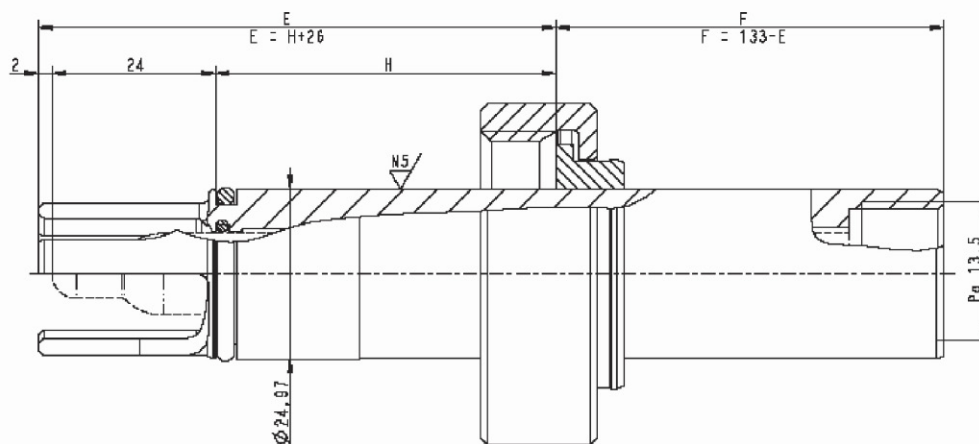
PN 9160483 weld-in socket or other G 1-1/4 in. threaded socket



The Insertion Mounting Assembly (PN 9160478) can be used with the Hx338-01 pH sensor or the Hx438-01 dissolved oxygen sensor.



A pH sensor shown in the tip of the Insertion Mounting Assembly. The three pins protect the glass bulb.



**Parts Locator for the Insertion Mounting Assembly**

Technical Data / Technische Daten P/N 237331-OP

- Material / Material: SS 316L / DIN 1.4435
- Temperature Range: 0 – 135° C
- Max. pressure: 6 bar
- H = O-Ring Position: 22 mm
- O-Ring Material: FDA-EPDM



# Retractable Mounting Assembly

The Rosemount Analytical Retractable Mounting Assembly (PN 9160477) is the ideal sensor accessory for large scale biopharm and industrial applications. The holder enables the user to install 225 mm length pH or 210 mm length dissolved oxygen electrodes into critical processes. The sensor can be retracted from the process for cleaning, calibrating, or exchanging the electrode without stopping or interrupting the process. It is designed for use with 210 to 225 mm length PG 13.5 threaded sensors (for use with Hx338 and Hx438 sensors).

The Retractable Mounting Assembly is very easy to use and maintain. One push button allows insertion and removal of the

sensor. All O-rings can be changed easily and without special tools. A special safety lock prevents the user from moving the hardware into the process without an electrode installed, which in turn prevents exposure of the process tank to the outer atmosphere.

When the sensor is retracted, it is placed into the electrode chamber. In this retracted position, the sensor can be cleaned, calibrated, or stored wet without dismounting from the holder. The tube connectors allow easy tube access to the electrode chamber.

## Specifications

**Mechanical Connection:** G-1-1/4 in.

**Total Length:** 316 mm (measuring position); 400 mm (retracted position)

**Maximum Diameter:** 57 mm

**Materials of Construction:** Stainless Steel 1.4571; AISI 316 Ti, EDPM

**Surface Finish:** < 16 micro inch Ra

**Temperature Range:** -10 to 140 °C (14 to 284° F)

**Maximum Pressure:** 4 bar (59 psi)

**Insertion Length:** 70 mm

**Compatible Sensors:**

Hx338-02 pH (see page 2)

Hx438-02 Dissolved Oxygen (see page 10)

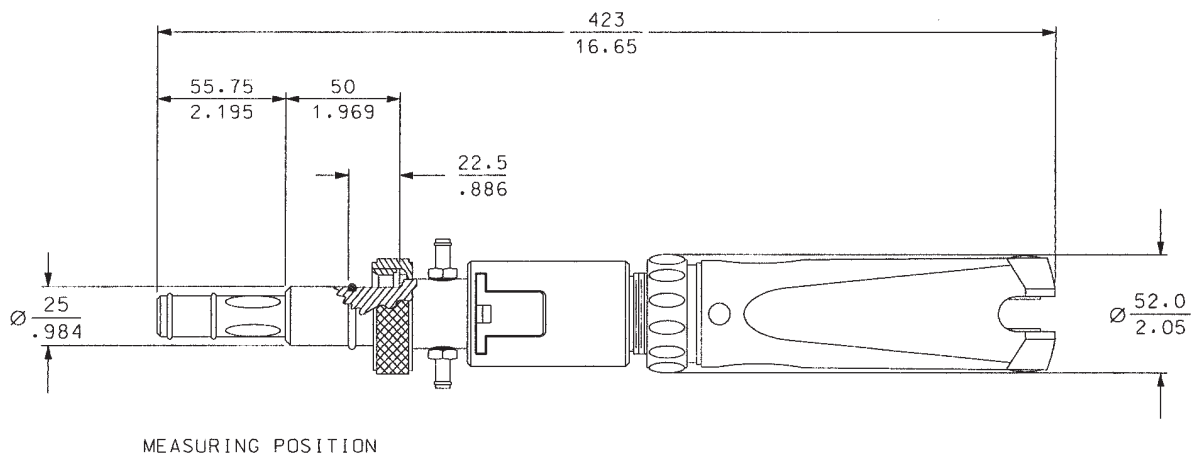
All 12 mm electrodes with PG 13.5 threads and 210 to 225 mm length

**Mounting accessory needed for installation:** PN 9160483

44 mm weld-in socket or other G 1-1/4 in. threaded socket



The Retractable Mounting Assembly (PN 9160477) can be used with the Hx338-02 pH sensor or the Hx438-02 dissolved oxygen sensor.



COMPATIBLE ROSEMOUNT ANALYTICAL SENSORS:  
 MODEL HX338-02 pH SENSOR  
 MODEL HX438-02 D.O. SENSOR

# Pressurized Mounting Assembly

The Rosemount Analytical Pressurized Mounting Assembly is especially designed for use in every critical processes or applications where high accuracy or long-term stability is required and a flowing reference junction is needed. Such sensors need to be pressurized over process pressure to enable the reference electrolyte to slowly flow out of the sensor.

The Pressurized Mounting Assembly enables installation of these sensors into a process tank or pipe. The hardware uses rounded seals, ensuring that the sensor fits tightly into the hardware. Large windows permit viewing of the electrolyte

level in the sensor. The integrated manometer indicates the pressure applied to the sensor’s electrolyte. The hardware is equipped with a lever to slowly depressurize, making removal of the sensor simple while avoiding opening of the holder under pressure. Three stainless steel pins protect the sensor against breakage from solids found in the process.

The Pressurized Mounting Assembly is available in various lengths for installation into tanks or fermentors with different wall thickness (e.g. isolated or double walled types).

PN	DESCRIPTION
9160479	Pressurized mounting assembly for 70 mm insertion (uses 120 mm sensor)
9160480	Pressurized mounting assembly for 100 mm insertion (uses 150 mm sensor)
9160481	Pressurized mounting assembly for 150 mm insertion (uses 200 mm sensor)
9160482	Pressurized mounting assembly for 200 mm insertion (uses 250 mm sensor)

## Specifications

**Mechanical Connection:** G-1-1/4 in.

**Total Length:** 395 mm (of installed holder)

**Maximum Diameter:** 60 mm

**Materials of Construction:** Stainless Steel 1.4571; AISI 316 Ti, Viton

**Temperature Range:** -10 to 130 °C (12 to 266° F)

**Maximum Pressure:** 6 bar (87 psi)

**Standard Immersion Length:** 70, 100, 150, and 200 mm

**Compatible Sensors:** Hx348 pH (see page 4)

**Mounting accessory needed for installation:** PN 9160483  
44 mm weld-in socket or other G 1-1/4 in. threaded socket



Removing the pressure from the assembly is simple:



Step 1: Pressurized Mounting Assembly shown without cable protection cap. Notice the lever is in pressurized position.



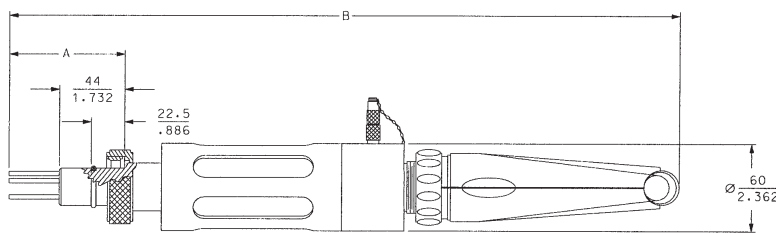
Step 2: Pressurized Mounting Assembly shown with lever in pressure release position.



Step 3: Once pressure is released, the sensor can be removed from the Pressurized Mounting Assembly.



A pH sensor shown in the tip of the Pressurized Mounting Assembly. The three pins protect the glass bulb.

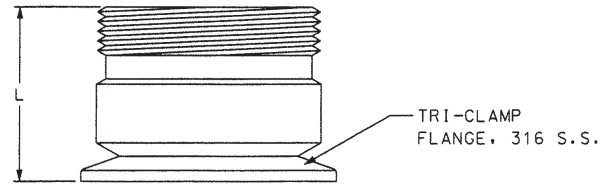


ACCESSORY PART NUMBER	COMPATIBLE pH SENSOR	DIMENSIONS			
		A		B	
		mm	inch	mm	inch
9160479	Hx348-01	70	2.76	475	18.71
9160480	Hx348-02	100	3.94	505	19.89
9160481	Hx348-03	150	5.91	555	21.86
9160482	Hx348-04	200	7.88	605	23.82

COMPATIBLE ROSEMOUNT ANALYTICAL SENSORS: MODEL Hx348

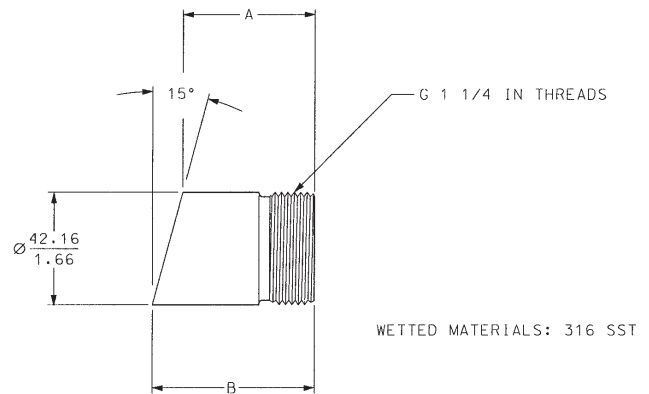
## Installation Accessories

The Tri-Clamp adapter makes sensor mounting easy. These 316 stainless steel Tri-Clamp fittings are ideal for any sanitary mounting application used in the Biopharm and food & beverage industries. Simply insert the sensor into the Tri-Clamp adapter and tighten down locking nut over the G 1-1/4 inch threads. The Tri-Clamp is available in 1 - 1/2 inch and 2.0 inch flange sizes to meet any mounting configuration.



S.Q. NO.	L		TRI-CLAMP FLANGE
	INCH	MM	
7524A	1.73	44	1.5
7524B	1.73	44	2.0
7524C	2.40	61	1.5
7524D	2.40	61	2.0

The weld-in socket is the base for the installation of Rosemount Analytical's mounting hardware. Made of stainless steel, it is easily welded into a tank, fermentor, or pipe. Due to the special design, it maintains its exact inner diameter after welding, which is important with respect to the correct tightening of the holder's o-rings. The socket has an installation angle of 15° that enables an optimal and flexible installation. The weld-in socket can also be used to mount the Gx448 directly to the process.



PART #	DESCRIPTION
9160483	Weld-in threaded socket, G 1-1/4 in., 44 mm
9160504	Weld-in threaded socket, G 1-1/4 in., 61 mm





WELD-IN SOCKET PART NUMBER	DIMENSION			
	A		B	
9160483	44	1.74	55	2.17
9160504	61	2.4	72	2.83

# Analyzers and Transmitters For Use with Steam Sterilizable Sensors

Rosemount Analytical is proud to offer a full line of analyzers and transmitters to fit each individual process need. Below, you will find the key features and benefits. If you need more information about a particular analyzer/transmitter, please consult Rosemount Analytical, Liquid Division, at the number listed on the back page of this data sheet.



Model	56	1056	5081	1066
2-Wire or 4-Wire	4	4	2	2
Power	115/230V AC 24V DC	115/230V AC 24V DC	24V DC	24V DC
Mounting Options	Panel, Pipe, Wall	Panel, Pipe, Wall	Pipe	Panel, Pipe, Wall
HART Communications	pH, ORP, Cond, DO	pH, ORP, Cond, DO	pH, ORP, Cond, DO	pH, ORP, Cond, DO
Handheld Remote	-	-	✓	-
AMS Compatible	pH, ORP, Cond, DO	pH, ORP, Cond, DO	pH, ORP, Cond, DO	pH, ORP, Cond, DO
FOUNDATION Fieldbus	-	-	pH, ORP, Cond, DO	pH, ORP, Cond, DO
Enclosure Features	NEMA 4X, IP65	NEMA 4X, IP65	NEMA 4X	NEMA 4X, IP65
Current Outputs	4	2	1	1
Alarms	3+ fault	3	0	0
Relay Contacts	4	3	0	0
Compatible Sensors	Hx338 Hx348 Hx438 Gx448 403	Hx338 Hx348 Hx438 Gx448 403	Hx338 Hx348 Hx438 Gx448 403	Hx338 Hx348 Hx438 Gx448 403
pH	✓	✓	✓	✓
Conductivity	✓	✓	✓	✓
Dissolved Oxygen	✓	✓	✓	✓

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