Product Data Sheet
PDS 71-steam/rev.E
February 2005

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 130°C (266°F) Steam-In-Place (SIP) applications
- 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
- PROTECTS CABLE-TO-SENSOR CONNECTION
- INSTALLS WITH STANDARD G 1-1/4 inch weld-in socket

ANALYZERS AND TRANSMITTERS WITH MANY OPTIONS:

- TWO OR FOUR wire models
- TEMPERATURE COMPENSATION
- 4-20 mA, HART, OR FIELDBUS communications
- HIGH/LOW alarms
- PID control
- SENSOR DIAGNOSTIC capabilities
- VARIOUS MOUNTING STYLES
- ENCLOSURES for various safety levels

FEATURES AND BENEFITS

For many years, Emerson Process Management, Rosemount Analytical, Liquid Division, 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.

MODEL Hx338 STEAM STERILIZABLE AND AUTOCLAVABLE COMBINATION pH SENSOR

Model 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 Model 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 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 12 mm 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.

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

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)

The 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	5 m (16.4 ft), AS7 connector, bare wire on analyzer end
9160496	10 m (32.8 ft), AS7 connector, bare wire on analyzer end
9160497	1 m (3.3 ft), AS7 connector, BNC on analyzer end
9160498	3 m (9.8 ft), AS7 connector, BNC on analyzer end
9160499	5 m (16.4 ft), AS7 connector, BNC on analyzer end
23856-00	Cable adapter, K9 to AS9/AS7 connector for retrofitting AK9 cable for S7 sensor connections
23645-06	15 ft. (4.6 m) cable with mating VP connector with BNC on transmitter end
23645-07	15 ft. (4.6 m) cable with mating VP connector with bare wires on transmitter end

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

PN	MOUNTING ACCESSORIES
9160478	Insertion assembly 70 mm insertion, use 120 mm sensor
9160477	Retractable assembly 70 mm insertion, use 225 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

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 Model Hx338-01 into process tanks or pipes.

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

MODEL Hx338 STEAM STERILIZABLE AND AUTOCLAVABLE COMBINATION pH SENSOR

SPECIFICATIONS

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

Temperature Range: -10 to 130°C (14 to 266°F)

Maximum Pressure: 87 psig (600 kPa abs, 6 bar)

Wetted materials: Glass, Viton[1]

Process connections: PG 13.5 threads

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

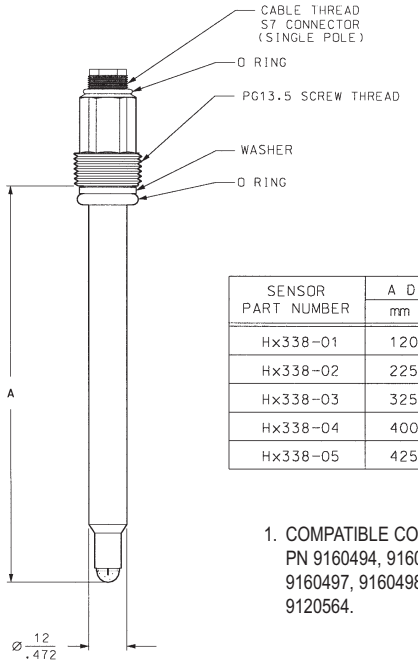
Cable Connector: S7 connector plug, single pole, and VP connector

Cable Compatibility:
any AS7 connector plug, single pole
PN 9120550 VP connector, 10 ft cable
PN 9120564 VP connector 16.4 ft cable

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

Compatible Analyzers: All Rosemount Analytical pH analyzers/transmitters

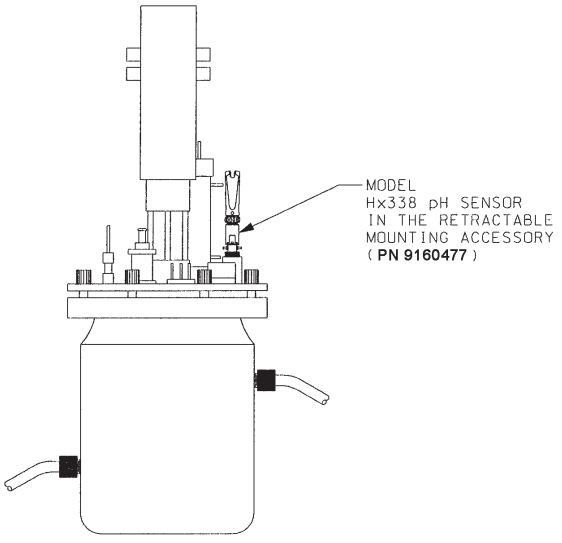
[1]Viton is a registered trademark of E.I. du Pont de Nemours & Co.



SENSOR PART NUMBER	A DIMENSION	
	mm	inch
Hx338-01	120	4.725
Hx338-02	225	8.859
Hx338-03	325	12.796
Hx338-04	400	15.749
Hx338-05	425	16.733

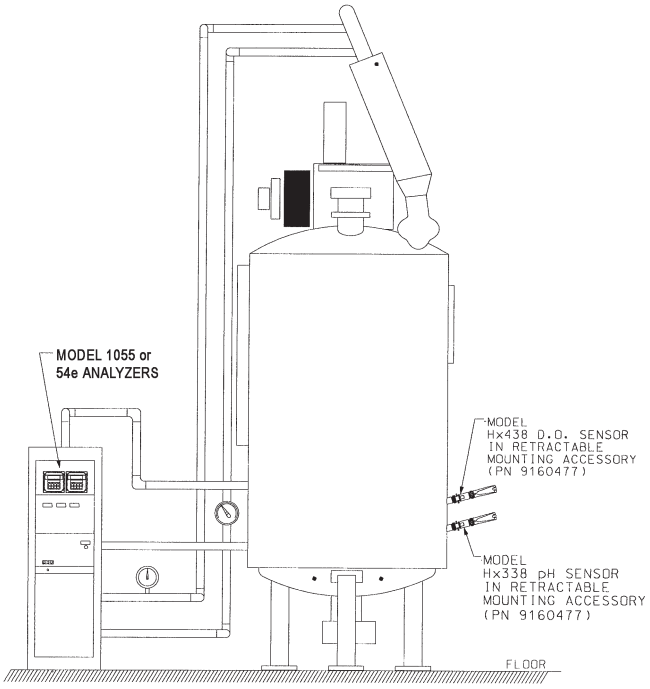
1. COMPATIBLE CONNECTOR CABLE PN 9160494, 9160495, 9160496, 9160497, 9160498, 9160499, 9120550, 9120564.

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.

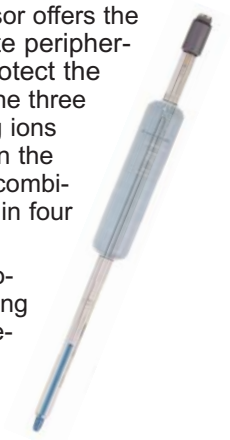
MODEL Hx348 STEAM STERILIZABLE AND AUTOCLAVABLE COMBINATION pH SENSOR

Model 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 poisoning 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 Model 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.



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

ORDERING INFORMATION

MODEL Hx348	pH SENSOR
CODE	SENSOR INSERTION LENGTHS
01	120 mm (4.73 in.)
02	150 mm (5.91 in.)
03	200 mm (7.88 in.)
04	250 mm (9.85 in.)

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

CODE	SENSOR DESIGN
10	Disposableand 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

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

PN	CABLE ACCESSORIES
9160494	1 m (3.3 ft), AS7 connector, bare wire on analyzer end
9160495	5 m (16.4 ft), AS7 connector, bare wire on analyzer end
9160496	10 m (32.8 ft), AS7 connector, bare wire on analyzer end
9160497	1 m (3.3 ft), AS7 connector, BNC on analyzer end
9160498	3 m (9.8 ft), AS7 connector, BNC on analyzer end
9160499	5 m (16.4 ft), AS7 connector, BNC on analyzer end
23856-00	Cable adapter, K9 to AS9/AS7 connector for retrofitting AK9 cable for S7 sensor connections

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

MODEL Hx348 STEAM STERILIZABLE AND AUTOCLAVABLE COMBINATION pH SENSOR

SPECIFICATIONS

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

Temperature Range: -10 to 130°C (14 to 266°F)

Maximum Pressure: 87 psig (600 kPa abs, 6 bar)

Wetted materials: Glass, Viton

Process connections: None

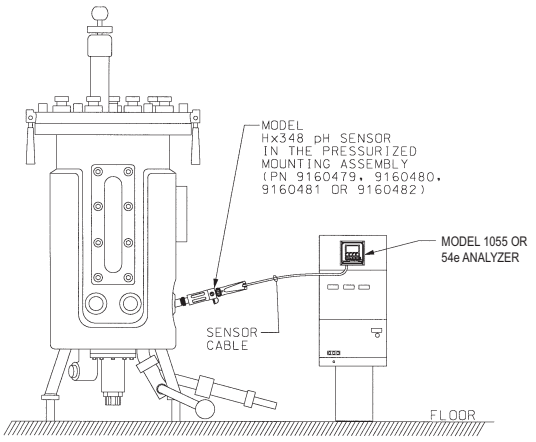
Sensor Lengths: Choice of 120, 150, 200, or 250 mm

Cable Connector: S7 connector plug, single pole

Cable Compatibility: any AS7 connector plug, single pole

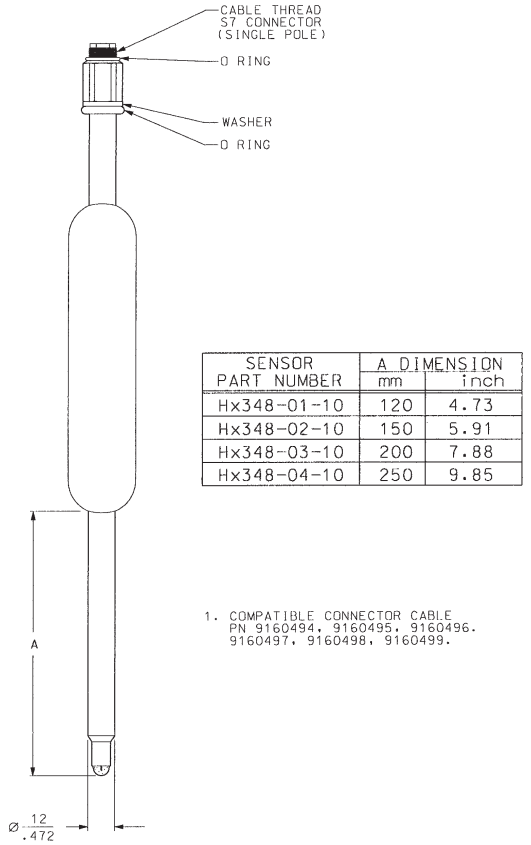
Compatible Mounting Accessory: Pressurized mounting assembly (see page 17)

Compatible Analyzers: All Rosemount Analytical pH analyzers/transmitters



SAMPLE INSTALLATION DRAWING

Pilot plant fermentor (bioreactor) using Model Hx348 and the Pressurized Mounting assembly in a side mount installation.

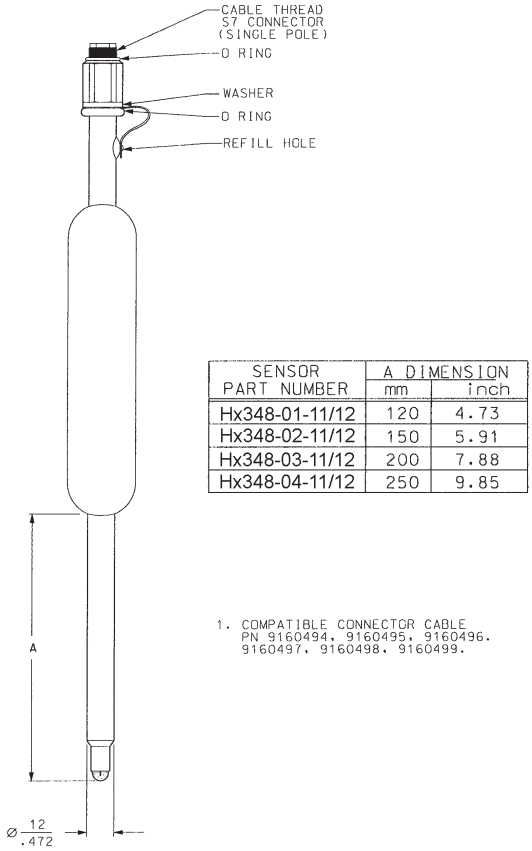


SENSOR PART NUMBER	A DIMENSION mm	A DIMENSION inch
Hx348-01-10	120	4.73
Hx348-02-10	150	5.91
Hx348-03-10	200	7.88
Hx348-04-10	250	9.85

1. COMPATIBLE CONNECTOR CABLE PN 9160494, 9160495, 9160496, 9160497, 9160498, 9160499.

SENSOR DIMENSIONAL DRAWING
Model Hx348 Non-refillable Sensor

Model Hx348 Disposable Sensor is recommended for typical installations requiring low maintenance.



SENSOR PART NUMBER	A DIMENSION mm	A DIMENSION inch
Hx348-01-11/12	120	4.73
Hx348-02-11/12	150	5.91
Hx348-03-11/12	200	7.88
Hx348-04-11/12	250	9.85

1. COMPATIBLE CONNECTOR CABLE PN 9160494, 9160495, 9160496, 9160497, 9160498, 9160499.

SENSOR DIMENSIONAL DRAWING
Model Hx348 Refillable Sensor

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

MODEL 328A STEAM STERILIZABLE AND AUTOCLAVABLE COMBINATION pH SENSOR

The Model 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 Model 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.

Model 328A Sensor and the Standard Mounting Adapter

ORDERING INFORMATION

Model 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 12 mm 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**

MODEL 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, Model 328A will perform continuously for up to 50 steam sterilization cycles.

Sensitivity: ±0.02pH

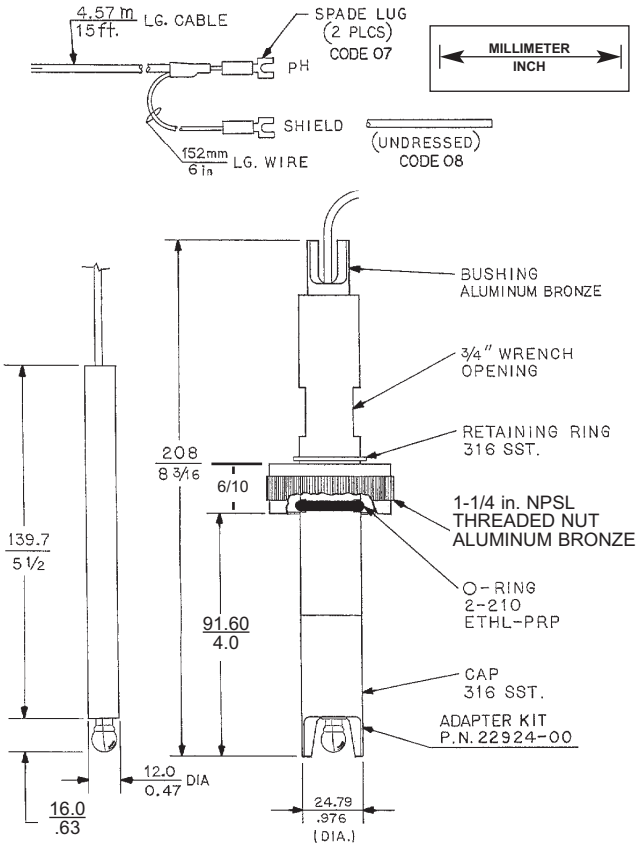
Range: 0-13 pH:

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)

MODEL 403 ENDURANCE™ CONDUCTIVITY SENSOR

Model 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).The Model 403-14 has a maximum temperature rating of 221°F (105°C). Maximum pressure rating for all models is 250 psig (1825 kPa). The standard Model 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.

MODEL 403

SPECIFICATIONS

Cell Constants: 0.01/cm, 0.1/cm, 1.0/cm, and 10.0/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, EPDM (all FDA 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

MODEL 403	SANITARY CONDUCTIVITY SENSORS
CODE	Cell Constant (required selection)
11	0.01/cm
12	0.1/cm
13	1.0/cm
14	10/cm

CODE	Sanitary Fitting (required selection)
20	1-1/2 in. Stainless Steel Sanitary Fitting
21	2 in. Stainless Steel Sanitary Fitting (not available with codes 13 and 14)

CODE	Temperature Compensation (optional selection)
-	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)

CODE	Additional Options (optional selection)
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

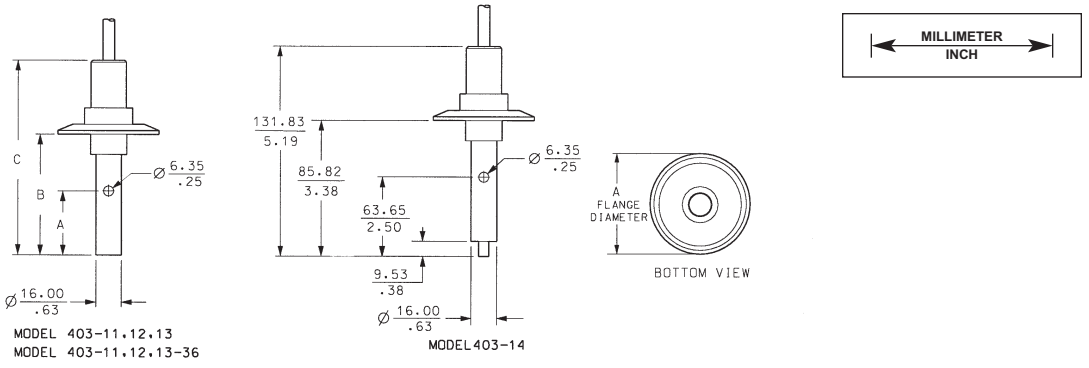


TABLE 1

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

TABLE 2

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: MODELS Hx438 AND Gx448

Emerson Process Management, Rosemount Analytical, 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 Model 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 Model 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 Models Hx438 and Gx448 have a new proprietary 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.

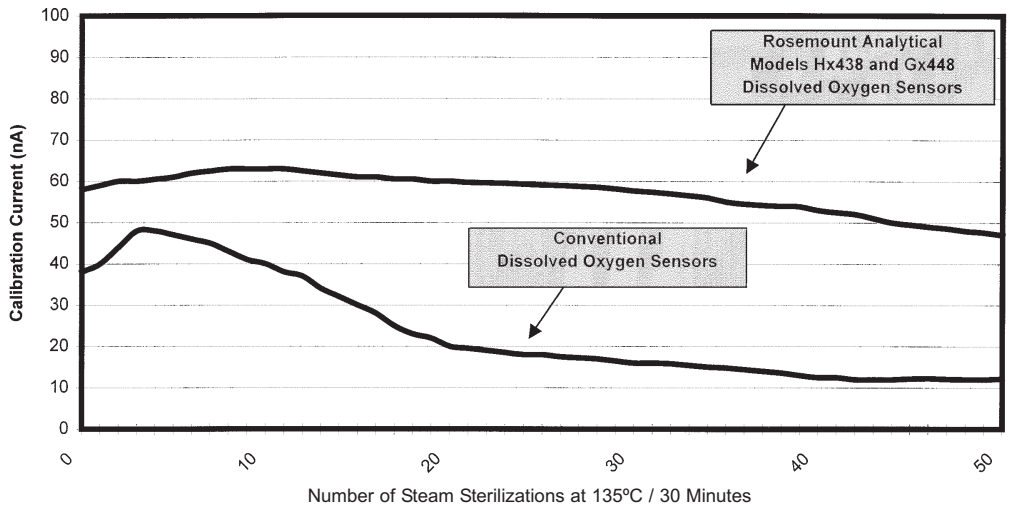
Fast Response: The extraordinary performance of the new membrane material leads to short response times, even under critical conditions.

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: Models 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.

MODEL Hx438 REBUILDABLE STEAM STERILIZABLE DISSOLVED OXYGEN SENSOR

Model 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 Model 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.

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

ORDERING INFORMATION

MODEL	
Hx438	DISSOLVED OXYGEN SENSOR (12 mm 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	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

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

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

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

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

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

MODEL Hx438 REBUILDABLE STEAM STERILIZABLE DISSOLVED OXYGEN SENSOR

SPECIFICATIONS

Temperature Range: -10 to 130°C (14 to 266°F)

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

Wetted materials: Stainless Steel, Viton

Process connections: PG 13.5

Sensor Lengths: Choice of 120, 210, 325, or 425 mm

Cable Connector: 4-pin

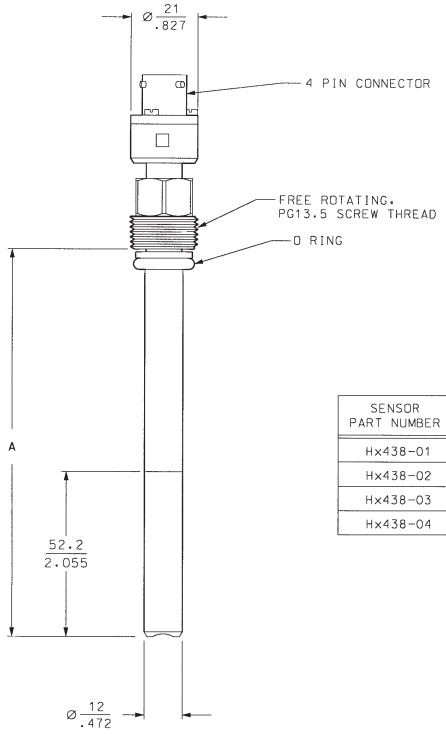
Cable Compatibility: Standard 4-pin Connector Cable

Compatible Mounting Accessory: Insertion or Retractable Mounting Assembly (see pages 15 and 16)

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

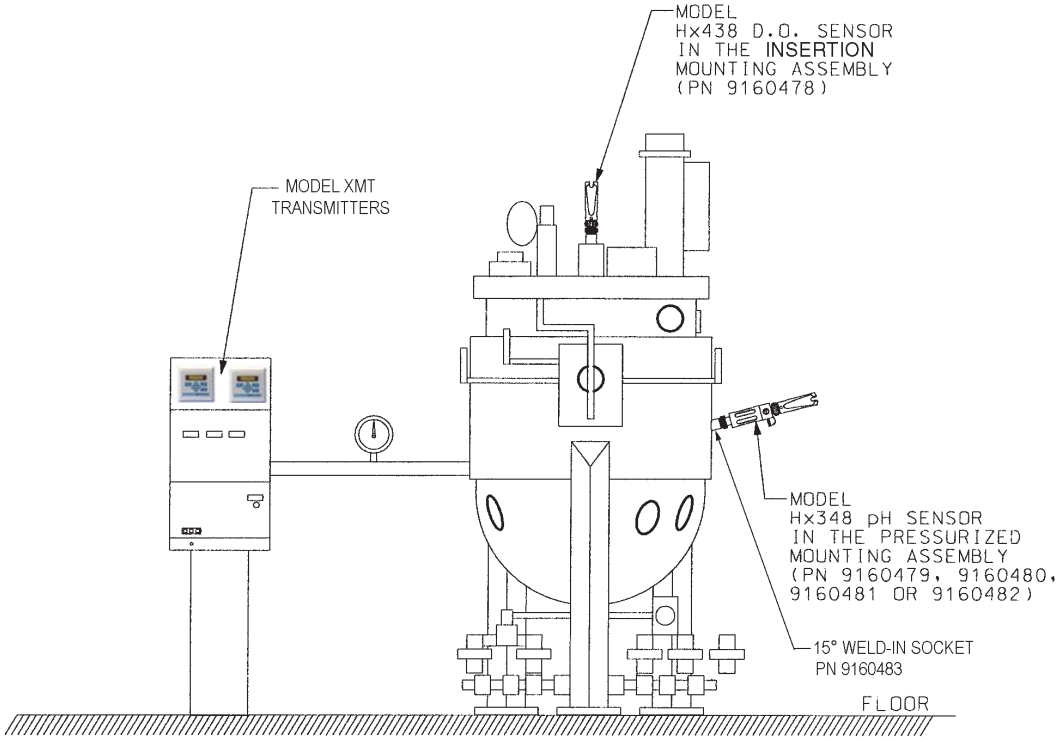
Measurement Range: 0 to 20 ppm, 0 to 250% saturation, depending on instrument

Temperature Compensation: 22K NTC



SENSOR PART NUMBER	A DIMENSION mm	A DIMENSION 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 Models Hx438 and Hx348 in various mounting assemblies.

MODEL Gx448 REBUILDABLE STEAM STERILIZABLE DISSOLVED OXYGEN SENSOR

Model 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 Model Gx448 is offered in three (3) different 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.

Model 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.

ORDERING INFORMATION

MODEL Gx448	DISSOLVED OXYGEN SENSOR (25 mm diameter)
CODE	DESCRIPTION
01	100 mm (3.94 in.)
02	150 mm (5.91 in.)
03	300 mm (11.81 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

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

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

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

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

Model Gx448 shown without the cable protection cap

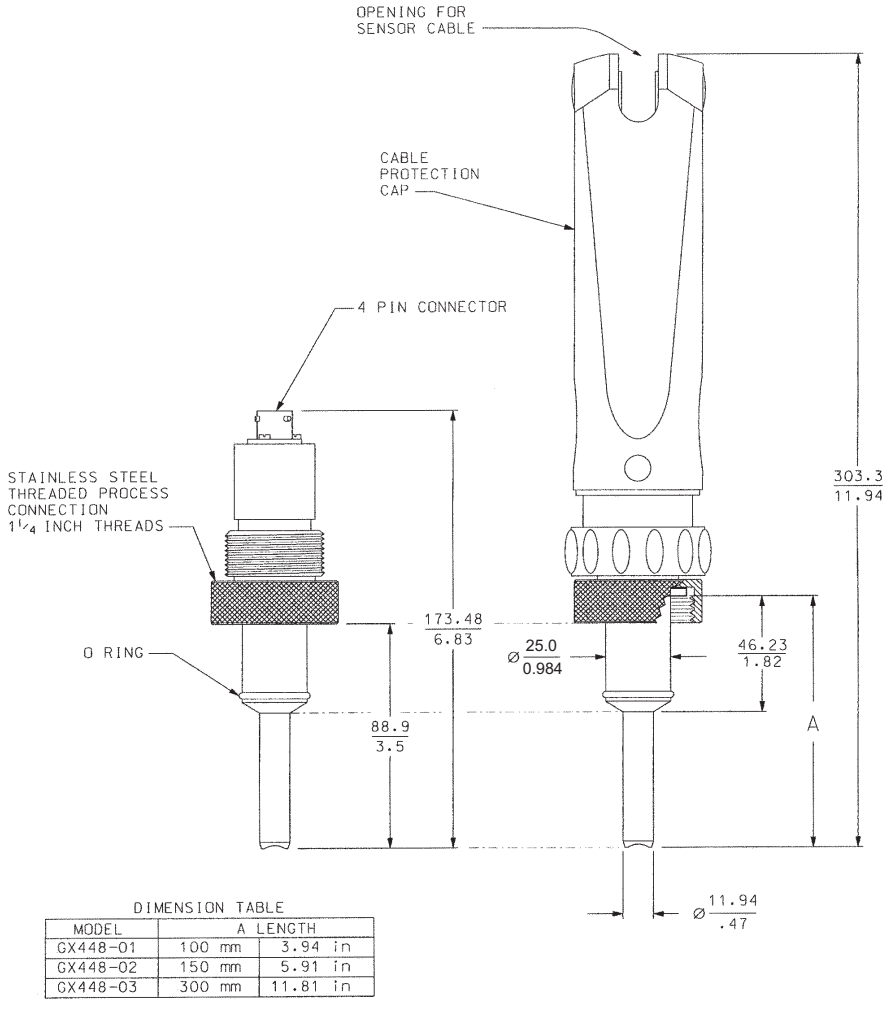
MODEL Gx448 REBUILDABLE STEAM STERILIZABLE DISSOLVED OXYGEN SENSOR

SPECIFICATIONS

Temperature Range: -10 to 130°C (14 to 266°F)
Maximum Pressure: 59 psig (400 kPa abs, 4 bar)
Wetted materials: Stainless Steel, Viton
Process connections: G 1-¼ in. thread
Sensor Lengths: Choice of 100, 150, or 300 mm
Cable Connector: 4-pin
Cable Compatibility: Standard 4-pin connector cable
Compatible Mounting Accessories:

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 Models 54eA, 1055, 5081A, and Xmt-A
Measurement Range: 0 to 20 ppm, 0 to 250% saturation, depending on instrument
Temperature Compensation: 22K NTC



DIMENSION TABLE

MODEL	A LENGTH	
GX448-01	100 mm	3.94 in
GX448-02	150 mm	5.91 in
GX448-03	300 mm	11.81 in

SENSOR DIMENSIONAL DRAWING

SENSOR MOUNTING HARDWARE FOR MODELS Hx338 AND Hx348 pH SENSORS AND MODEL 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:

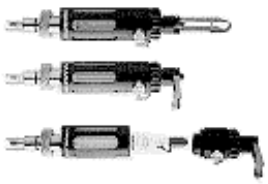
The integrity of the electrical connection between the sensor and cable is maintained by the unique **cable guard system**. This design is the newest industry standard and allows the user to remove the sensor and cable easily without threading the cable through older standard hardware with rubber plugs. 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.

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

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 or 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.

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 a 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: Stainless Steel 1.4571; AISI 316 Ti, Viton

Temperature Range: -10 to 130°C (14 to 266°F)

Maximum Pressure: 6 bar (87 psi)

Insertion Length: 70 mm

Compatible Sensors:

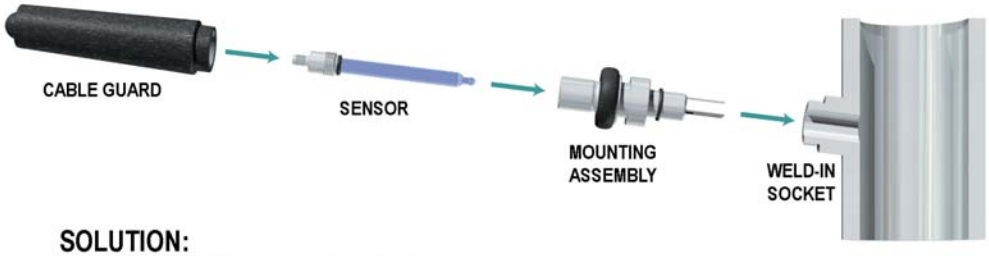
Model Hx338-01 pH (see page 2)
Model Hx438-01 Dissolved Oxygen (see page 10)
All electrodes with PG 13.5 threads and 120 mm length

Mounting accessory needed for installation:

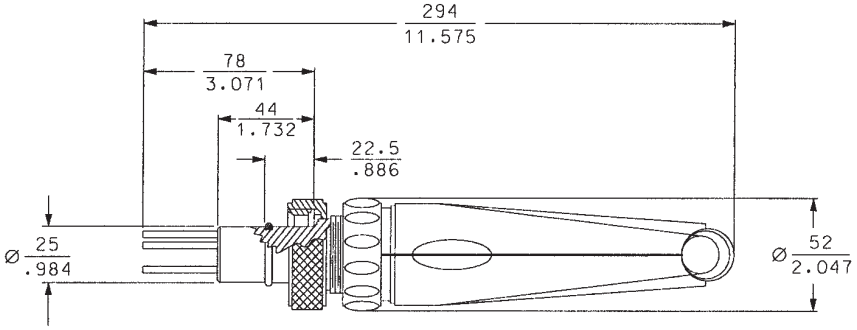
PN 9160483 weld-in socket or other G 1-1/4 in. threaded socket

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

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



SOLUTION:
The Model Hx338 Steam Sterilizable pH Sensor with protectant cable shell helps prevent sensor breakage to maintain process integrity.



COMPATABLE ROSEMOUNT ANALYTICAL SENSORS:
MODEL HX338-01 pH SENSOR
MODEL HX438-01 D.O. SENSOR

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 Models Hx338 and Hx438 sensors).

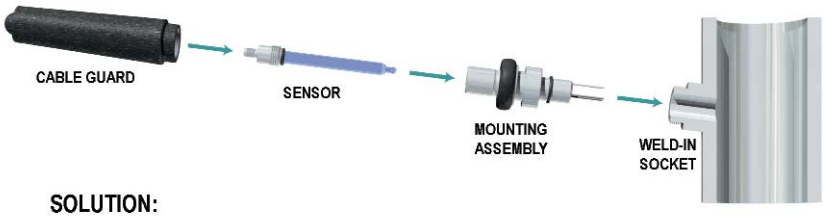
The Retractable Mounting Assembly is very easy to use and maintain. One push button allows insertion and removal of the sensor. All O-rings can be changed easily and without special tools. A special safety lock prevents the user from moving the hardware into the process without an electrode installed, 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. Two tube connectors allow easy tube access to the electrode chamber.

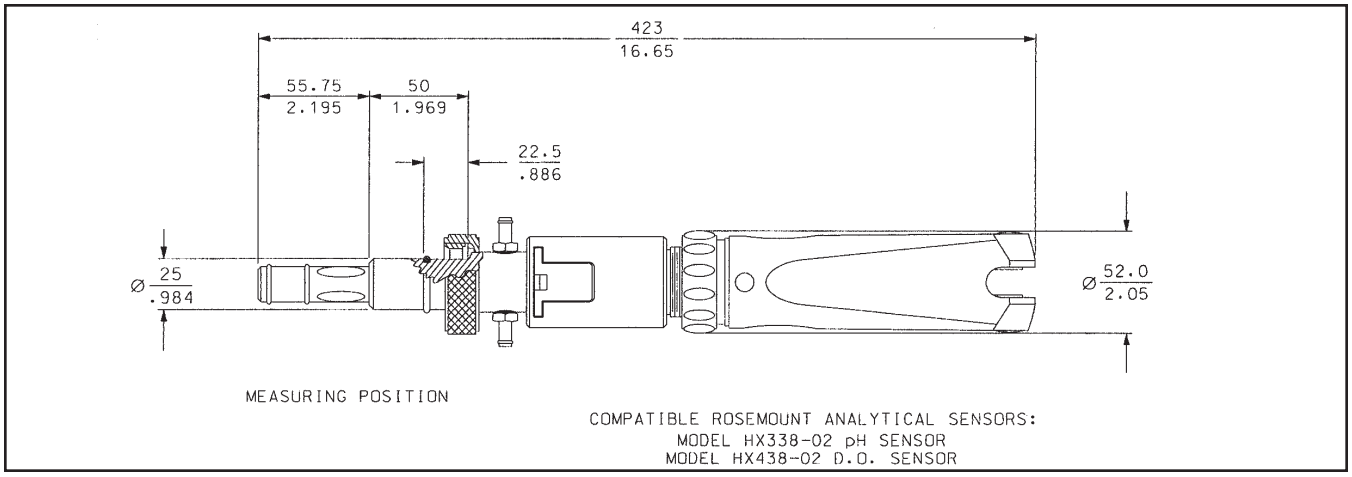
SPECIFICATIONS

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, Viton
Temperature Range: -10 to 130°C (14 to 266°F)
Maximum Pressure: 4 bar (59 psi)
Insertion Length: 70 mm
Compatible Sensors:
Model Hx338-02 pH (see page 2)
Model 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 Model Hx338-02 pH sensor or the Model Hx438-02 dissolved oxygen sensor.



SOLUTION:
The Model Hx338 Steam Sterilizable pH Sensor with protectant cable shell helps prevent sensor breakage to maintain process integrity.



PRESSURIZED MOUNTING ASSEMBLY

The Rosemount Analytical Pressurized Mounting Assembly is especially designed for use in very 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 thicknesses (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 (14 to 266°F)

Maximum Pressure: 6 bar (87 psi)

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

Compatible Sensor: Model Hx348 pH (see page 4)

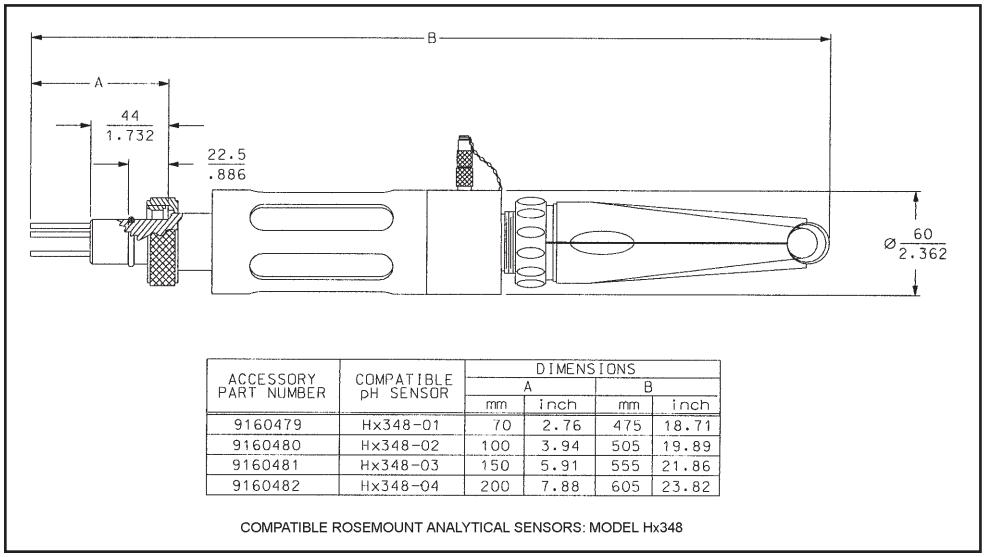
Mounting accessory needed for installation: PN 9160483 44 mm weld-in socket or other G 1-1/4 in. threaded socket

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.



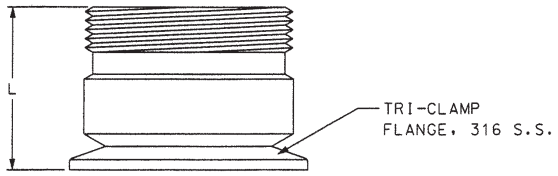
ACCESSORY PART NUMBER	COMPATIBLE pH SENSOR	DIMENSIONS A mm	A inch	B mm	B inch
9160479	Hx348-01	70	2.76	475	18.71
9160480	Hx348-02	100	3.94	505	19.89
9160481	Hx348-03	150	5.91	555	21.86
9160482	Hx348-04	200	7.88	605	23.82

COMPATIBLE ROSEMOUNT ANALYTICAL SENSORS: MODEL Hx348

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

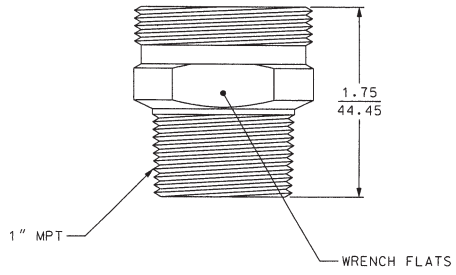
INSTALLATION ACCESSORIES

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 G1-1/4 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 INCH / MM	TRI-CLAMP FLANGE
7524A	1.73 / 44	1.5
7524B	1.73 / 44	2.0
7524C	2.40 / 61	1.5
7524D	2.40 / 61	2.0

Adapter G1-1/4 X Tri-Clamp Flange

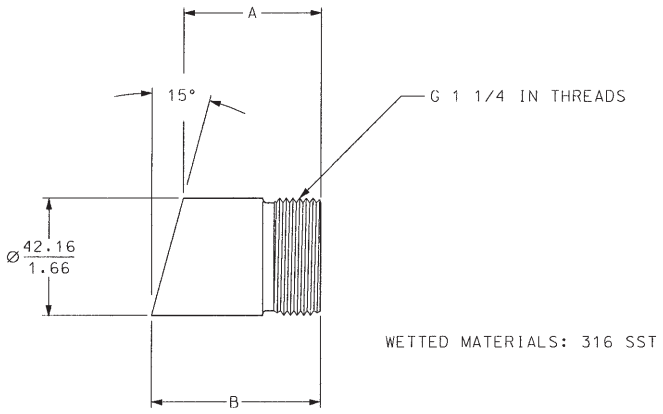


Adapter G1-1/4 X 1 inch MNPT

The Male 1-1/4 inch X 1 inch MNPT adapter is used for insertion into 1 inch FNPT process lines. This adapter is made of 316 stainless steel with an overall height of 1-3/4 inch.

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 Model 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	54e	1055	5081	Xmt
2-Wire or 4-Wire	4	4	2	2
Power	115/230 VAC 24 VDC	115/230 VAC 24 VDC	24 VDC	24 VDC
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
Handheld Remote	—	—	✓	—
AMS Compatible	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, 7B	NEMA 4X, IP65
Current Outputs	2	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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