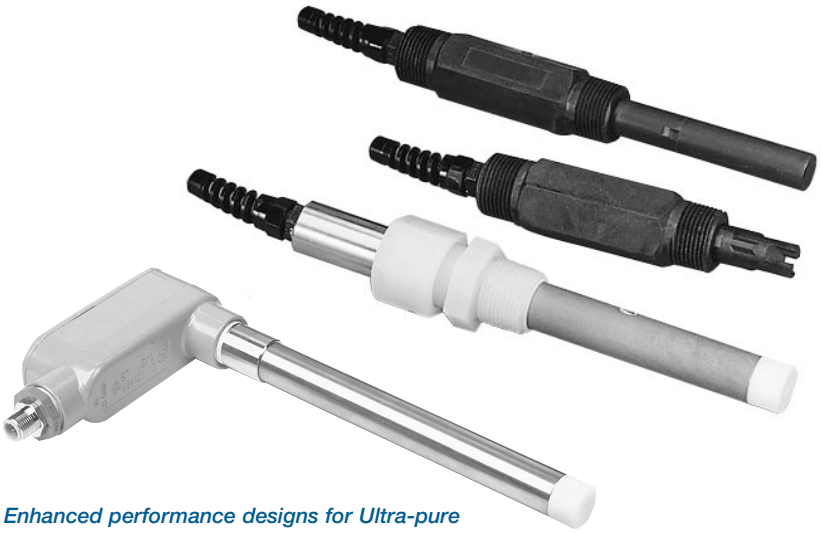
Contacting Conductivity/Resistivity Sensors



Enhanced performance designs for Ultra-pure Water, Sanitary (CIP), Boiler/Condensate and General Purpose applications.

Use the Digital Gateway to make any analog conductivity sensor compatible with the sc1000 Controller.

DW
PW
IW

Features and Benefits

High Performance Design

These enhanced performance sensors are manufactured to exacting tolerances using high quality, rugged materials for demanding applications including ultra-pure water, clean-in-place (CIP), and boiler/condensate monitoring. Each sensor is tested to determine its unique, absolute four-digit cell constant. Simply key in this constant (Hach's easy DRY-CAL™ method) when configuring the analyzer to ensure the highest possible measuring accuracy. Also, each sensor has a Pt 1000 RTD temperature element built into its tip for exceptionally fast response to changes in temperature with ±0.1°C accuracy.

Resistivity and Conductivity Measurement Capability

These enhanced performance sensors measure from theoretically pure water (0.057 µS/cm or 18.2 MΩ) up to 200,000 µS/cm. Hach's sc Digital Controller accepts multiple digital sensor inputs, and can be user-set to measure conductivity, resistivity, TDS, salinity, or one of six calculated measurements.

Versatile Mounting Styles

Compression fitting sensors—Feature titanium electrodes and a compression fitting for universal installation with up to 4 inches (102 mm) insertion depth. The 1/2-inch or 3/4-inch male NPT compression fittings are offered in Kynar® (PVDF) or 316 stainless steel. A longer version of this sensor is available for use with a 316 stainless steel ball valve hardware assembly to insert/retract the sensor from the process without stopping the flow. The longer version can also be used for insertion through a compression fitting. Maximum insertion depth is 7 inches (178 mm).

Non-metallic general purpose sensors—Have graphite electrodes and 3/4-inch male NPT threaded Ryton® bodies. These sensors can be mounted into a standard 3/4-inch pipe tee, 1-1/2-inch union hardware, or fastened onto the end of a pipe.

High pressure and high temperature sensors—Are designed for monitoring boiler water and condensate in return lines. They have 316 stainless steel electrodes and threaded bodies (3/4-inch male NPT). They can be fastened into a boiler wall using a 3/4-inch weldolet or mounted into a process line using a standard 3/4-inch stainless pipe tee.

Sanitary clean in place (CIP) style sensors—Have 316 stainless steel electrodes and an integral 1-1/2-inch or 2-inch flange. These sensors can be installed using standard sanitary mounting hardware.

Full-Featured "Plug and Play" sc Digital Controllers

There are no complicated wiring or set up procedures with any sc controller. Just plug in any combination of digital sensors and it's ready to use—it's "plug and play."

One or multiple sensors—The sc controller family allows you to receive data from up to eight digital sensors in any combination using a single controller.

Communications—Multiple alarm/control schemes are available using the relays and PID control outputs. Available communications include analog 4-20 mA, digital MODBUS® (RS485 and RS232) or Profibus DP protocols. (Other digital protocols are available. Contact your representative for details.)

Data logger—A built-in data logger collects measurement data, calibration, verification points, and alarm history.

Specifications*

Cell Constants and Measuring Ranges

Sensor Cell Constant	Inherent Measuring Range	
	Conductivity (µS/cm)	*Resistivity (Mohm)*
0.05	0–100	0.002–20
0.5	0–1000	0.001-20
1	0–2000	not applicable
5	0–10000	not applicable
10	0–200000	not applicable

Temperature Measurement Range
–20 to 200°C (–4 to 392°F)

Accuracy
±2% of reading above 200 µS/cm

Sensitivity
±0.5% of reading

Response Time
90% of reading within 30 seconds of step change

Repeatability
±0.5% of reading

Operating Temperature
–20 to 200°C (–4 to 392°F)

Flow Rate
0–3 m/s (0–10 ft./s), maximum, fully immersed

Temperature Compensator
Pt 1000 RTD

Transmission Distance
100 m (328 ft.), maximum

1000 m (3280 ft.), maximum when used with a termination box

Standard Probe Cable Length (integral)
Digital Probe: 7 m (23 ft.)

Analog Probe: 6 m (20 ft.)

Sensor Cable
Digital: PUR (polyethylene) 5-conductor, shielded, rated to 150°C (302°F)

Analog: Integral (no junction box) 6 wire cable (4 conductors and two isolated shield wires)

Analog with Junction Box Head: (optional) 6-position terminal strip supplied in integrally-mounted junction box (polypropylene, aluminum, or 316 stainless steel)

	Model 3422-series Compression Fitting	**Model 3433-series Non-metallic General Purpose**	**Model 3444-series Boiler/ Condensate**	**Model 3455-series Sanitary (CIP) Flange**
Temperature/ Pressure Limits (See Note 1)	When used with Kynar® (PVDF) compression fitting: 150°C at 1.7 bar (302°F at 25 psi). When used with manufacturer-supplied 316 stainless steel compression fitting: 150°C at 13.7 bar (302°F at 200 psi). When used with 316 stainless steel ball valve hardware assemblies: 125°C at 10.3 bar (257°F at 150 psi).	150°C at 6.8 bar (302°F at 100 psi) or 20°C at 13.7 bar (68°F at 200 psi). When used with hardware, a lower rated mounting hardware or piping material may limit the temperature and pressure ratings listed above.	Sensor with integral cord grip: 200°C at 20.7 bar (392°F at 300 psi). Sensor with integral polypropylene J-box Head: 92°C at 20.7 bar (198°F at 300 psi). Sensor with integral aluminum or 316 SS J-box head: 200°C at 20.7 bar (392°F at 300 psi).	When used with manufacturer-supplied sanitary mount hardware assemblies: 125°C at 10.3 bar (257°F at 150 psi) *(See Note 2)*
Wetted Materials	Titanium electrodes (316 stainless steel outer electrode for extended sensor body style used with ball valve assembly), PTFE Teflon® insulator, and treated Viton® O-ring seals	Graphite electrodes, Ryton® body, and Viton® O-ring seals	316 stainless steel and titanium electrodes, PEEK insulator, and fluoroelastomer O-ring seals	316 stainless steel electrodes, PTFE Teflon® insulator, and pufluoroelastomer O-ring seals

**Specifications subject to change without notice.*

NOTES

1. For conductivity applications above 70°C (158°F), use the Digital Gateway (P/N 61207-00) with the appropriate sensor. Please contact Technical Support for further details.
2. Other brands of mounting hardware assemblies and sanitary clamps may reduce the listed rating.

Engineering Specifications

Model 3422-series Compression Fitting Sensors

1. The sensor shall have these important enhanced performance design characteristics:

   a) Manufactured to exacting tolerances using high quality, rugged materials.

   b) Individually tested to determine its absolute four-digit cell constant, ensuring highest possible measuring accuracy.

   c) Built to include a Pt 1000 RTD temperature element within its tip for exceptionally fast response to changes in temperature with ± 0.1ºC accuracy.

2. The sensor shall measure from theoretical pure water (0.057 µS/cm or 18.2 MΩ) up to 200,000 µS/cm.
3. The compression fitting style sensor shall have titanium electrodes (or 316 stainless steel outer electrode for extended sensor body style used with ball valve assembly), a nominal cell constant of 0.05, 0.5, 1, 5, or 10, and a 1/2 inch NPT or 3/4 inch NPT compression fitting made of Kynar® (PVDF) or 316 stainless steel. It shall directly mount into a pipe tee or vessel, and have an insertion depth of up to 4 inches (102 mm). Reversing the compression fitting shall enable the sensor to be fastened onto the end of a pipe for immersion applications.
4. The sensor shall have integral digital electronics and an extension cable or an optional sensor module or Digital Gateway shall be available for connecting to a sc Digital Controller.
5. The sensor shall be Company Model 3422-series.

Model 3433-series Non-metallic General Purpose Sensors

1. The sensor shall have these important enhanced performance design characteristics:

   a) Manufactured to exacting tolerances using high quality, rugged materials.

   b) Individually tested to determine its absolute four-digit cell constant, ensuring highest possible measuring accuracy.

   c) Built to include a Pt 1000 RTD temperature element within its tip for exceptionally fast response to changes in temperature with ±0.1ºC accuracy.

2. The general purpose style sensor shall have graphite electrodes, a nominal cell constant of 0.5 or 10, and a 3/4-inch NPT threaded Ryton body. It shall mount into a standard 3/4-inch pipe tee, optional 1/4-turn twist lock adapter, 1-1/2 inch union hardware, or fasten onto the end of a pipe.
3. The sensor shall have an integral 6 m (20 ft.) cable, or an integrally-mounted junction box (polypropylene, aluminum, or 316 stainless steel) that requires optional interconnect cable.
4. An optional sensor module or Digital Gateway shall be available for connecting to a sc Digital Controller.
5. The sensor shall be Company Model 3433-series.

Model 3444-series Boiler/Condensate Sensors

1. The sensor shall have these important enhanced performance design characteristics:

   a) Manufactured to exacting tolerances using high quality, rugged materials.

   b) Individually tested to determine its absolute four-digit cell constant, ensuring highest possible measuring accuracy.

   c) Built to include a Pt 1000 RTD temperature element within its tip for exceptionally fast response to changes in temperature with ±0.1ºC accuracy.

2. The boiler/condensate style sensor shall have 316 stainless steel and titanium electrodes, a nominal cell constant of 0.5 or 5, and a 3/4-inch NPT threaded 316 stainless steel body. It shall fasten into a boiler wall using a 3/4-inch weldolet, or mount into a process line using a standard 3/4-inch stainless pipe tee.
3. The sensor shall have an integral 6 m (20 ft.) cable, or an integrally-mounted junction box (polypropylene, aluminum, or 316 stainless steel) that requires optional interconnect cable.
4. An optional sensor module or Digital Gateway shall be available for connecting to a sc Digital Controller.
5. The sensor shall be Company Model 3444-series.

Model 3455-series Sanitary (CIP) Flange Sensors

1. The sensor shall have these important enhanced performance design characteristics:

   a) Manufactured to exacting tolerances using high quality, rugged materials.

   b) Individually tested to determine its absolute four-digit cell constant, ensuring highest possible measuring accuracy.

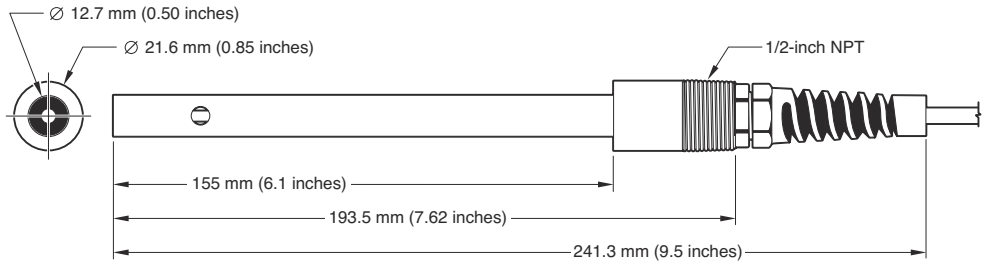
   c) Built to include a Pt 1000 RTD temperature element within its tip for exceptionally fast response to changes in temperature with ±0.1ºC accuracy.

2. The sanitary (CIP) flange style sensor shall have 316 stainless steel electrodes, a nominal cell constant of 0.05, 1, or 10, and a 1-1/2-inch or 2-inch diameter flange. It shall mount using standard sanitary mounting hardware.
3. The sensor shall have an integral 6 m (20 ft.) cable, or an integrally-mounted junction box (polypropylene, aluminum, or 316 stainless steel) that requires optional interconnect cable.
4. An optional sensor module or Digital Gateway shall be available for connecting to a sc Digital Controller.
5. The sensor shall be Company Model 3455-series.

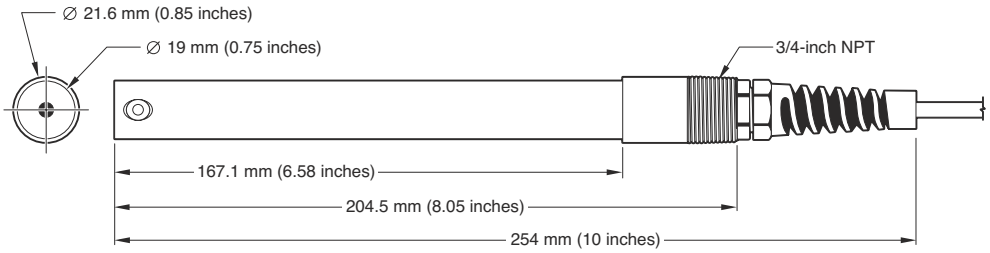
Dimensions

Model 3422-series Compression Fitting Sensor

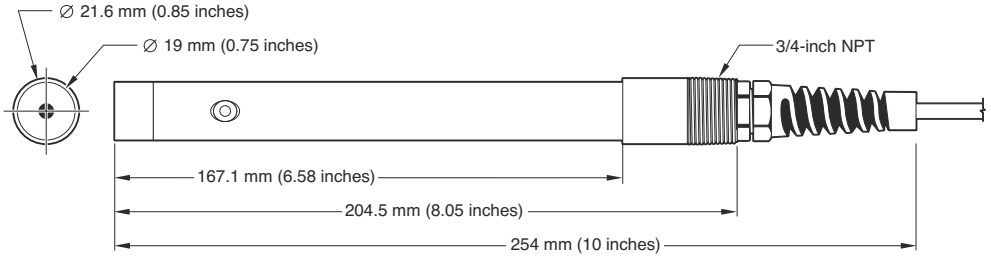
Compression-Style Sensor, 0.5-in. Diameter



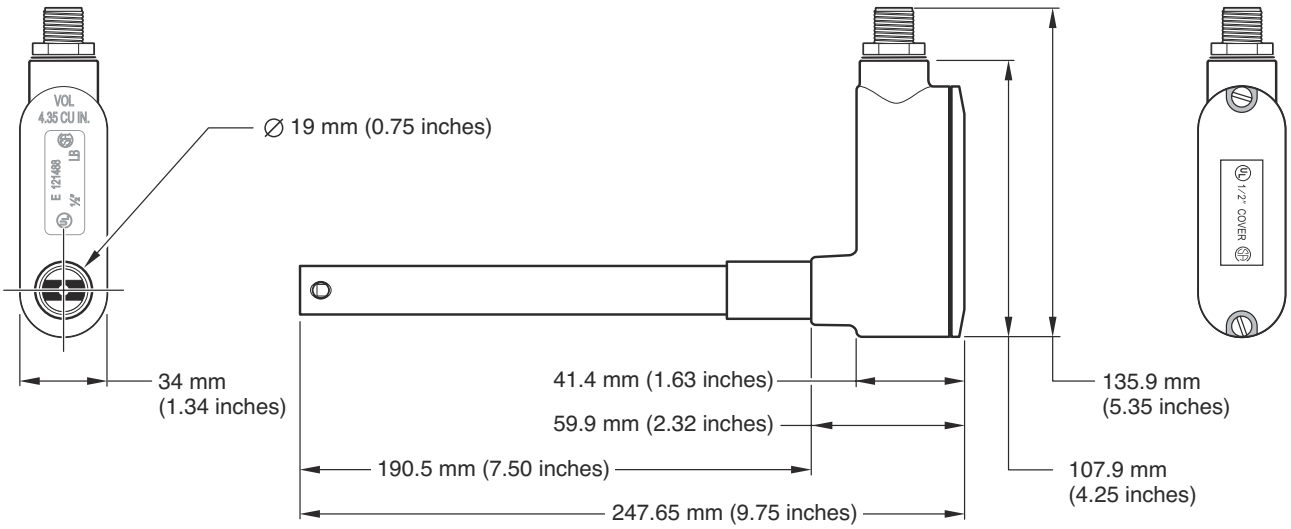
Compression-Style Sensor, 0.75-in. Diameter



Compression-Style Sensor with Teflon® Tip

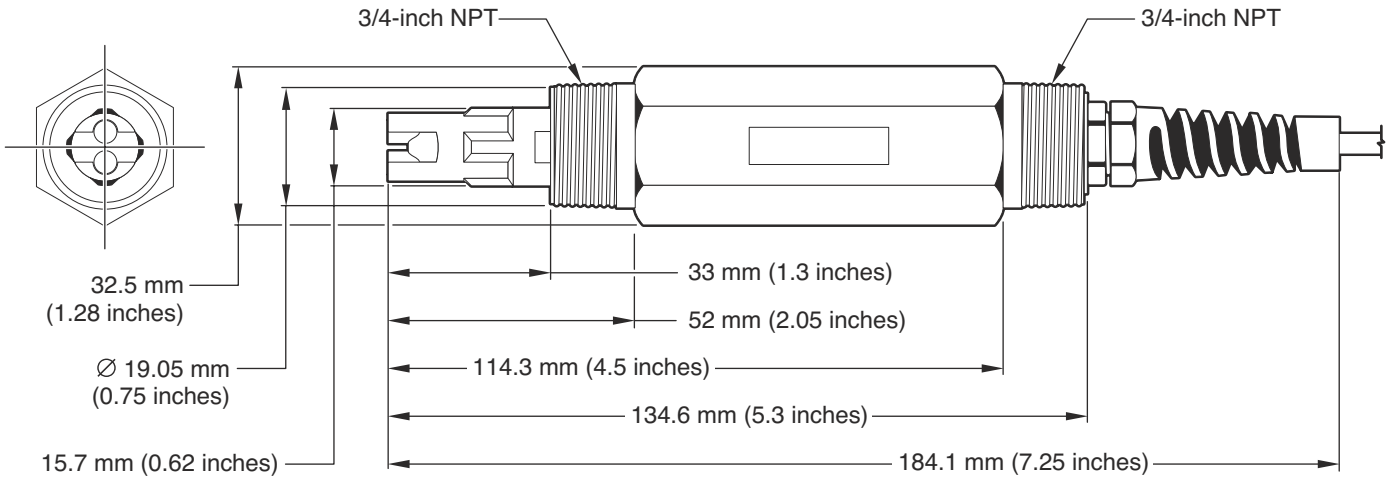


Compression-Style Sensor with Integral Junction Box

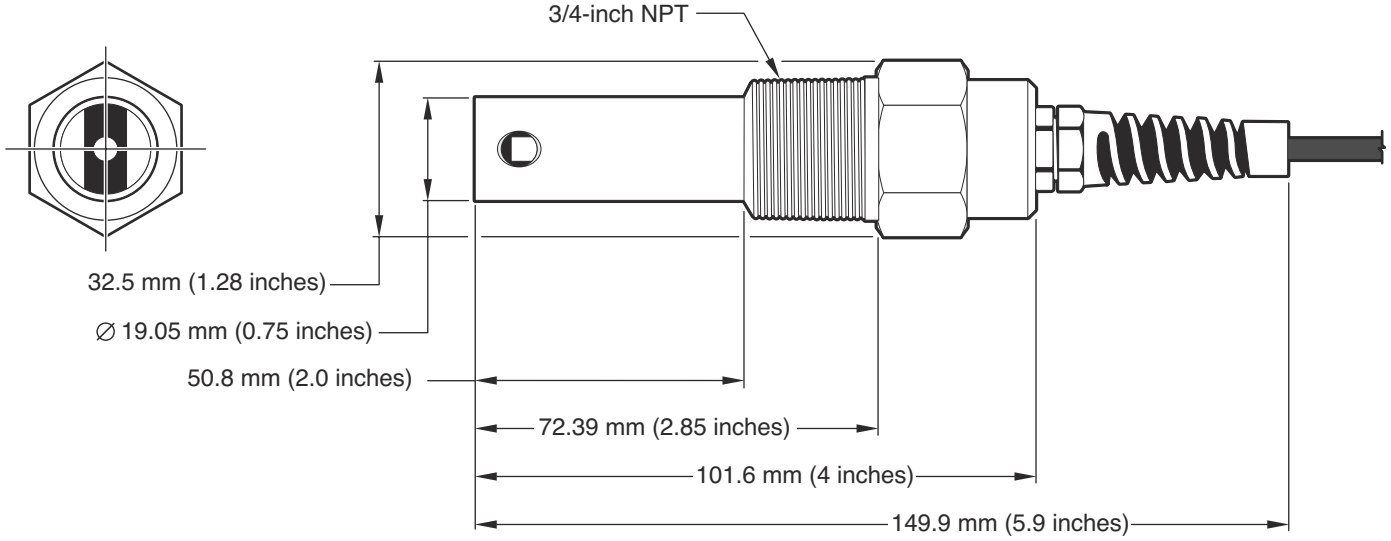


Dimensions *continued*

Model 3433-series Non-metallic General Purpose Sensor

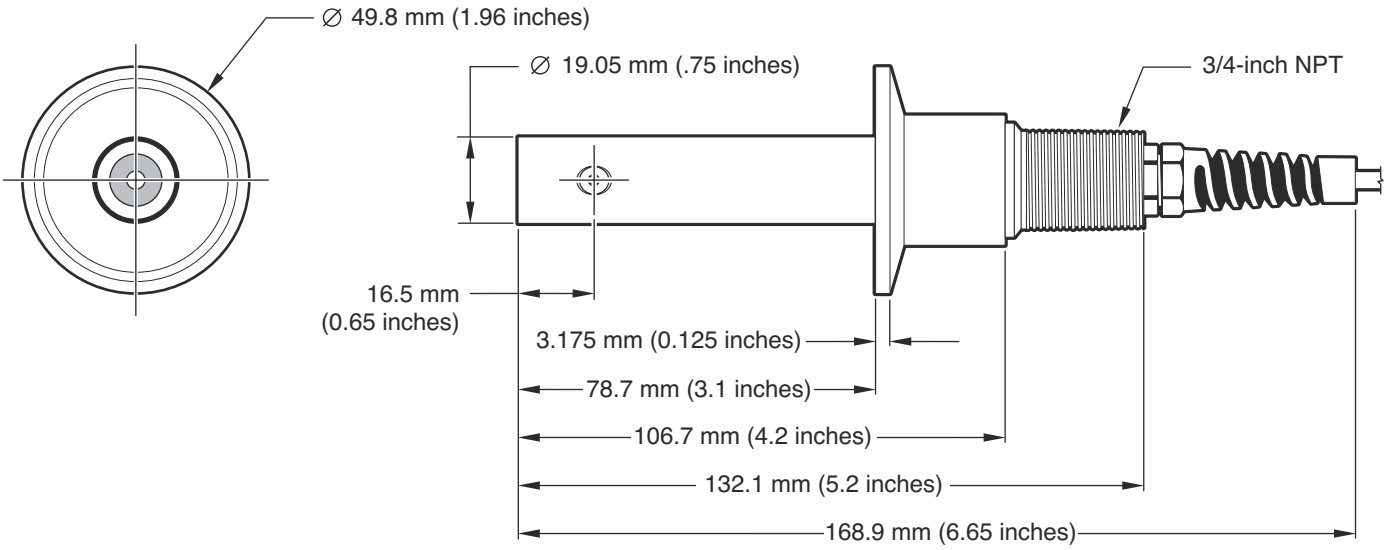


Model 3444-series Boiler/Condensate Sensor

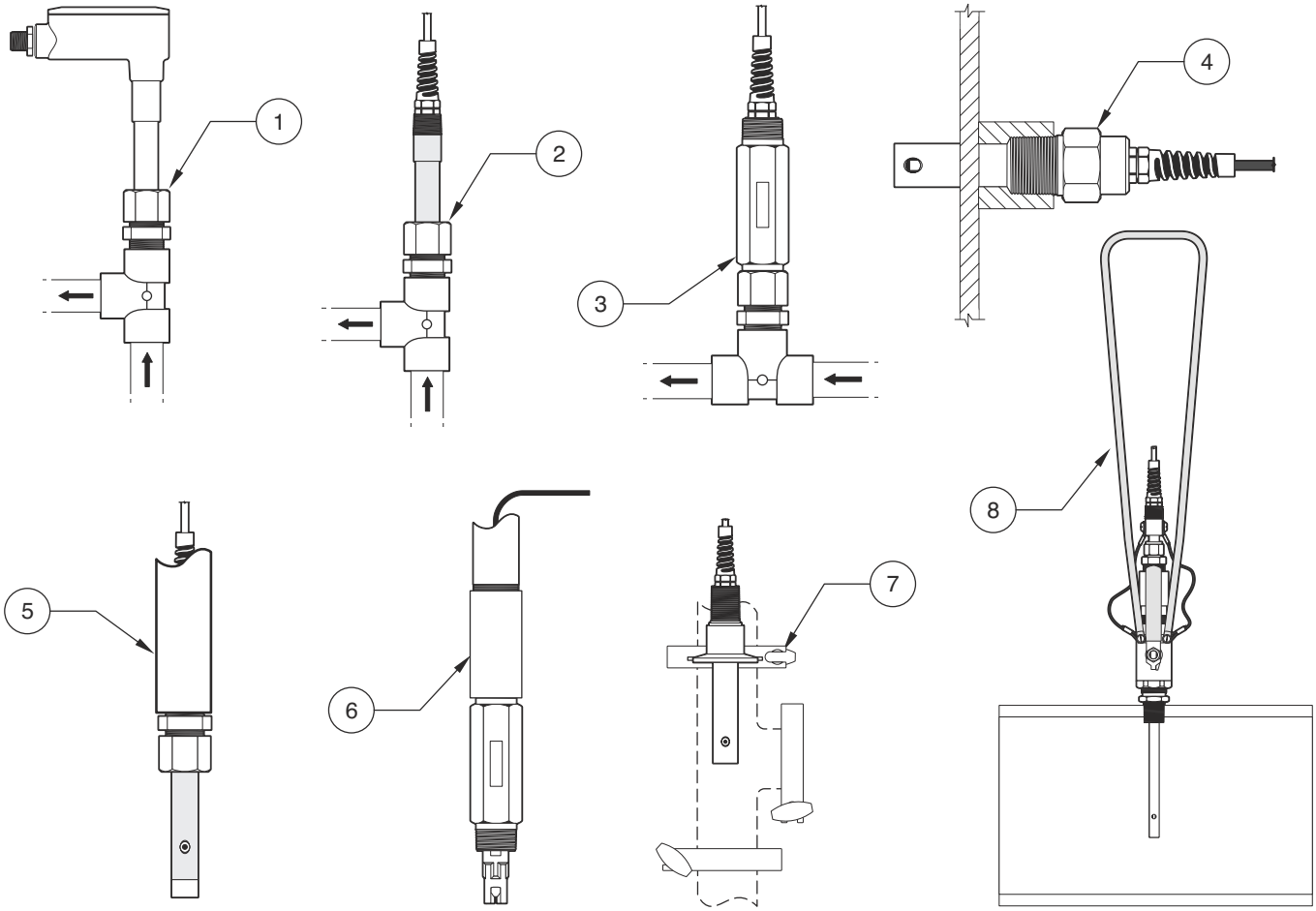


Dimensions *continued*

Model 3455-series Sanitary (CIP) Flange Sensor



Installation Examples



1. Insertion mounting
2. Insertion mounting
3. Non-metallic sensor, insertion mounting
4. Boiler wall insertion mounting
5. End of pipe mounting
6. Non-metallic sensor, end of pipe mounting
7. Sanitary (CIP) flange mounting
8. Ball valve insertion for compression-style sensor with extended sensor body

Ordering Information

Compression Fitting Sensors

Designed for ultrapure water and pure water applications, these small, enhanced performance contacting conductivity sensors provide the required absolute cell (K) constant accuracy, and ultrafast-acting temperature compensation. Materials of construction extend sensor operating life with no degradation in measurement reliability.

3422 sc Digital Compression Fitting Sensors

All digital compression fitting sensors have titanium electrodes and include built-in digital electronics and integral 7 m (23 ft.) cable terminated with connector for the sc Digital Controllers. For insertion applications only. (For immersion applications, order 3422 Analog Compression Fitting Sensors.) For other cell constants and configurations, please contact your Sales Representative.

Product Number	*Cell Constant*	*Compression Fitting Style*
D3422A1	0.05	1/2-inch NPT Kynar® (PVDF)
D3422A2	0.05	1/2-inch NPT 316 stainless steel
D3422B3	0.5	3/4-inch NPT Kynar® (PVDF)
D3422C3	1.0	3/4-inch NPT Kynar® (PVDF)
D3422D3	5.0	3/4-inch NPT Kynar® (PVDF)
D3422E3	10	3/4-inch NPT Kynar® (PVDF)

Digital Gateway

6120700 Use the Digital Gateway to connect analog 3400-series conductivity sensors to the sc1000 Digital Controller. **3422**

Analog Compression Fitting Sensors

All analog compression fitting sensors have titanium electrodes and include an integral 6 m (20 ft.) cable terminated with stripped and tinned wires. For other cell constants and configurations, including options for integral junction boxes, please contact your Sales Representative.

Product Number	*Cell Constant*	*Compression Fitting Style*
3422A1A	0.05	1/2-inch NPT Kynar® (PVDF)
3422A2A	0.05	1/2-inch NPT 316 stainless steel
3422B3A	0.5	3/4-inch NPT Kynar® (PVDF)
3422C3A	1.0	3/4-inch NPT Kynar® (PVDF)
3422D3A	5.0	3/4-inch NPT Kynar® (PVDF)
3422E3A	10	3/4-inch NPT Kynar® (PVDF)

Accessories for Digital and Analog 3422-series Sensors

Compression Fittings

4H1285 1/2-inch 316 Stainless Steel Fitting
4H1135 3/4-inch 316 Stainless Steel Fitting
1000F1236-111 1/2-inch PVDF (Kynar®) Fitting
1000F1236-122 3/4-inch PVDF (Kynar®) Fitting

Low-volume Flow Chambers

For use only with a 0.05 cell constant sensor. These tees limit sample volume to approximately 20 mL for high-purity water applications.

1000G3316-101 Kynar® (PVDF) 1/2-inch pipe tee
1000A3316-102 316 SS 1/2-inch pipe tee

Mounting Hardware for Digital and Analog 3422-series Sensors

316 Stainless Steel Ball Valve Mounting Hardware

Ball valve mounting hardware assemblies consist of a 1-inch stainless steel ball valve, internal Viton® seals, 1-inch NPT stainless steel close nipple, and steel guard with safety cables.

MH113M2C For 0.05 cell constant sensor (1/2-inch diameter)
MH114M3C For all other sensors (3/4-inch diameter)

Ordering Information *continued*

Non-metallic General Purpose Sensors

The Model 3433-series graphite electrode sensors are low-cost and offer advanced features. They are specifically designed for general purpose measuring applications that require a non-metallic sensor. Ryton® body is compatible with most acidic, basic, and salts measurements.

3433 sc Digital Non-Metallic, General Purpose Sensors

All digital general purpose sensors come complete with a non-metallic sensor with graphite electrode, 3/4-inch male NPT threaded Ryton® body with integral 6 m (20 ft.) cable, digital gateway, and 1 m (3.3 ft.) digital extension cable. When ordering a replacement sensor, please select the appropriate sensor from the “Replacement Sensor” column.

Product Number	*Cell Constant*	*Replacement Sensor*
D3433B8	0.5	**3433B8A**
D3433E8	10	**3433E8A**

Digital Gateway

6120700 Use the Digital Gateway to connect analog 3400-series conductivity sensors to the sc1000 Digital Controller. **3433**

Analog Non-Metallic, General Purpose Sensors

All analog general purpose sensors come complete with a non-metallic sensor with graphite electrode and 3/4-inch male NPT threaded Ryton® body with integral 6 m (20 ft.) cable terminated with stripped and tinned wires. For other configurations, including options for integral junction boxes, please contact your Sales Representative.

Product Number	*Cell Constant*
3433B8A	0.5
3433E8A	10

Mounting Hardware for Digital and Analog Model 3433-series Sensors

Union Mounting Hardware

MH576N3MZ All-PVC assemblies include: 1-1/2-inch pipe tee, 1-1/2-inch close nipple, 1-1/2-inch -modified union

Boiler/Condensate Sensors

The Model 3444-series enhanced performance contacting conductivity sensors are specifically designed for high temperature and high pressure applications. They are especially convenient for direct boiler wall installations.

3444 sc Digital Boiler/Condensate Style Sensors

All digital boiler/condensate style sensors have 316 stainless steel electrode electrodes, 3/4-inch male NPT threaded 316 stainless steel body with integral 6 m (20 ft.) cable, digital gateway, and 1 m (3.3 ft.) digital extension cable. When ordering a replacement sensor please select the appropriate sensor from the “Replacement Sensor” column.

Product Number	*Cell Constant*	*Replacement Sensor*
D3444B8	0.5	**3444B8A**
D3444D8	5.0	**3444D8A**

Digital Gateway

6120700 Use the Digital Gateway to connect analog 3400-series conductivity sensors to the sc1000 Digital Controller. **3444**

Analog Boiler/Condensate Style Sensors

All analog boiler/condensate style sensors have 316 stainless steel electrodes and 3/4-inch male NPT threaded 316 stainless steel body with integral 6 m (20 ft.) cable terminated with stripped and tinned wires. For other configurations, including options for integral junction boxes, please contact your Sales Representative.

Product Number	*Cell Constant*
3444B8A	0.5
3444D8A	5.0

Ordering Information *continued*

Sanitary (CIP) Flange Sensors

These CIP-ready, enhanced performance contacting conductivity sensors are designed for direct mounting into processes using CIP type fittings. Applications may include food, pharmaceutical, high purity water, reverse osmosis, waste treatment, and other processes.

3455 sc Digital Sanitary (CIP) Flange Style Sensors

All digital sanitary (CIP) flange style sensors have 316 stainless steel electrodes, integral 6 m (20 ft.) cable, digital gateway, and 1 m (3.3 ft.) digital extension cable. When ordering a replacement sensor please select the appropriate sensor from the "Replacement Sensor" column.

Product Number	*Cell Constant*	*Installation Style*	*Replacement Sensor*
D3455A6	0.05	Sanitary (CIP) 1-1/2-inch flange	**3455A6A**
D3455C7	1.0	Sanitary (CIP) 2-inch flange	**3455C7A**
D3455E7	10	Sanitary (CIP) 2-inch flange	**3455E7A**

Digital Gateway

6120700 Use the Digital Gateway to connect analog 3400-series conductivity sensors to the sc1000 Digital Controller. **3455**

Analog Sanitary (CIP) Flange Style Sensors

All analog sanitary (CIP) flange style sensors have 316 stainless steel electrodes with integral 6 m (20 ft.) cable terminated with stripped and tinned wires. For other configurations, including different flange sizes and integral junction box options, please contact your Sales Representative.

Product Number	*Cell Constant*	*Installation Style*
3455A6A	0.05	Sanitary (CIP) 1-1/2 inch flange
3455C7A	1.0	Sanitary (CIP) 2 inch flange
3455E7A	10	Sanitary (CIP) 2 inch flange

Mounting Hardware for Digital and Analog Model 3455-series Sensors

Sanitary 1-1/2-inch Mounting Hardware

9H1388 1-1/2-inch sanitary tee
9H1382 1-1/2-inch heavy duty sanitary clamp

Sanitary 1-1/2-inch Gasket

9H1381 EDPM (standard)
9H1383 Viton® (optional)

Sanitary 2-inch Mounting Hardware

9H1310 2-inch sanitary tee
9H1132 2-inch heavy duty sanitary clamp

Sanitary 2-inch Gasket

9H1327 EDPM (standard)
9H1384 Viton® (optional)

Ordering Information *continued*

Accessories for all 3400-series Contacting Conductivity Sensors

Cables

Digital cables are used only with digital sensors or gateways when connecting to the sc Digital Controllers.

6122400 Digital Extension Cable, 1 m (3.3 ft.)

5796000 Digital Extension Cable, 7.7 m (25 ft.)

5796100 Digital Extension Cable, 15 m (50 ft.)

5796200 Digital Extension Cable, 31 m (100 ft.)

Analog cables are used only with analog sensors, junction box, and controller.

1W1100 Analog Interconnect Cable, order per foot

Digital Termination Box

Used with digital extension cables when the desired cable length between the digital sensor/digital gateway and the sc Digital Controller is between 100 m (328 ft.) and 1000 m (3280 ft.).

5867000 Digital Termination Box

Analog Junction Box

Used with analog interconnect cable when the desired cable length between analog sensor and analog controller is greater than the standard length of sensor cable. Each junction box includes terminal strip and gasket.

60A2053 Junction Box, Surface-mount, aluminum (includes mounting hardware)

60A9944 Junction Box, Pipe-mount, PVC (for 1/2-inch diameter pipe, includes mounting hardware)

60G2052 Junction Box, Pipe-mount, PVC (for 1-inch diameter pipe, includes mounting hardware)

76A4010-001 Junction Box, NEMA 4X (no mounting hardware included)

Conductivity Reference Solutions

Please specify the desired conductivity value when placing your order.

Product Number	*Description*	*Volume*
25M3A2000-119	100-1000 µS/cm	1 liter
25M3A2050-119	1000-2000 µS/cm	1 liter
25M3A2100-119	2000-150,000 µS/cm	1 liter
25M3A2200-119	200,000-300,000 µS/cm	1 liter

To complete your conductivity measurement system, choose from these controllers...

Model sc200 Controller

(see Lit. #2665)

The sc200 controller platform can be configured to operate either 2 Digital Sensor Inputs, or 1 or 2 Analog Sensor Inputs, or a combination of Digital and Analog Sensor Inputs. Customers may choose their communication options from a variety of offerings ranging from MODBUS RTU to Profibus DPV1.

sc200 for Digital Sensors

LXV404.99.00552 sc200 controller, 2 channel, digital
LXV404.99.00502 sc200 controller, 1 channel, digital
LXV404.99.00542 sc200 controller, 2 channel, digital & mA input
LXV404.99.00512 sc200 controller, 2 channel, digital & pH/DO
LXV404.99.00522 sc200 controller, 2 channel, digital & Conductivity
LXV404.99.00532 sc200 controller, 2 channel, digital & Flow

sc200 for Analog Sensors

LXV404.99.00102 sc200 controller, 1 channel, pH/DO
LXV404.99.00112 sc200 controller, 2 channel, pH/DO
LXV404.99.00202 sc200 controller, 1 channel, Conductivity
LXV404.99.00222 sc200 controller, 2 channel, Conductivity
LXV404.99.00212 sc200 controller, 2 channel, pH/DO & Conductivity
LXV404.99.00302 sc200 controller, 1 channel, Flow
LXV404.99.00332 sc200 controller, 2 channel, Flow
LXV404.99.00312 sc200 controller, 2 channel, Flow & pH/DO
LXV404.99.00322 sc200 controller, 2 channel, Flow & Conductivity

Note: Other sensor combinations are available. Please contact Technical Support or your representative.
Note: Communication options (MODBUS and Profibus DPV1) are available.

Model sc1000 Controller

(see Lit. #2403)

Each sc1000 Probe Module provides power to the system and can accept up to 8 digital sensors/expansion boards. Probe Modules can be networked together to accommodate up to 32 digital sensors/expansion boards attached to the same network.

LXV402.99.00002 sc1000 Display Module
LXV400.99.1R572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, 110-230V
LXV400.99.1B572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, RS-485 (MODBUS), 110-230V
LXV400.99.1F572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, PROFIBUS DP, 110-230V
LXV400.99.1R582 sc1000 Probe Module, 6 sensors, 4 mA Out, 4 mA In, 4 Relays, 110-230V

At , it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.