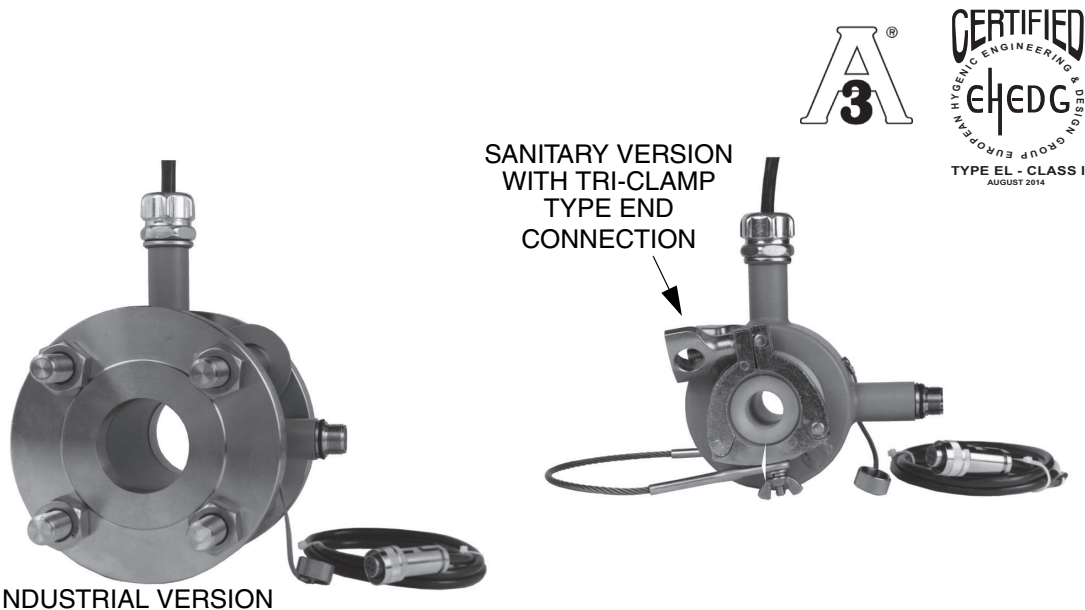


**871FT Series Non-Invasive Sanitary and Industrial Flow-Through Conductivity Sensors**



The Foxboro<sup>®</sup> brand 871FT Series Non-Invasive Sanitary and Industrial Flow-Through Sensors are a family of in-line sensors that measure the conductivity of virtually any conductive liquid. They are offered in many common line sizes from 0.5 to 4.0 inches. A selection of construction materials to accommodate a wide range of sanitary and industrial applications is also offered.

**FEATURES**

- ▶ Vaaler Award from Chemical Processing Magazine for industrial version; top honors from Food Processing for sanitary version.
- ▶ Compatible with Foxboro Intelligent and Analog Transmitters and Analyzers.
- ▶ Non-invasive modular design permits ease of installation, and removal from process line without need to open line.
- ▶ Unique patented sensor and toroid design.
- ▶ No obstruction of process flow.
- ▶ In-line calibration negates safety issues.
- ▶ Sanitary sensor with Virgin PEEK insulator complies with 3-A Sanitary Standard 74. Sanitary sensor with 2-inch line size and Virgin PEEK insulator is certified by EHEDG (European Hygienic Engineering and Design Group) for in-place cleanability according to EHEDG Document 2. Additionally, the Virgin PEEK insulator used in these sensors is FDA compliant. The Virgin PEEK insulator has a crevice-free design, interior bore surface finish <math>< 16 \mu\text{inch}</math>, and provides quick-disconnect construction.

- ▶ Industrial sensor with a wide selection of materials. Significantly reduces coatings or foulings, eliminates sidewall effects, and also eliminates exposure of personnel to hazardous chemicals.
- ▶ Sanitary sensors are offered with the traditional Tri-Clamp type, quick-disconnect end connections.
- ▶ Conforms to all Applicable European Union Directives (product marked with “CE” logo)
- ▶ Pressure Equipment Directive compliance per PED 97/23/EC for most versions (contact Global Customer Support).
- ▶ Numerous options and accessories offered.

### NON-INVASIVE FLOW-THROUGH DESIGN

The 871FT Flow-Through Sensors provide a totally non-invasive measurement of conductivity and significantly reduce the influence of coatings and deposits on conductivity measurements. For example:

- ▶ Where the process solution contains solids that cause fouling, the tubular design of the flow cell promotes self-cleaning and limits obstruction. Measurement inaccuracies and downtime associated with this problem are significantly reduced or eliminated altogether.
- ▶ Installation problems, such as cavitation, pipe-wall effects, and probe orientation, associated with traditional conductivity insertion methods, often create measurement inaccuracies, and therefore, over-compensation within the control loop. The non-invasive design eliminates:
  - Wasted Chemical Feedstock in Chemical Dilution Processes
  - Over-utilization of Water Purification Systems
  - Loss of Expensive, Recoverable Product in Decanting Applications
  - Excessive Loading and Reagent Costs in Waste Neutralization Processes
  - Out of Specification Product caused by Incorrect Caustic or Acid Strength.

- ▶ For critical processes in the pharmaceutical and biotechnology industries that involve solutions with proteins and other physically sensitive species, the non-invasive flow-through measurement eliminates damage to these sensitive and typically expensive media. For those industries requiring sanitary designs with smooth bore finishes, the 871FT Sanitary version is compliant with 3-A Sanitary Standard and certified by EHEDG.

The non-invasive modular design permits ease of installation and removal from process lines.

### PRINCIPLE OF OPERATION

These Sensors consist of inductive toroids mounted on an electrically nonconductive (insulator) section coaxial with the piping system. The primary toroids induce an electric current in the process fluid as it passes through the insulator (bore piece). The voltage created, which varies with process fluid conductivity, is detected by secondary toroid(s)<sup>(1)</sup> and converted to a conductivity measurement.

### SANITARY SENSORS

This unique non-invasive Sanitary Sensor VPEEK material is 3-A compliant per Sanitary Standard 74 and certified by EHEDG. The sensor is offered in materials consistent with U.S. Food and Drug Administration regulations for Food Service. The assembly complies with 3-A Sanitary standards of design for dairy equipment, and may be completely disassembled for total sanitation. A Sensor is provided with Virgin PEEK<sup>(2)</sup> insulator (bore piece) providing a 16 μinch or better interior bore finish in line sizes from 0.5 to 4.0 inches. Completely crevice-free flow-through construction facilitates all CIP operations. Industry standard Tri-Clamp type end connection mountings permit ease of flow-through installation and removal.

### **The Sanitary Non-invasive Advantage**

The Non-Invasive Sanitary 871FT Sensors provide a unique conductivity measurement for numerous Food and Pharmaceutical applications, including the monitoring and control of beverage products (such as juices, beer, milk, wine, soft drinks, and bottled water) and their associated CIP requirements.

Also, these Sensors permit dramatic savings in product otherwise lost to drain, and provide significant savings in maintenance time and in manually monitored and/or lost CIP solution(s). In addition, the capability of in-line calibration obviates the need to open the process line to the environment, which then often requires a process line recertification. Calibration may be completed without stopping the process flow. The simple Tri-Clamp type end connection permits ease of installation for conventional applications.

### **INDUSTRIAL SENSORS**

The Industrial Sensor is offered in a choice of process-wetted materials to satisfy a wide array of chemical concentration and control applications, from aggressive to benign, of high or low conductivity. These flow-through sensors provide ANSI Class 150/300 flanges or NPT pipe mounting, in either 316 ss, Carpenter 20, or nickel alloy<sup>(3)</sup>. Insulator materials of glass-filled PEEK, PCTFE, or PVDF<sup>(4)</sup> in line sizes from 1/2 to 4.0 inches may be selected to satisfy a multitude of applications. See the Model Code section for the numerous industrial sensor configurations offered.

### **The Industrial Non-invasive Advantage**

These Industrial Sensors provide a non-invasive conductivity measurement for innumerable aqueous and/or chemical concentration monitoring and control applications (such as condensate and boiler water, acid or caustic concentration control, waste stream monitoring, leak detection, and interface detection).

The Industrial Sensors may often be calibrated in line, thus significantly reducing scheduled maintenance time, and eliminating the need for exposure of personnel to potentially hazardous chemicals. Simple design, and ANSI Class 150 or 300 flange mounting, facilitates both installation and removal of the sensor from the process line.

### **Externally Accessible Calibration Port**

In controlling and measuring solutions that are hazardous to personnel, or where explosive environments are common, traditional conductivity calibration is tedious, dangerous, and costly. Obtaining permits, suiting up, testing for gas, pulling the probe, capping the line, final calibration, and cleaning up can take as much as several hours per installation. In a medium-sized chemical plant, this can easily consume several hundred man hours of a maintenance budget. With the 871FT Calibration Port, breaking into the line is eliminated, calibration is accomplished in-situ, and the associated costs and safety issues diminish appreciably.

### **Rugged Design, Robust, Environmentally Isolated Sensor**

871FT Industrial Sensors are housed in a tough epoxy-painted aluminum housing that provides NEMA 4, CSA Enclosure 4, and IP65 protection ratings. The housing can be provided as a special, using 316 ss material. Contact Global Customer Support for further details.

The most common failure mode of conventional insertion sensors is process ingress due to loss of seal integrity, and/or degradation and breakdown of the housing material. The toroids of the 871FT are electrically and physically isolated from process fluid contact. In addition, the insulator is available in many more chemically compatible materials than those available in conventional sensors. These two elements combine to create a virtually fail-proof sensor. Downtime and production losses associated with sensor failure are virtually eliminated.

1. This product is protected by Foxboro Patent No. 5157332, and others.

2. PEEK = PolyEtherEtherKetone (Virgin or Glass-Filled); PCTFE = PolyChloroTriFluoroEthylene.

3. Equivalent to Hastelloy® C. Hastelloy is a registered trademark of Haynes International, Inc.

4. PVDF = PolyVinylidene DiFluoride.

## EASE OF INSTALLATION

The Sensor's "wafer" design permits it to literally replace a small section of process piping, while its industry standard end connections permit ease of installation to, and removal from, process lines. The unique compact sensor design provides an end-to-end dimension which does not exceed seven inches in any bore size. The Dimensions-Nominal section depicts and lists the exact measurements for each sensor type vs. line size. Normal precautions should be taken relative to pipeline support (see Sensor Approximate Mass in Table 2), and alignment of the flow-through. Naturally, cantilever or bending loads on the sensor should be eliminated.

## WETTED MATERIALS

The Sanitary Sensor provides only the Insulator (bore piece) as a wetted part. This may be either FDA/3-A compliant and EHEDG certified Virgin PEEK, or PCTFE. Gaskets are provided by the user. Refer to the Standard Specifications section and to Table 10.

The Industrial Sensor provides a choice of application suitable metals, insulator (bore piece), and O-ring materials. Also refer to the Standard Specifications section and also Table 10.

## TEMPERATURE COMPENSATION

The 871FT Flow-Through Sensor offers a choice of field-replaceable temperature sensor elements of either 1000 Ohm RTD (for use with the 875EC Analyzer or 870ITEC Transmitter), or 100 Ohm RTD (compatible with either the 870ITEC Transmitter, or 875EC, 873EC, or 873AEC Analyzers). These RTDs provide the fastest temperature response practical by inserting into the process stream through a user supplied, industry standard tee.

## LOCATION IN PROCESS LINE

Sensors can be installed in any nonmagnetic metal piping, and are neither flow-direction, nor flow-rate sensitive. They can be mounted in any convenient orientation (horizontal, vertical, or sloping) which assures full and continuous capacity of the bore, and includes normal precautions (separation by 3 to 5 pipe diameters) for upstream or downstream disturbances (e.g., valves, elbows). Avoidance of entrained air or the formation of voids will assure a stable, accurate measurement. Refer to MI 611-202 for information relating to the 871FT Sensors.

## WIDE RANGE CAPABILITY

These sensors are capable of providing measurements of virtually any conductive liquid by selecting either a "Low" (full scale range as low as 50  $\mu$ S/cm) or "High" conductivity (full scale range as high as 2000 mS/cm) version relative to bore size. Table 1 identifies these ranges vs. bore sizes.

## CABLE

The 871FT includes an integral PVC 20 foot (6 metre) cable, or an optional shielded Teflon, RFI/EMI protected cable. The Teflon cable eliminates the need for placing the cable in conduit in many typical installations. Extension cable(s), as well as the appropriate junction boxes, are available and are described in the Accessories section. The maximum recommended cable length, as with any toroidal conductivity sensor, is 100 feet (30 metres).

## COMPATIBLE INSTRUMENTATION

These Sensors are ideal for use with 876EC or 870ITEC Transmitters, or the 875EC, 873EC, or 873AEC Analyzers. They are not easily compatible to the older instrumentation (e.g., 870EC Transmitter or 872-20 Monitor).

**Table 1.**  
**871FT Sensor Full Scale Range Settings - Minimum to Maximum Values Shown**  
**for Each Sensor Type and Inch Bore Size**

mS/cm	–	0.1	0.2	0.5	1	2	5	10	20	50	100	200	500	1000	2000
µS/cm	50	100	200	500	1000	2000	5000	–	–	–	–	–	–	–	–
871FT-1C					X	X	X	X	X	X	X	X	X	X	X
871FT-2C				X	X	X	X	X	X	X	X	X	X	X	X
871FT-1D				X	X	X	X	X	X	X	X	X	X	X	X
871FT-2D				X	X	X	X	X	X	X	X	X	X	X	
871FT-1E				X	X	X	X	X	X	X	X	X	X	X	X
871FT-2E			X	X	X	X	X	X	X	X	X	X	X		
871FT-1F			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-2F	X	X	X	X	X	X	X	X	X	X	X	X			
871FT-1G			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-2G	X	X	X	X	X	X	X	X	X	X	X				
871FT-1H		X	X	X	X	X	X	X	X	X	X	X	X		
871FT-2H	X	X	X	X	X	X	X	X	X	X	X				
871FT-1J	X	X	X	X	X	X	X	X	X	X	X	X	X		
871FT-2J	X	X	X	X	X	X	X	X	X	X					
871FT-3C				X	X	X	X	X	X	X	X	X	X	X	X
871FT-4C		X	X	X	X	X	X	X	X	X	X	X	X		
871FT-3E					X	X	X	X	X	X	X	X	X	X	X
871FT-4E	X	X	X	X	X	X	X	X	X	X	X	X			
871FT-3F					X	X	X	X	X	X	X	X	X	X	X
871FT-4F	X	X	X	X	X	X	X	X	X	X	X				
871FT-3G					X	X	X	X	X	X	X	X	X	X	X
871FT-4G	X	X	X	X	X	X	X	X	X	X	X				
871FT-3H			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-4H	X	X	X	X	X	X	X	X	X	X					
871FT-3J			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-4J	X	X	X	X	X	X	X	X	X	X					

**NOTE**

Refer to Model Codes that follow for description of Model Number in first column. For example, 871FT-1C is Sanitary, High Range, with a 1/2-inch line size.

## STANDARD SPECIFICATIONS

### End Connection Materials

316 ss, Carpenter 20-CB3, or nickel alloy<sup>(5)</sup>; applicable to industrial versions only. Sanitary versions utilize a one-piece insulator of VPEEK or PCTFE material; the traditional Tri-Clamp type end connection is used with either of these materials.

### Pressure-Temperature Ratings, Wetted Materials

See Tables 3 to 9 for Pressure-Temperature Ratings applicable to PCTFE, GFPEEK, VPEEK, and PVDF materials when used with various end connections.

### Wetted Material Compatibility with Process Solutions

Refer to Table 10.

### Sanitary Sensor – Wetted Bore Piece

#### VPEEK - FDA AND 3-A COMPLIANT; EHEDG CERTIFIED

##### NOTE

User supplied EHEDG approved seals, i.e. SS/Kalrez, are required to maintain EHEDG certification for use with Tri-Clamp Connector.

*O-ring Material Not applicable*

*Maximum Pressure<sup>(6)</sup>*

225 psi (1550 kPa); Tri-Clamp with 1/2, 3/4, and 2- in line sizes

150 psi (1034 kPa); Tri-Clamp with 1-, 1 1/2-, and 3-in line sizes

100 psi (690 kPa); Tri-Clamp with 4-in line size

*Temperature Limits<sup>(6)</sup>*

14 to 250°F (–10 to +121°C)

### PCTFE

*O-ring Material*

Not applicable

*Maximum Pressure<sup>(6)</sup>*

60 psi (414 kPa)

*Temperature Limits<sup>(6)</sup>*

14 to 250°F (–10 to +121°C)

### Industrial Sensor – Wetted Bore Piece

#### GLASS-FILLED PEEK (GFPEEK)

*O-ring Material*

EPDM<sup>(7)</sup> standard; Viton and Chemraz<sup>(7)</sup> optional.

*Maximum Pressure<sup>(6)</sup>*

275 psi (1896 kPa) for ANSI Cl. 150 Flange  
400 psi (2758 kPa) for ANSI Cl. 300 Flange

*Temperature Limits<sup>(6)</sup>*

14 to 411°F (–10 to +211°C)  
with both ANSI Class 150 and 300 Flanges

### PVDF

*O-ring Material*

EPDM standard; Viton and Chemraz optional.

*Maximum Pressure<sup>(6)</sup>*

100 psi (690 kPa) with ANSI Class 150 Flange

365 psi (2517 kPa) with ANSI Class 300 Flange

*Temperature Limits<sup>(6)</sup>*

14 to 250°F (–10 to +121°C)  
with both ANSI Class 150 and 300 Flanges

5. Equivalent to Hastelloy® C-276.

6. Refer to Pressure-Temperature Ratings section.

7. EPDM is Ethylene Propylene Terpolymer; Chemraz is a Perfluoro Elastomer.

**PCTFE***O-ring Material*

EPDM standard; Viton and Chemraz optional.

*Maximum Pressure<sup>(6)</sup>*

100 psi (690 kPa)  
with ANSI Class 150 Flanges

*Temperature Limits<sup>(6)</sup>*

14 to 250°F (-10 to +121°C)  
with ANSI Class 150 Flanges

**Sensor Approximate Mass**

Table 2 lists approximate masses for each sensor line size and applicable end connection.

**Sensor Dimensions**

Refer to Dimensions-Nominal section.

**Table 2. Inch Size Sensors - Approximate Mass**

Line Size		Approximate Mass in Pounds (lb)			
Model Code	in	Sanitary Versions	Industrial Versions		
			ANSI Class 150	ANSI Class 300	NPT Adapter (a)
C	1/2	2.5	11	15	14
D	3/4	2.5	N/A (b)	N/A (b)	N/A (b)
E	1	7.5	10	14	18.5
F	1 1/2	7	12	15	17.5
G	2	6.5	17	20	28.5
H	3	9.3	32	40	N/A (b)
J	4	8.8	41	60	N/A (b)

a. NPT Adapters available with ANSI Class 150 flanges only.

b. N/A means Not Applicable.

PRESSURE-TEMPERATURE RATINGS

**Table 3. Nominal Pressure-Temperature Ratings Sanitary Sensor with VPEEK Insulator Material and Tri-Clamp Type End Connection**

Line Size	Process Press.	Maximum Temp.
1/2, 3/4, and 2 in	225 psi	14 to 250°F
1, 1 1/2, and 3 in	150 psi	14 to 250°F
4 in	100 psi	14 to 250°F

(a) For applications to 284°F, contact Global Customer Support (see back page).

**Table 4. Nominal Pressure-Temperature Ratings Sanitary Sensor with PCTFE Insulator Material and Tri-Clamp Type End Connection**

Line Size (a)	Process Press.	Maximum Temp.
1/2, 1, 1 1/2, 2, and 3 in	60 psi (b) (c)	140°F (c)
	55 psi	150°F
	50.5 psi	160°F
	46 psi	170°F
	41.5 psi	180°F
	37 psi	190°F
	32.5 psi	200°F
	28 psi	210°F
	23.5 psi	220°F
	19 psi	230°F
	14.5 psi	240°F
10 psi (c)	250°F (c) (d)	

- a. 3/4 in line size not available with PCTFE material. Also, for 4 in line size, contact Global Customer Support (see back page).
- b. 60 psi from 14 to 140°F.
- c. 60 psi at 140°F linearly derated to 10 psi at 250°F.
- d. Pressure of 15.3 psi at 250°F can be used for up to 2 hours for hot water or steam sterilization. For periods longer than 2 hours, contact Global Customer Support (see back page).

**Table 5. Nominal Pressure-Temperature Ratings Industrial Sensor with GFPEEK Insulator Material**

Line Size	Process Press.	Maximum Temp.
All Line Sizes	275 psi (a) (b)	140°F (a) (b)
–	268 psi	160°F
ANSI Cl. 150	259 psi	190°F
Flange or	249 psi	220°F
NPT End	240 psi	250°F
Connection	231 psi	280°F
	225 psi	300°F
	212 psi	340°F
	206 psi	360°F
	200 psi	380°F
	193 psi	400°F
	190 psi (b)	411°F (b)

- a. 275 psi from 14 to 140°F
- b. 275 psi at 140°F linearly derated to 190 psi at 411°F

**Table 6. Nominal Pressure-Temperature Ratings Industrial Sensor with PVDF Insulator Material**

Line Size	Process Press.	Maximum Temp.
All Line Sizes	100 psi (a) (b)	140°F (a) (b)
–	96 psi	150°F
ANSI Cl. 150	89 psi	170°F
Flange or	82 psi	190°F
NPT End	78 psi	200°F
Connection	74.5 psi	210°F
	71 psi	220°F
	63 psi	240°F
	60 psi (b)	250°F (b)

- a. 100 psi from 14 to 140°F
- b. 100 psi at 140°F linearly derated to 60 psi at 250°F.

**Table 7. Nominal Pressure-Temperature Ratings Industrial Sensor with PCTFE Insulator Material**

Line Size	Process Press.	Maximum Temp.
All Line Sizes	100 psi (a) (b)	140°F (a) (b)
–	90 psi	150°F
ANSI Cl. 150	74 psi	170°F
Flange or	58 psi	190°F
NPT End	50 psi	200°F
Connection	34 psi	220°F
	18 psi	240°F
	10 psi (b)	250°F (b)

- a. 100 psi from 14 to 140°F.
- b. 100 psi at 140°F linearly derated to 10 psi at 250°F.



**Table 8. Nominal Pressure-Temperature Ratings Industrial Sensor with GFPEEK Insulator Material and 316 ss ANSI Class 300 Flange**

Line Size	Process Press.	Maximum Temp.
All Line Sizes	400 psi (a)	411°F (a)

a. 400 psi from 14 to 411°F.

**Table 9. Nominal Pressure-Temperature Ratings Industrial Sensor with PVDF Insulator Material and Nickel Alloy (a) ANSI Class 300 Flange**

Line Size	Process Press.	Maximum Temp.
1/2 in only	365 psi (b) (c)	150°F (b) (c)
	334.5 psi	160°F
	304 psi	170°F
	273.5 psi	180°F
	243 psi	190°F
	212.5 psi	200°F
	182 psi	210°F
	151.5 psi	220°F
	121 psi	230°F
	90.5 psi	240°F
60 psi (c)	250°F (c)	

a. Equivalent to Hastelloy® C-276.

b. 365 psi from 14 to 150°F.

c. 365 psi at 150°F linearly derated to 60 psi at 250°F.

**NOTE**

Use values in tables to determine field installation requirements, even though the ratings of sanitary or flanged end connections by themselves may be greater. Linear interpolation of the values is acceptable.

**Table 10. Wetted Material Compatibility with Process Solutions**

Standard Curves (Ref Temp.) (a)	Temperature Compensation Range	Wetted Materials Compatibility for Sanitary and Industrial Sensors (b)											
		Sanitary Sensors		Industrial Sensors									
		VPEEK	PCTFE (c)	GFPEEK	PVDF	EPDM	Viton	Chemraz	316 ss	Carp 20	Hast C	Ti	
NaCl (25°C) 0 to 25%	32 to 392°F	A 212°F	R 347°F	A 212°F	R 270°F	R 130°F	R 190°F	R 400°F	G 350°F	G 210°F	G 210°F	E 210°F	
H <sub>3</sub> PO <sub>4</sub> (25°C) 0 to 35%	40 to 200°F	A 392°F	R 347°F	A 392°F	R 250°F	R 140°F	R 190°F	R 400°F	G 200°F	E 160°F G 210°F	E 150°F G 210°F	S 120°F	
HCl (25°C) 0 to 15%	14 to 252°F	A 212°F	R @ the BP	A 212°F	R 280°F	R 100°F	R 350°F	R 400°F	NO	NO	E 90 G 150°F	NO	
H <sub>2</sub> SO <sub>4</sub> (25°C) 0 to 25%	14 to 249°F	A 212°F	R 77°F	A 212°F	R 220°F	R 140°F	R 350°F	R 400°F	NO	E 110°F G 210°F	E 130°F G 190°F	NO	
H <sub>2</sub> SO <sub>4</sub> (50°C) 99.5 to 93%	14 to 249°F	NO	R >302°F	NO	R 210°F	NO	R 350°F	R 400°F	NO	E 100°F G 210°F	E 140°F G 240°F	NO	
H <sub>2</sub> SO <sub>4</sub> (30°C) 96 to 93%	50 to 194°F	NO	R >302°F	NO	R 210°F	NO	R 350°F	R 400°F	NO	E 100°F G 210°F	E 140°F G 240°F	NO	
H <sub>2</sub> SO <sub>4</sub> 80%	Custom	NO	Not Rated	NO	R 190°F	NO	R 340°F	R 380°F	NO	E 110°F S 150°F	E 240°F	NO	
H <sub>2</sub> SO <sub>4</sub> 70%	Custom	NO	Not Rated	NO	R 210°F	NO	R 340°F	R 380°F	NO	E 110°F S 150°F	G 190°F	NO	

Table 10. Wetted Material Compatibility with Process Solutions (Continued)

Standard Curves (Ref Temp.) (a)	Temperature Compensation Range	Wetted Materials Compatibility for Sanitary and Industrial Sensors (b)										
		Sanitary Sensors		Industrial Sensors								
		VPEEK	PCTFE (c)	GFPEEK	PVDF	EPDM	Viton	Chemraz	316 ss	Carp 20	Hast C	Ti
H <sub>2</sub> SO <sub>4</sub> 60%	Custom	NO	Not Rated	NO	R 220°F	R 130°F	R 320°F	R 380°F	NO	E 130°F S 160°F	E 130°F G 230°F	NO
Oleum (65°C) 42 to 18%	89 to 249°F	NO	R @ 100% 77°F	NO	NO	NO	R 190°F	R 390°F	G 250°F	G 110°F	E 140°F	NO
Oleum (65°C) 0 to 10%	89 to 249°F	NO	R @ 100% 77°F	NO	NO	NO	R 190°F	R 390°F	G 250°F	G 110°F	E 140°F	NO
HNO <sub>3</sub> (25°C) 0 to 10%	14 to 249°F	A 212°F	R 158°F	A 212°F	R 200°F	NO	R 400°F	R 400°F	E 210°F	E 210°F	E 210°F	E 240°F G 400°F
NaOH (25°C) 0 to 15%	31 to 250°F	A 392°F	R >302°F	A 392°F	R 210°F	R 210°F	NO	R 400°F	E 150°F G 300°F	E 170°F G 300°F	G 210°F	E 210°F
NaOH (50°C) 0 to 15%	32 to 212°F	A 392°F	R >302°F	A 392°F	R 210°F	R 210°F	NO	R 400°F	E 150°F G 300°F	E 170°F G 300°F	G 210°F	E 210°F
NaOH (100°C) 0 to 20%	12 to 252°F	A 392°F	R >302°F	A 392°F	R 210°F	R 210°F	NO	R 400°F	E 170°F G 210°F	E 110°F G 300°F	G 210°F	E 210°F
KOH (25°C) 0 to 6%	50 to 104°F	A 77°F	R 176°F	A 77°F	R 210°F	R 250°F	NO	R 400°F	G 350°F	G 210°F	G 210°F	E 200°F
KCl (20°C) 0 to 16%	32 to 77°F	A 212°F	No Data	A 212°F	R 280°F	R 300°F	R 400°F	R 400°F	G 350°F	G 210°F	G 210°F	E 210°F
CH <sub>3</sub> COOH (25°C) 0 to 8%	40 to 250°F	A 212°F	R 347°F	A 212°F	R 300°F	R 140°F	R 190°F	R 400°F	E 400°F	E 220°F	E 300°F	E 260°F
HF (25°C) 0 to 30%	94 to 204°F	NO	R 77°F	NO	R 260°F	NO	R 210°F	R 300°F	NO	G 190°F	G 210°F	NO
HF (0°C) 90 to 99.9%	-4 to +406°F	NO	R 77°F	NO	R 200°F	NO	NO	R 400°F	G 80°F	G 80°F	G 210°F	NO
Na <sub>2</sub> CO <sub>3</sub> (85°C) Green Liquor	94 to 204°F	A	No Data	A 212°F	R 280°F	R 300°F	R 190°F	R 400°F	G 350°F	E 200°F G >450°F	G 210°F	E 210°F
Na <sub>2</sub> O (160°C) Black Liquor	115 to 411°F	A	No Data	A	-	-	-	-	-	-	-	-
White/Brown Liq.	-	A	NO	A	-	-	-	-	-	-	-	-

- The standard curves of the solutions listed are resident in the 870ITEC Intelligent Transmitter and 875EC Intelligent Analyzer memories.
- The wetted materials compatibility for the solutions listed at a specified temperature are rated as follows:  
For Nonmetallic Materials: A = No attack, little or no absorption; R = Recommended - Resistant to Solution; NO = Not Recommended  
For Metallic Material: E = Excellent, <2 mils per year; G = Good, <20 mils per year; S = Satisfactory, <50 mils per year; NO = Not Recommended.
- PCTFE is also used for Industrial Sensors.

Table 11. 871FT Sensor Full Scale Range Settings - Minimum to Maximum Values Shown for Each Sensor Type and Inch Bore Size

mS/cm	–	0.1	0.2	0.5	1	2	5	10	20	50	100	200	500	1000	2000
µS/cm	50	100	200	500	1000	2000	5000	–	–	–	–	–	–	–	–
871FT-1C					X	X	X	X	X	X	X	X	X	X	X
871FT-2C				X	X	X	X	X	X	X	X	X	X	X	X
871FT-1D				X	X	X	X	X	X	X	X	X	X	X	X
871FT-2D				X	X	X	X	X	X	X	X	X	X	X	
871FT-1E				X	X	X	X	X	X	X	X	X	X	X	X
871FT-2E			X	X	X	X	X	X	X	X	X	X	X		
871FT-1F			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-2F	X	X	X	X	X	X	X	X	X	X	X	X			
871FT-1G			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-2G	X	X	X	X	X	X	X	X	X	X	X				
871FT-1H		X	X	X	X	X	X	X	X	X	X	X	X		
871FT-2H	X	X	X	X	X	X	X	X	X	X	X				
871FT-1J	X	X	X	X	X	X	X	X	X	X	X	X	X		
871FT-2J	X	X	X	X	X	X	X	X	X	X					
871FT-3C				X	X	X	X	X	X	X	X	X	X	X	X
871FT-4C		X	X	X	X	X	X	X	X	X	X	X	X		
871FT-3E					X	X	X	X	X	X	X	X	X	X	X
871FT-4E	X	X	X	X	X	X	X	X	X	X	X	X			
871FT-3F					X	X	X	X	X	X	X	X	X	X	X
871FT-4F	X	X	X	X	X	X	X	X	X	X	X				
871FT-3G					X	X	X	X	X	X	X	X	X	X	X
871FT-4G	X	X	X	X	X	X	X	X	X	X	X				
871FT-3H			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-4H	X	X	X	X	X	X	X	X	X	X					
871FT-3J			X	X	X	X	X	X	X	X	X	X	X	X	
871FT-4J	X	X	X	X	X	X	X	X	X	X					

**NOTES**

1. Data relating to the compatibility of PCTFE material is based on information available from 3M.
2. The material compatibility data provided in the table above has been taken from data published by recognized experts, and can vary depending on the expert source. Therefore, the table is provided as a reference only, and the ultimate material selection is the responsibility of the user.
3. For material compatibility/solution concentrations other than those in the table above, contact Global Customer Support (see back page).

ELECTRICAL SAFETY SPECIFICATIONS

Testing Laboratory, Types of Protection, and Area Classification	Condition of Certification	Electrical Safety Design Code
<b>ATEX</b> intrinsically safe for II 1 GD, EEx ia IIC, Zone 0.	Temperature Class T4-T6; T110°C-T260°C. Connect per MI 611-208.	CS-E/AAA
<b>ATEX</b> Type n energy limited for II 3 GD, EEx nL, IIC, Zone 2.	Temperature Class T4-T6; T110°C-T260°C. Connect per MI 611-208.	CS-E/ANN
<b>CSA</b> intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G and Class III, Division I.	Connect to certified 870ITEC Transmitter per MI 611-206. Temperature Class T6.	CS-E/CAA
<b>CSA</b> Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G, Class III, Division 2.	Connect to certified 870ITEC Transmitter, or 873EC, 873AEC, or 875EC Analyzers per MI 611-206. Temperature Class T6.	CS-E/CNZ
<b>FM</b> intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G, and Class III, Division I.	Connect to approved 870ITEC Transmitter per MI 611-206. Temperature Class T6.	CS-E/FAA
<b>FM</b> nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; Class III, Division 2.	Connect to approved 870ITEC Transmitter, or 873EC, 873AEC, or 875EC Analyzers per MI 611-206. Temperature Class T6.	CS-E/FNZ

**NOTE**

These sensors have been designed to meet the electrical safety descriptions noted in the table above. For detailed information, contact Global Customer Support (see back page).

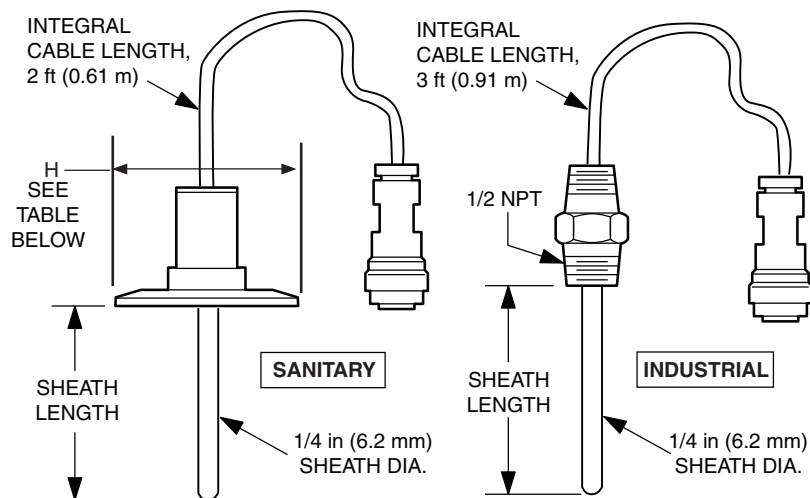
ACCESSORIES LISTING

For details relating to the Accessories listed in the table below, refer to "ACCESSORIES" below.

Part Numbers	Description	Comments
BS807BD	Calibration Cable	Required for In-line Calibration
EP485A and EP485N	Calibration Plugs, High Precision	Sensor/Range Specific. Contact Global Customer Support.
BS807DY	Junction Box, 9 conductor	Use with Teflon, 9 conductor cable
BS807NS	Junction Box, 8 conductor	Use with PVC, 8 conductor cable
BS807PA	Extension Cable, Teflon, lugs/lugs termination	Use with 870ITEC and 875EC
BS807PB	Extension Cable, Teflon, lugs/lugless termination	Use with 873EC, 873AEC, and 875EC
BS807PC	Extension Cable, PVC, lugs/lugs termination	Use with 870ITEC and 875EC
BS807PD	Extension Cable, PVC, lugs/lugless termination	Use with 873EC, 873AEC, and 875EC
BS809UN	RTD Patch Cable, 10 ft (3 m) long	Use with RTD Assembly
BS809UP	RTD Patch Cable, Length per Sales Order	Use with RTD Assembly
P0170RB	Cable, Teflon, not terminated, nor dressed	Use with 870ITEC, 873EC, 873AEC, and 875EC
P0170RG	Cable, PVC, not terminated, nor dressed	Use with 870ITEC, 873EC, and 875EC
Tees	For Temperature Compensation Sensors (RTD)	User Supplied
Clamps	For Temperature Compensation Sensors (RTD)	User Supplied
See Accessories section	Temperature Compensation Sensor Elements	Sanitary and Industrial RTDs are used as Temperature Compensation Sensor Elements.

ACCESSORIES

Temperature Compensation Sensor Elements (RTDS)



Sanitary RTDs - Inch Sizes (8)

Line Size	Dimension H	RTD Value	RTD ASSY Part No.
1/2	0.98 in	100 Ω	BS807VR
		1000 Ω	BS807VS
3/4 (a)	0.98 in	100 Ω	BS807VR
		1000 Ω	BS807VS
1 (b)	0.98 in	100 Ω	BS807VR
		1000 Ω	BS807VS
1 1/2 (b)	0.98 in	100 Ω	BS807VR
		1000 Ω	BS807VS
2	2.52 in	100 Ω	BS807VT
		1000 Ω	BS807VU
3 (b)	2.52 in	100 Ω	BS807VT
		1000 Ω	BS807VU
4	4.68 in	100 Ω	BS807VV
		1000 Ω	BS807VW

a. Reducing Tees are required with the 3/4, 1, 1 1/2, and 3 inch line sizes. See RTD Sanitary Tees in DIMENSIONS-NOMINAL section.

Industrial RTDs - Inch Sizes(9)

Size (in)	Value	Material	Part No.
1/2 and 1	100 Ω	Nickel Alloy (a)	BS807WP
		316 ss	BS807WR
		C-20Cb3	BS807WT
	1000 Ω	Nickel Alloy(a)	BS807WQ
		316 ss	BS807WS
		C-20Cb3	BS807WU
1 1/2 and 2	100 Ω	Nickel Alloy(a)	BS807VH
		316 ss	BS807VX
		C-20Cb3	BS807WF
	1000 Ω	Nickel Alloy(a)	BS807VJ
		316 ss	BS807VY
		C-20Cb3	BS807WG
3 and 4	100 Ω	Nickel Alloy(a)	BS807VM
		316 ss	BS807WB
		C-20Cb3	BS807WK
	1000 Ω	Nickel Alloy(a)	BS807VN
		316 ss	BS807WC
		C-20Cb3	BS807WL

a. Equivalent to Hastelloy® C.

Sheath Length, Protrusion into Tee, and Tri-Clamp Type End Connection Size (Inch Sizes)

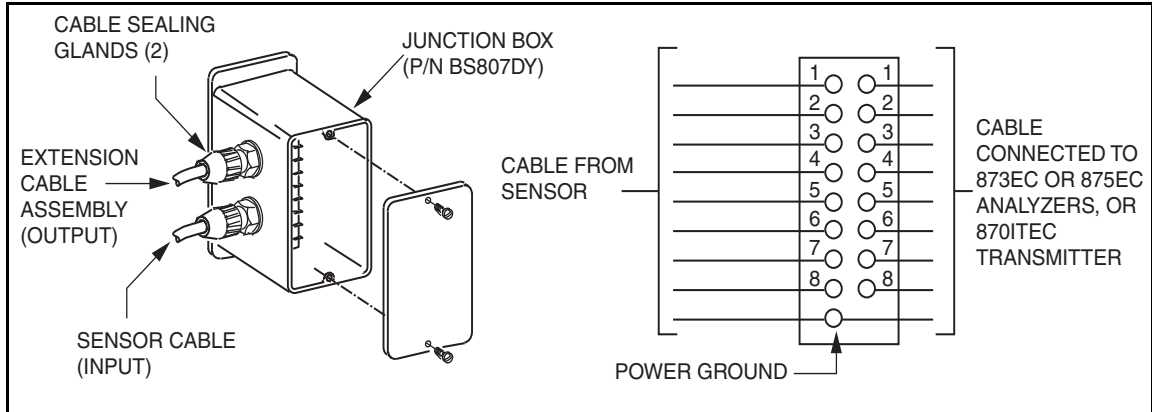
Line Size	Sanitary RTDs, 100 or 1000 Ω			Industrial RTDs, 100 or 1000 Ω	
	Sheath Length	Protrusion	Tri-Clamp	Sheath Length	Protrusion (a)
1/2 in	2.5 in	1/8 in	3/4 in	3.38 in	0.56 in
3/4 in	2.5 in	1/8 in	3/4 in	–	–
1 in	2.5 in	1/8 in	1 1/2 in	3.38 in	0.56 in
1 1/2 in	2.5 in	1/8 in	1 1/2 in	3.88 in	0.56 in
2 in	3.25 in	1/4 in	2 in	3.88 in	0.19 in
3 in	3.25 in	3/16 in	3 in	5.44 in	0.65 in
4 in	4.5 in	Dead Center	4 in	5.44 in	0.25 in

a. Nominal dimension based on use of ANSI Class 150 flange; and a flange thickness of 0.1 inch beyond the I.D. of a Schedule 40 pipe.

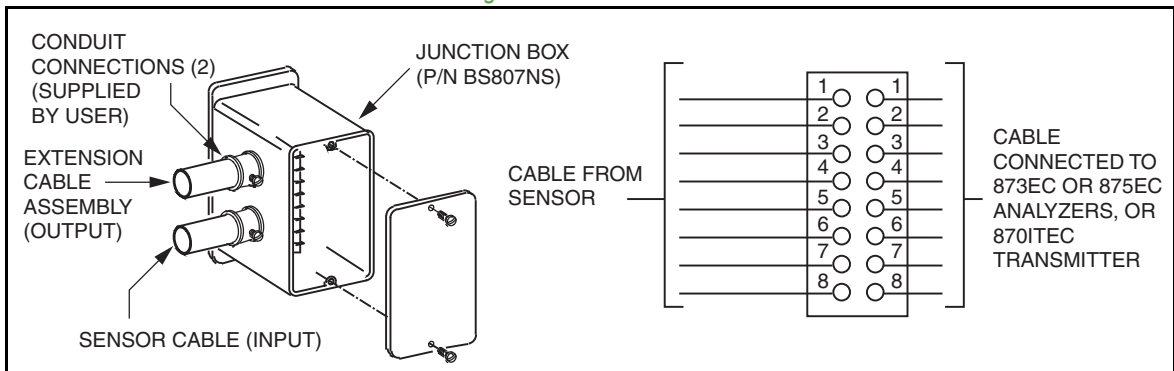
8. For Sanitary 871FT, the RTD sheath material is 316 ss.

9. For Industrial 871FT, when the RTD is ordered as part of the 871FT Model Code, the wetted material is the same as the flange material selected.

*Junction Box Wiring with 9-Conductor Teflon-Jacketed Cable*

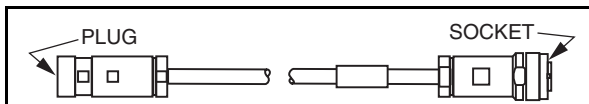


*Junction Box Wiring with 8-Conductor PVC-Jacketed Cable*



**RTD Patch Cable**

This Cable is used with RTD assemblies. Specify Part Number BS809UN for the standard 10 ft (3 m) length, and Part Number BS809UP for special lengths. Contact Global Customer Support (see back page) for special length restrictions.



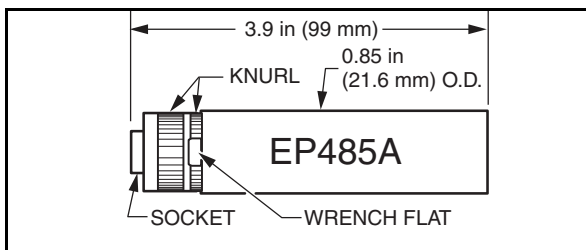
**Foxboro Calibration Cable**

Calibration Cable (P/N BS807BD) is required for any in-line calibration of the 871FT Sensors. For high precision, low end conductivity ranges, a specific calibration plug is available. See calibration plug paragraph that follows.



## Calibration Plug

For high precision, low end and/or full scale conductivity ranges, an EP485A or EP485N calibration plug is offered in lieu of the calibration cable described in the previous paragraph. The EP485A is offered with sanitary or industrial sensors, while the EP485N is offered with industrial sensors only. The plug is specific to an 871FT Sensor Model, and the desired conductivity value. It connects to the calibration port of the sensor, and calibration is in accordance with Instruction MI 611-220 or Instruction MI 611-202. Specify Calibration Plug Model EP485A or EP485N, sanitary or industrial, line size, conductivity range, and RTD value. Contact Global Customer Support (see back page) with your requirements prior to ordering. A typical calibration plug is shown below.



## Cable Assemblies and Extension Cables

The Extension Cable Assembly, Foxboro P/N BS807PA, is a Teflon jacketed multiconductor (8 conductors plus ground) cable that provides intrasystem connections up to 100 ft (30 m). Numbered leads terminated in spade terminals at both ends allow the extension cable to be connected to the terminals in the junction box, and at the opposite end permit connection to 870ITEC Transmitters, or 875EC Analyzers.

The Extension Cable Assembly, Foxboro P/N BS807PB, is a Teflon jacketed multiconductor (8 conductors plus ground) cable that provides intrasystem connections up to 100 ft (30 m).

Numbered leads terminated in spade terminals at one end allow the extension cable to be connected to the terminals in the junction box, while stripped and tinned leads at the opposite end permit connection to 873EC and 873AEC Analyzers.

The Extension Cable Assembly, Foxboro P/N BS807PC, is a PVC jacketed multiconductor (8 conductors, no ground) cable that provides intrasystem connections up to 100 ft (30 m). Numbered leads terminated in spade terminals at both ends allow the extension cable to be connected to the terminals in the junction box, and at the opposite end permit connection to 870ITEC Transmitters, or 875EC Analyzers.

The Extension Cable Assembly, Foxboro P/N BS807PD, is a PVC jacketed multiconductor (8 conductors, no ground) cable that provides intrasystem connections up to 100 ft (30 m).

Numbered leads terminated in spade terminals at one end allow the extension cable to be connected to the terminals in the junction box, while stripped and tinned leads at the opposite end permit connection to 873EC and 873AEC Analyzers.

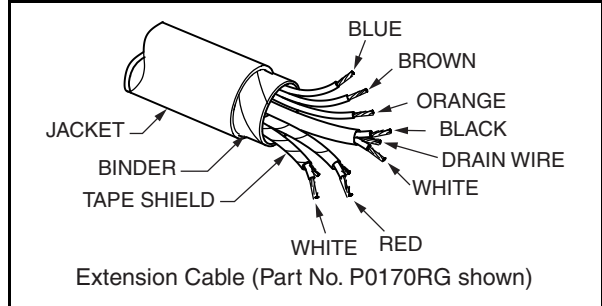
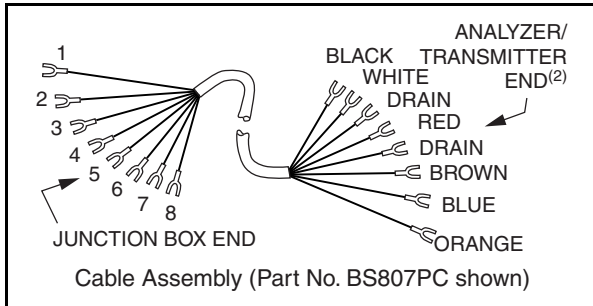
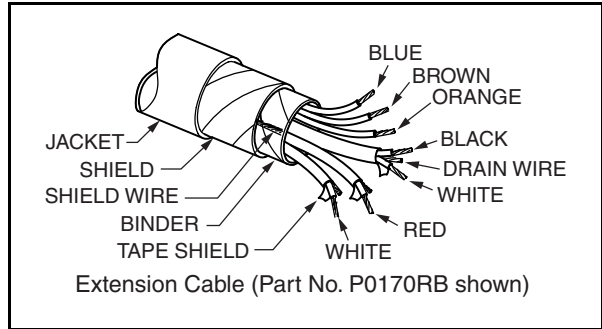
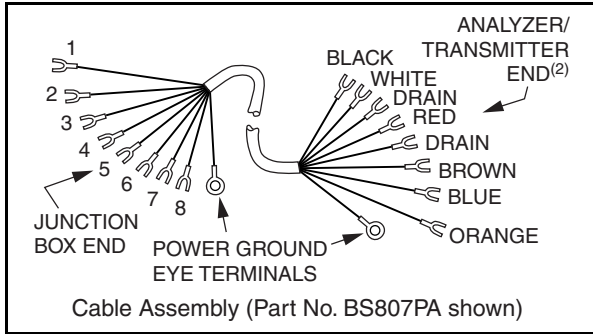
The extension cable, Foxboro P/N P0170RB, is a Teflon jacketed multiconductor (8 conductors plus ground) cable that provides intrasystem connections. It is available in lengths up to 1000 ft (300 m)<sup>(10)</sup>. No wire lead terminations are provided. For use with either 870ITEC Transmitter, or 873EC, 873AEC, or 875EC Analyzers (must be selected for use with NEMA 1 873 Analyzers having a plastic enclosure).

The extension cable, Foxboro P/N P0170RG, is a PVC jacketed multiconductor (8 conductors, no ground) cable that provides intrasystem connections. Available in lengths up to 1000 ft (300 m). No wire lead terminations are provided. For use with either 870ITEC Transmitter, or 873EC, 873AEC, or 875EC Analyzers.

Refer to next page for typical extension cable assemblies and extension cables.

10. Although the extension cable is available in lengths up to 1000 ft, the maximum recommended separation between sensor and Analyzer or Transmitter is 100 ft (30 m)





MODEL CODE: SANITARY FLOW-THROUGH CONDUCTIVITY SENSOR

Description	Model
Sanitary Flow-Through Conductivity Sensor; for use with 875EC, 873EC, and 873AEC Analyzers; and 876EC and 870ITEC Transmitters	871FT
<b>Sensor Type</b>	
Sanitary, High-Range Conductivity (3-A Compliant)	-1
Sanitary, Low-Range Conductivity (3-A Compliant)	-2
<b>Nominal Line Size</b>	
1/2 in (a)	C
3/4 in (a) (b)	D
1 in (a)	E
1 1/2 in (a)	F
2 in	G
3 in	H
4 in	J
<b>End Connection Material</b>	
None (One-Piece Insulator)	1
<b>Insulator (Wetted Bore Piece) Material</b>	
Virgin PolyEtherEtherKetone (VPEEK); FDA/3-A Compliant Material	A
PolyChloroTriFluoroEthylene (PCTFE) (c)	C
<b>End Connection Form</b>	
Tri-Clamp (d) (e)	1
<b>RTD</b>	
None	C
1000 Ohm RTD (for use with 870ITEC Transmitter or 875EC Analyzer)	R
100 Ohm RTD	T
<b>Options</b>	
Cable Length per Sales Order; 100 ft (30 m) recommended maximum	-3
Cable with Lugless Terminations; Used with 876EC and 873EC or 873AEC Analyzers because they require lugless terminations.	-4
Shielded Teflon Cable;	-9
▶ May be used with all Analyzers/Transmitters;	
▶ 873EC/873AEC NEMA 1 Analyzers (plastic enclosures) require Teflon cable	
Calibration Cable; for in-line calibration	-C
Calibration Plug Model EP485A recommended. Contact Global Customer Support.	
Detailed Instruction Manual	-M
EHEDG Certification (f)	-E
EXAMPLE: 871FT-1G1A1R-3C	

- 1/2-inch and 3/4-inch line sizes use 3/4-inch Tri-Clamp type end connections. 1- and 1 1/2-inch line sizes use 1 1/2 inch Tri-Clamp type end connections.
- Available only with Insulator Material Code A (VPEEK).
- For 4-inch line sizes, contact Global Customer Support (see back page).
- See "Pressure-Temperature Ratings" section for pressure derating with increasing temperature.
- Sanitary sensors use gaskets which are supplied by user. User supplied EHEDG approved seals, i.e. SS/Kalrez, are required to maintain EHEDG certification for use with Tri-Clamp Connector.
- Only available on 2 inch Sanitary line size with End Connection 1 (None), Insulator Material A (Virgin PEEK), and End Connection Form 1 (Tri-Clamp).

MODEL CODE: INDUSTRIAL FLOW-THROUGH CONDUCTIVITY SENSOR

Description	Model
Industrial Flow-Through Conductivity Sensor, for use with 875EC, 873EC, and 873AEC Analyzers; and 876EC and 870ITEC Transmitters	871FT
<b>Sensor Type</b>	
Industrial, High-Range Conductivity	-3
Industrial, Low-Range Conductivity	-4
<b>Nominal Line Size</b>	
1/2 in (a) (b)	C
1 in (a)	E
1 1/2 in	F
2 in	G
3 in (c)	H
4 in (c)	J
<b>End Connection Material</b>	
Nickel Alloy (b) (d) (e)	2
316 Stainless Steel (316 ss)	3
Carpenter 20-CB3 (C-20Cb3) (e) (f)	4
<b>Insulator (Wetted Bore Piece) Material</b>	
PolyVinylideneDiFluoride (PVDF) (b)	B
PolyChloroTriFluoroEthylene (PCTFE) (g)	C
Glass-Filled PEEK (GFPEEK)	D
<b>End Connection Form (h)</b>	
Pipe Adapter, NPT (f)	2
Flange, ANSI Class 150	3
Flange, ANSI Class 300 (b) (i)	4
<b>RTD</b>	
None	C
1000 Ohm RTD (for use with 876EC and 870ITEC Transmitter or 875EC Analyzer only)	R
100 Ohm RTD	T
<b>Options</b>	
Cable Length per Sales Order 100 ft (30 m) maximum	-3
Cable with Lugless Terminations; Used with 873EC or 873AEC Analyzers because they require lugless terminations.	-4
Shielded Teflon Cable;	-9
▶ May be used with all Analyzers/Transmitters;	
▶ 873EC/873AEC NEMA 1 Analyzers (plastic enclosures) require Teflon cable	
Viton (g)	-V
Perfluoroelastomer (Chemraz)	-P
Calibration Cable; for in-line calibration Calibration Plug Models EP485A and EP485N recommended. Contact Global Customer Support.	-C
B7 Spacer Tubes and Hex Bolts (j) (k)	-B
Nickel Alloy (d) Spacer Tubes and Hex Bolts (j)	-H
Detailed Instruction Manual	-M
EXAMPLE: 871FT-3F3B3R-3V	

- a. 1/2- and 1-inch line sizes use 1-inch flanges, as applicable.
- b. A specific combination of Nominal Line Size, End Connection Material, Insulator Material, and End Connection Form is offered as shown in Table 12 below. Contact Global Customer Support (see back page) for further information.
- c. 3- and 4-inch line sizes not available with NPT pipe adapter mounting.

- d. Equivalent to Hastelloy® C-276.
- e. For 300 lb flange versions, contact Global Customer Support. Also see footnote (b).
- f. Industrial sleeve material is Alloy 20, ASTM A-351, Grade CN-7M.
- g. Specified for high concentration sulfuric acid or oleum applications. Select Carpenter 20 end connection material, and also select either the Viton or Chemraz O-ring options.
- h. See “Pressure-Temperature Ratings” section for pressure derating with increasing temperature.
- i. ANSI Class 300 Flanges are available with 316 ss material and having GFPEEK insulators only, except for the specific combination noted in footnote (b).
- j. Only available in Nominal Line Size 1/2 inch and 1 inch with End Connection Form 4.
- k. Consult Global Customer Support for material compatibility.

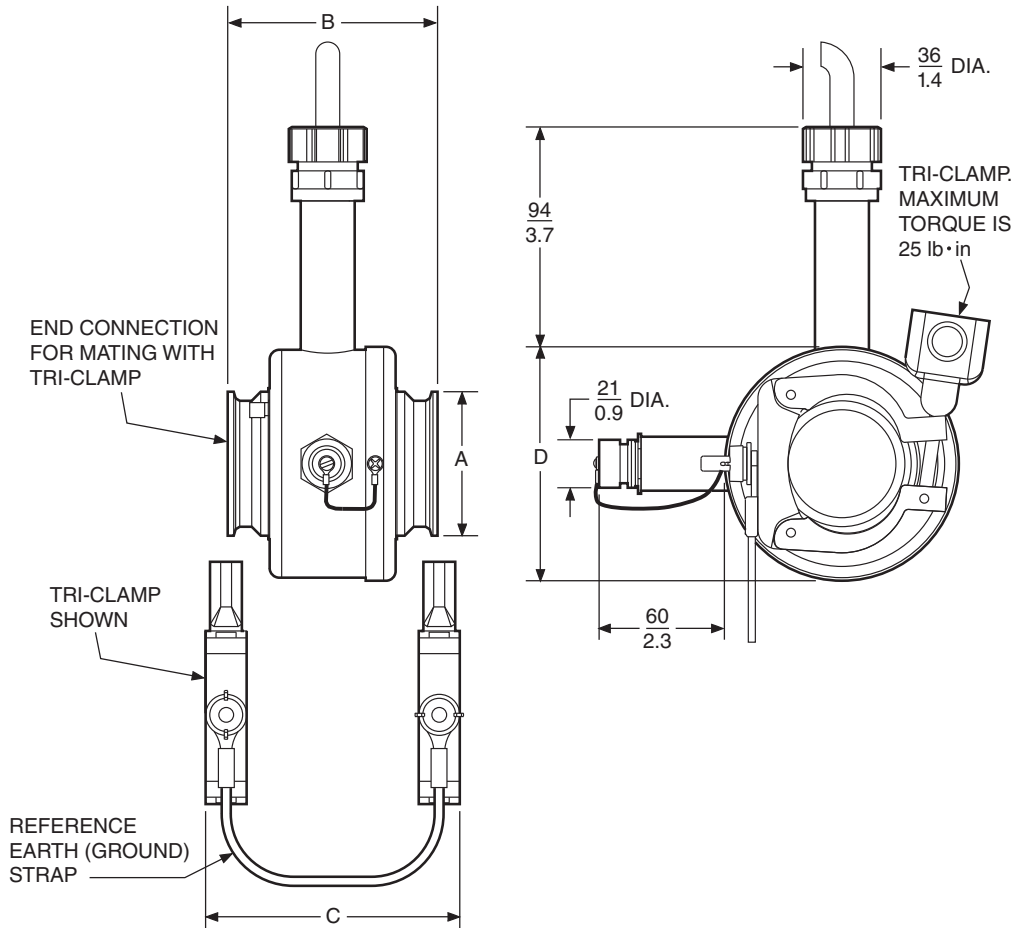
**Table 12. Nominal Line Size, End Connection Material, Insulator Material, and End Connection Form**

Nominal Line Size	End Connection Material	Insulator Material	End Connection Form
1/2 in, Code C	Nickel Alloy (a), Code 2	PVDF, Code B	ANSI Cl. 300, Code 4

- a. Equivalent to Hastelloy® C-276.

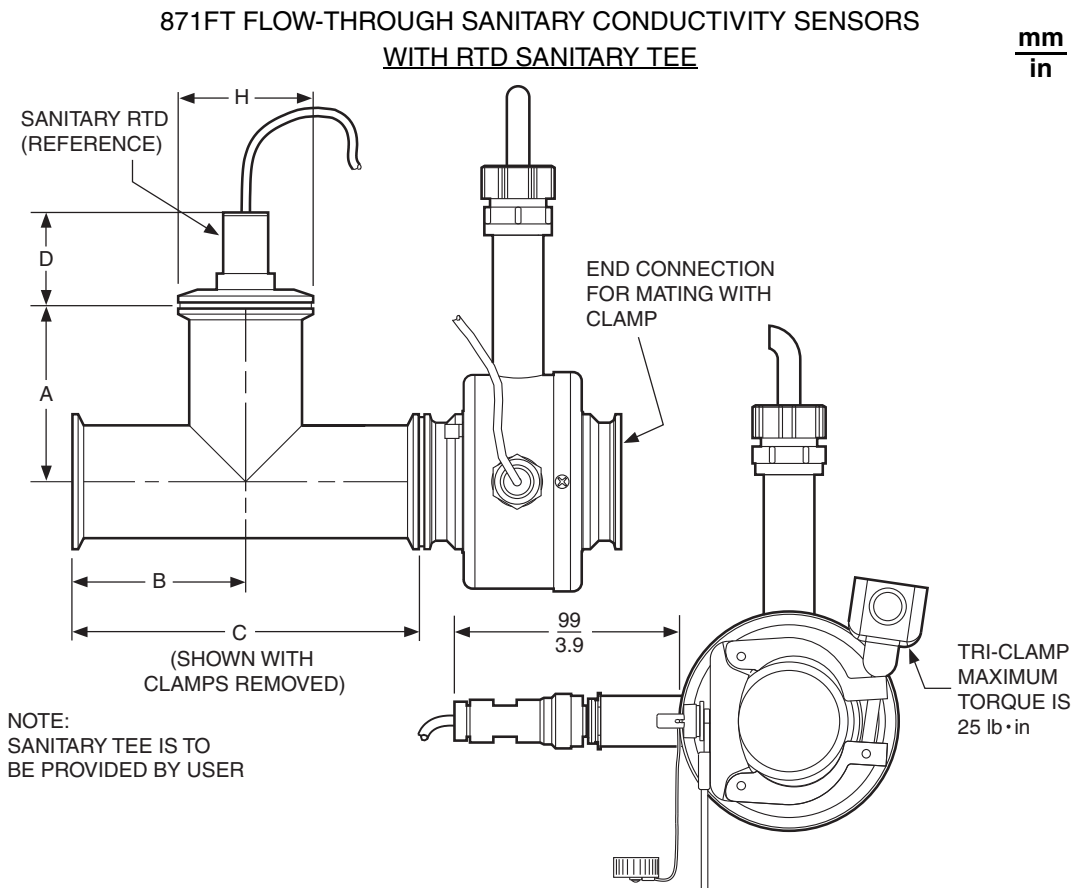
**DIMENSIONS-NOMINAL**  
871FT FLOW-THROUGH SANITARY CONDUCTIVITY SENSORS  
WITH SANITARY END CONNECTIONS

**mm**  
**in**



**Inch Size Sanitary Sensors with Tri-Clamp Type End Connections**

Nominal Line Size	Clamp Size	Nominal Dimensions - Inches			
		A	B	C	D
1/2 in	3/4 in	1.0 in	3.0	3.8	3.2
3/4 in	3/4 in	1.0 in	3.0	3.8	3.2
1 in	1 1/2 in	2.0 in	3.6	4.4	4.1
1 1/2 in	1 1/2 in	2.0 in	3.6	4.4	4.1
2 in	2 in	2.5 in	5.0	5.8	4.1
3 in	3 in	3.6 in	5.0	5.8	6.4
4 in	4 in	4.8 in	5.0	5.8	6.4



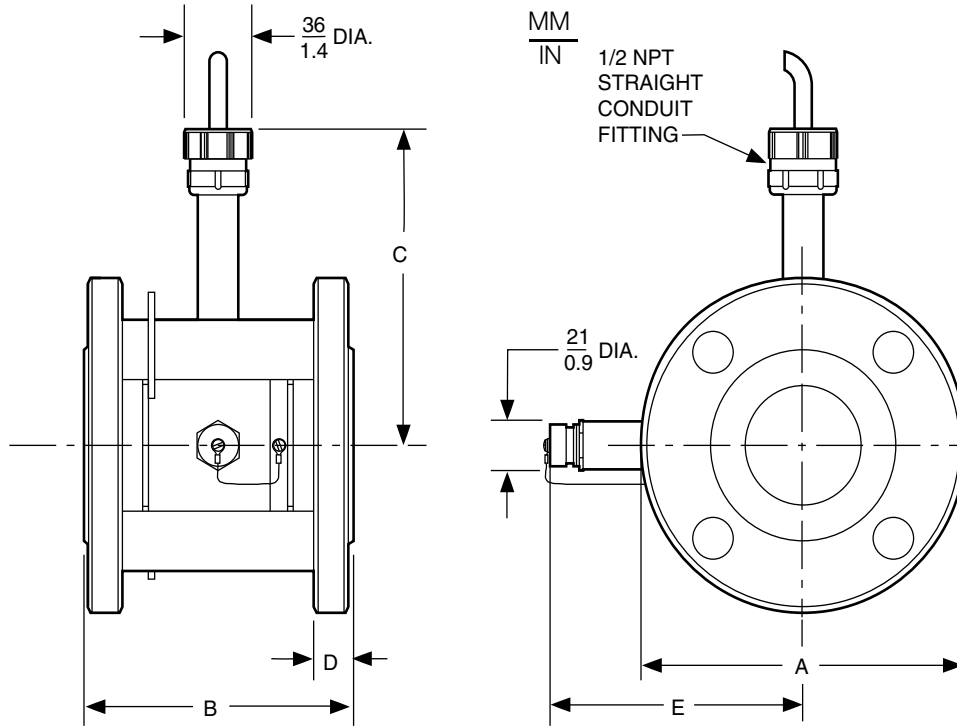
**Inch Size Sanitary Sensors with RTD and Tee**

Nominal Line Size	Clamp Size	Nominal Dimensions - Inches				
		A	B	C	D	H (Dia)
1/2 in	3/4 in	2.6	2.6	5.2	1.7	0.98
3/4 in (a)	3/4 in	2.6	2.6	5.2	1.7	0.98
1 in (b)	1 1/2 in	2.6	2.6	5.2	1.7	0.98
1 1/2 in (c)	1 1/2 in	2.9	2.9	5.8	1.7	0.98
2 in	2 in	3.5	3.5	7.0	1.8	2.52
3 in (d)	3 in	3.1	3.1	6.2	1.8	2.52
4 in	4 in	4.5	4.5	9.0	1.8	4.68

- a. Uses reducing tee, 3/4 to 1/2 in.
- b. Uses reducing tee, 1 in to 1/2 in.
- c. Uses reducing tee, 1 1/2 in to 1/2 in.
- d. Uses reducing tee, 3 in to 2 in.

871FT FLOW-THROUGH INDUSTRIAL CONDUCTIVITY SENSORS  
WITH FLANGED END CONNECTIONS

$\frac{\text{mm}}{\text{in}}$



Dimensions using ANSI Class 150 Flanges (a) (b)

Nominal Line Size	Nominal Dimensions - Inches					Bolt Holes
	A	B	C	D	E	
1/2 in	4.25	4.6	4.3	0.56	3.9	4
3/4 in	N/A	N/A	N/A	N/A	N/A	N/A
1 in	4.25	4.6	4.3	0.56	3.9	4
1 1/2 in	5.0	4.9	4.3	0.69	3.9	4
2 in	6.0	5.0	4.8	0.75	4.3	8
3 in	7.5	5.9	5.4	0.94	4.9	8
4 in	9.0	5.9	6.0	0.94	5.4	8

- a. N/A in table means Not Applicable.
- b. ANSI Class 150 Flanges available in 316 ss, nickel alloy, or Carpenter 20-Cb3.

NOTE

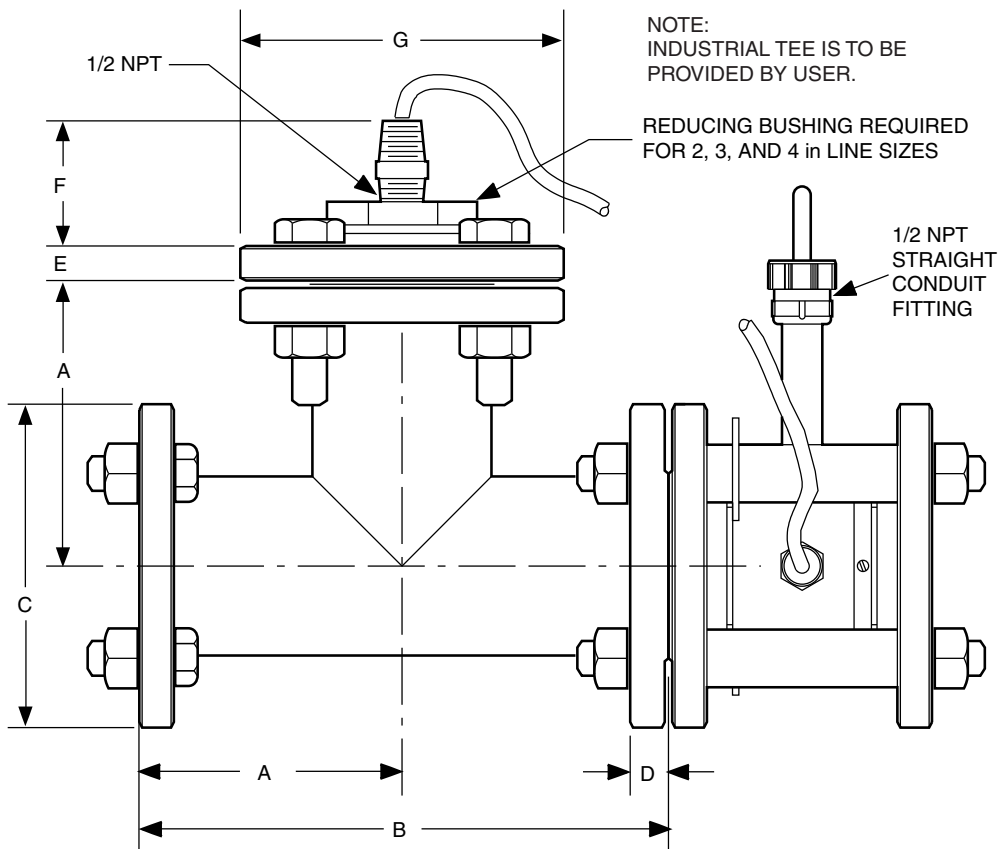
See Next Page for Dimensions with ANSI Class 300 Flanges.

Dimensions using ANSI Class 300 Flanges (a)

Nominal Line Size	Nominal Dimensions - Inches					Bolt Holes
	A	B	C	D	E	
1/2 in (a)	4.9	4.9	4.3	0.69	3.9	4
3/4 in	N/A	N/A	N/A	N/A	N/A	N/A
1 in	4.9	4.9	4.3	0.69	3.9	4
1 1/2 in	6.13	5.1	4.3	0.81	3.9	4
2 in	6.50	5.3	4.8	0.88	4.3	8
3 in	8.25	6.2	5.4	1.12	4.9	8
4 in	10.0	7.5	6.0	1.25	5.4	8

a. ANSI Class 300 Flanges available in 316 ss material and PEEK insulator only. However, a specific configuration is offered with a nickel alloy flange and PVDF insulator for the nominal 1/2 inch line size only.

871FT FLOW-THROUGH INDUSTRIAL CONDUCTIVITY SENSORS  
WITH BOTH ANSI CLASS 150 AND ANSI CLASS 300 FLANGED END CONNECTIONS  
AND WITH RTD INDUSTRIAL TEE  $\frac{\text{mm}}{\text{in}}$





**Dimensions Using ANSI Class 150 Flanges**

Nominal Line Size	Nominal Dimensions - Inches							Number of Bolt Holes
	A	B	C (Dia)	D	E	F	G (Dia)	
1/2 in	3.5	7.0	4.25	0.56	0.56	2.2	4.25	4
1 in	3.5	7.0	4.25	0.56	0.56	2.2	4.25	4
1 1/2 in	4.0	8.0	5.0	0.69	0.69	2.2	5.0	4
2 in	4.5	9.0	6.0	0.75	0.75	2.3	6.0	4
3 in	5.5	11.0	7.5	0.94	0.94	2.5	7.5	4
4 in	6.5	13.0	9.0	0.94	0.94	2.6	9.0	8

**NOTE**

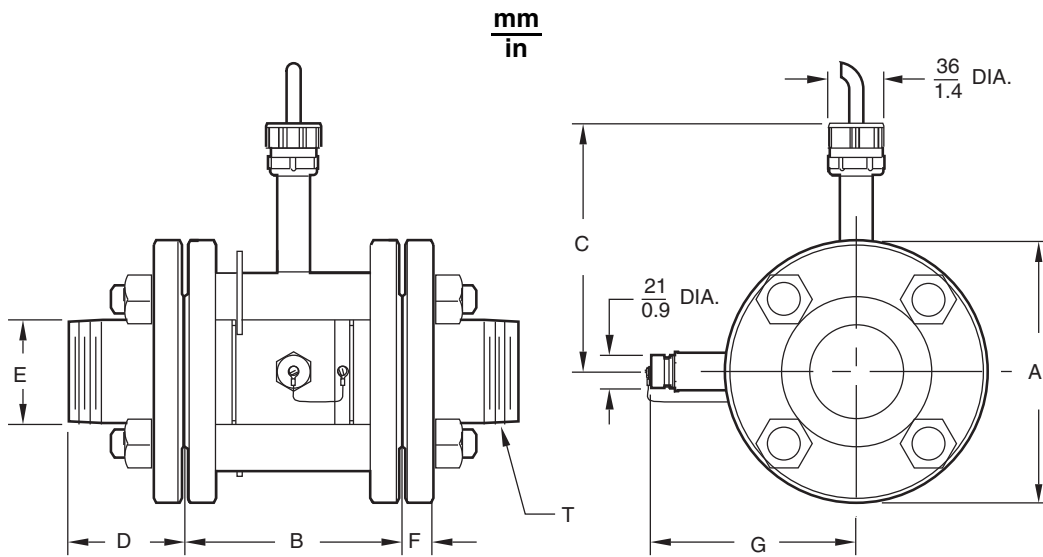
See Next Page for Dimensions with ANSI Class 300 Flanges.

**Dimensions Using ANSI Class 300 Flanges (a)**

Nominal Line Size	Nominal Dimensions - Inches							Number of Bolt Holes
	A	B	C (Dia)	D	E	F	G (Dia)	
1/2 in (a)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1 in	4.0	8.0	4.9	0.72	0.72	1.5	4.9	4
1 1/2 in	4.5	9.0	6.1	0.81	0.81	1.5	6.1	4
2 in	5.0	5.0	6.5	0.88	0.88	2.3	6.5	8
3 in	6.0	12	8.3	1.1	1.1	2.5	8.3	8
4 in	7.0	14	10	1.3	1.3	2.6	10	8

- a. ANSI Class 300 Flanges available in 316 ss material and PEEK insulator only. However, a specific configuration is offered with a nickel alloy flange and PVDF insulator for the nominal 1/2 inch line size only.

871FT FLOW-THROUGH INDUSTRIAL CONDUCTIVITY SENSORS  
WITH INDUSTRIAL-RATED NPT THREADED END CONNECTIONS  
USED WITH ANSI CLASS 150 FLANGES ONLY



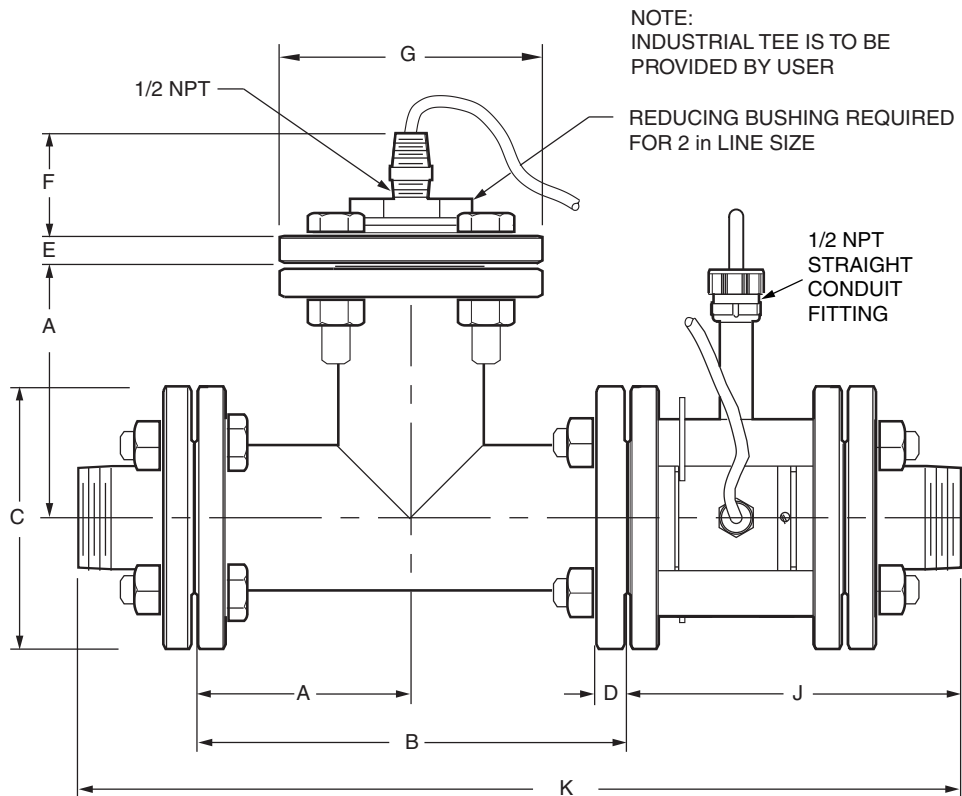
**Inch Size Sensor with NPT Threaded End Connection - Class 150 Flanges Only (a)**

Nominal Line Size (b)	Nominal Dimensions - Inches								Number of Bolt Holes (c)
	A (Dia)	B	C	D	E (Dia)	F	G	T (b)	
1/2 in	4.25	4.9	4.3	2.5	0.84	0.56	3.9	1/2 NPT	4
1 in	4.25	4.9	4.3	2.5	1.3	0.56	3.9	1 NPT	4
1 1/2 in	5.0	4.9	4.3	2.7	1.9	0.69	3.9	1 1/2 NPT	4
2 in	6.0	5.2	4.8	3.0	2.4	0.75	4.3	2 NPT	4

- a. NPT Threaded End Connections not applicable to ANSI Class 300 Flanges.
- b. Not applicable to 3/4 in, 3 in, or 4 in Line Sizes.
- c. Number of Bolt Holes in ANSI Class 150 Flange.

871FT FLOW-THROUGH INDUSTRIAL CONDUCTIVITY SENSORS  
WITH INDUSTRIAL-RATED NPT THREADED END CONNECTIONS  
AND WITH RTD INDUSTRIAL TEE  
USED WITH ANSI CLASS 150 FLANGES ONLY

$\frac{\text{mm}}{\text{in}}$



**Inch Size Sensors with Threaded Ends and RTD Tee - Class 150 Flanges Only (a)**

Nominal Line Size (b)	Nominal Dimensions - Inches									Number of Bolt Holes
	A	B	C (Dia)	D	E	F	G (Dia)	J(b)	K (c)	
1/2 in	3.5	7.0	4.25	0.56	0.56	2.2	4.25	7.4	17.0	4
1 in	3.5	7.0	4.25	0.56	0.56	2.2	4.25	7.4	17.0	4
1 1/2 in	4.0	8.0	5.0	0.67	0.69	2.2	5.0	7.7	18.5	4
2 in	4.5	9.0	6.0	0.75	0.75	2.3	6.0	8.3	20.4	4

- a. NPT Threaded End Connections not applicable to ANSI Class 300 Flanges.
- b. Not applicable to 3/4 in, 3 in, or 4 in Line Sizes.
- c. Dimensions J and K vary with user-supplied gasket thickness.

### REFERENCE DOCUMENTS

Document	Description
MI 611-220	Electrodeless Conductivity System Calibration Examples
PSS 6-1C1 E	873EC Electrochemical Analyzer
PSS 6-1C1 F	873AEC Electrochemical Analyzer
PSS 6-2N1 C	875EC Intelligent Electrochemical Analyzer
PSS 6-3N2 A	870ITEC Intelligent Electrochemical Transmitter
Bulletin EP485A	Calibration Plugs for use with 871FT Sanitary or Industrial Sensors
Bulletin EP485N	Calibration Plugs for use with 871FT Industrial Sensors Only

### ORDERING INSTRUCTIONS

1. Model Number (see Model Code)
2. Electrical Safety Design Code  
(from Electrical Safety Specifications section)
3. Calibration Cable or Calibration Plug (Recommended)
4. Other Accessories
5. Tag Data

### OTHER FOXBORO PRODUCTS

The Foxboro product lines offer a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, temperature, positioning, controlling, and recording. For a list of these offerings, visit our web site at:

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