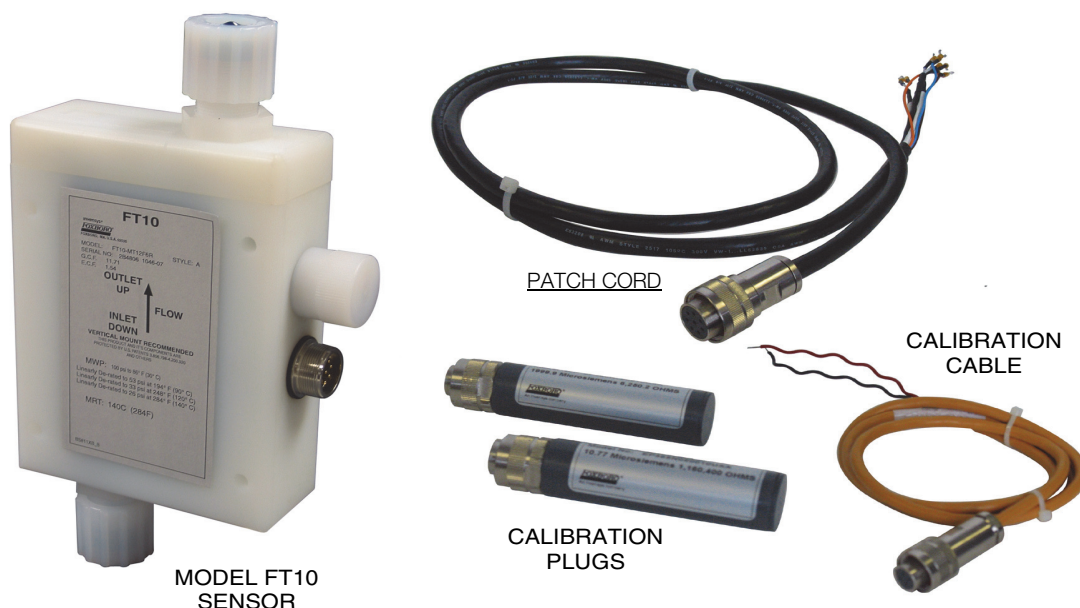


Model FT10
Noninvasive, Nonmetallic, Electrodeless Flow-Through Conductivity Sensor



The Foxboro® brand Model FT10 is an electrodeless conductivity flow-through sensor used in low liquid volumes, small line size, high purity, and/or aggressive chemical concentration measurement applications. It is a nonmetallic, noninvasive sensor with excellent performance characteristics.

FEATURES

- ▶ Compatible with Foxboro Models 875EC Intelligent Electrochemical Analyzers and 870ITEC Intelligent Electrochemical Transmitters.
- ▶ Unique patented sensor/toroid design.
- ▶ Noninvasive tubular design permits ease of installation, and removal from process.
- ▶ Tubular teflon design significantly reduces or eliminates coatings or foulings, sidewall effects, and exposure of personnel to hazardous chemicals.
- ▶ Enclosure meets IEC IP65 and NEMA Type 4X.
- ▶ Nonmetallic construction and end connections provide a flowtube which is electrically nonconductive.
- ▶ In-line calibration negates safety issues.
- ▶ Available in 1/2, 3/4, and 1 inch line sizes with a choice of end connection types.
- ▶ Optional surface mounting kit.
- ▶ Optional pipe mounting kit for use with nominal DN50 or 2 inch pipe.
- ▶ Numerous accessories offered to support product offering.

- ▶ CE marked; complies with applicable PED and EMC European Directives.
- ▶ Designed for use in Division 1 and Division 2 hazardous area installations.

PRINCIPLE OF OPERATION

The Model FT10 Flow-Through 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 conductive process fluid as it passes through the sensor assembly. The voltage created, which varies with process fluid conductivity, is detected by secondary toroid(s)⁽¹⁾ and converted to a conductivity measurement.

NONINVASIVE FLOW-THROUGH DESIGN

The FT10 Sensors provide a totally noninvasive measurement of conductivity, and significantly reduce the influence of coatings and deposits on the measurement. For example:

- ▶ 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 these problems.
- ▶ The noninvasive modular design permits ease of installation and removal from the process lines.
- ▶ For critical high purity and/or low concentration by weight processes in industries that involve aqueous based solutions, the noninvasive flow-through measurement maximizes measurement and control of these typically expensive binary solutions.
- ▶ Typical industries include:
 - Semiconductor
 - Specialty chemical
 - Electronics
 - Liquid Crystal Display (LCD)
 - Pharmaceutical (contact Global Customer Support)
 - Biotechnology (contact Global Customer Support)

NONMETALLIC DESIGN

The enclosure is made from ultra high molecular weight polyethylene (UHMWPE), and the process wetted material with fused end connection ports is PFA (for example, virgin teflon).

This nonmetallic construction ensures a flowtube that is electrically nonconductive. Because of the PFA flowtube, the FT10 may lend itself to specific applications within the sanitary industry.

TEMPERATURE COMPENSATION

If temperature compensation is required, an internal RTD provides a temperature measurement internal to the flowtube but is isolated from the process. Either a 3-wire, 1000 ohm platinum RTD, or a 3-wire, 100 ohm platinum RTD, for use with the Foxboro 870ITEC Intelligent Transmitter or Foxboro 875EC Intelligent Analyzer may be selected. The RTD wires terminate in the signal connector on the sensor housing, or the integral standard or high temperature sensor cable. Table 1 provides RTD resistance vs. temperature values.

EASE OF INSTALLATION

The sensor essentially replaces a small section of process tubing and is attached to the process using the end connections selected. It can also be provided with plain ends by using adapter tube accessories; see Table 7 and Figure 2. For specific user-required end connections, contact Global Customer Support. The sensor is light weight and small size, naturally varying with the line size selected (see inside pages). Normal precautions should be taken relative to pipeline alignment and support. Cantilever or bending loads on the sensor should be eliminated.

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

CALIBRATION

The FT10 Sensor, when connected to a Foxboro 875EC Intelligent Analyzer or a Foxboro 870ITEC Intelligent Transmitter, can be calibrated as a system. An integral calibration connector on the surface of the sensor accommodates a calibration cable that connects to a decade box provided by the user. In lieu of a calibration cable, a Foxboro Model EP485F calibration plug⁽²⁾ can be used for high precision calibration points.

SENSOR MOUNTING

To ensure optimum performance, it is essential that the tube be completely full during operation. This is best accomplished by mounting the sensor vertically with the process flow upward. Sloping positions with the flow upward is also acceptable. Even horizontal mounting may be used (although not recommended) provided the sensor is initially purged as listed in Table 3. Also see Table 4.

The Model FT10 is normally mounted to a surface, and an optional surface mounting kit is provided for that purpose. For users who prefer mounting to a nominal DN50 or 2-inch horizontal or vertical pipe, an optional pipe mounting kit is offered. See Dimensions-Nominal section.

SYSTEM CABLING

Interconnection between the sensor and transmitter or analyzer is determined by a Model Code selection, as follows (also refer to Figure 1):

- ▶ Termination selection 1 provides a standard temperature 10 ft (3 m) cable integral to the sensor and with terminals at the instrument end.
- ▶ Termination selection 2 provides a high temperature 10 ft (3 m) cable integral to the sensor and with terminals at the instrument end.
- ▶ Termination selection 6 provides an integral MIL Standard Tajimi connector at the sensor end. A patch cord with a mating Tajimi connector must be used with this selection.

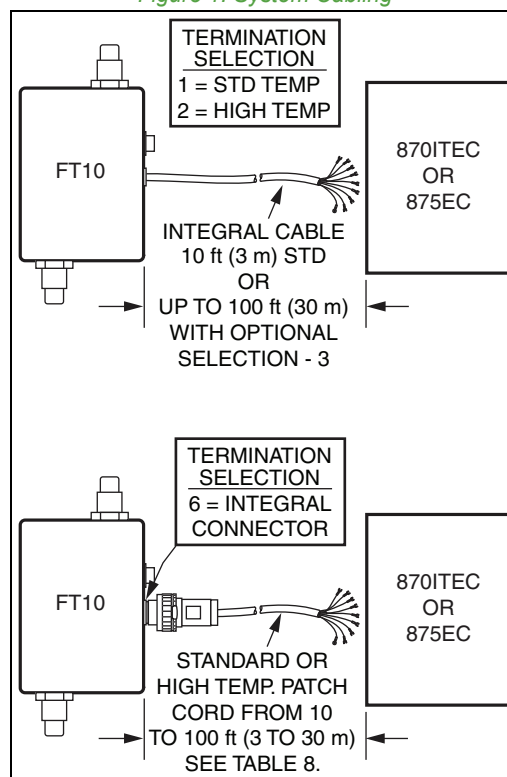
The standard temperature cable has a PVC jacket and may be used at ambient temperatures up to

105 °C (221 °F). The high temperature cable is teflon-jacketed with an integral RFI/EMI shield and may be used at ambient temperatures up to 200 °C (392 °F).

If lengths greater than 10 ft (3 m) are required with the integral cables, optional selection -3 allows lengths up to 100 ft (30 m) to be specified.

Similarly, patch cords can be either standard or high temperature with lengths from 10 to 100 ft (3 to 30 m). See Table 8.

Figure 1. System Cabling



2. This product is protected by U.S. Patent No. 7106067.

MODEL CODE

<u>Description</u>	<u>Model</u>
Noninvasive, Nonmetallic, Electrodeless Flow-Through Conductivity Sensor (a)	FT10
<u>Electrodeless Conductivity</u>	
All Teflon Flow-Through Sensor	-MT
<u>Tube/Line Size</u>	
1/2 inch	08
3/4 inch	12
1 inch	16
<u>End Connection Form (a) (b)</u>	
Flare Tube Fitting	F
Nippon Super Pillar 300 Fitting	N
<u>Termination</u>	
Integral Standard-Temperature PVC-Jacketed Sensor Cable (c)	1
Integral High-Temperature Shielded Teflon-Jacketed Sensor Cable	2
Integral Connector (d)	6
<u>RTD (Resistance Temperature Detector)</u>	
100 ohm RTD, 3 wire	T
1000 ohm RTD, 3 wire	R
<u>Optional Selections</u>	
Surface Mounting Kit (e)	-1
Pipe Mounting Kit(e)	-2
Cable Length per Sales Order (f)	-3
Specific Sensor Geometric Cell Factor (g)	-4
Examples: FT10-MT12N1R-1; FT10-MT16N6T-24	

- This selection provides the corresponding connection size for the line size selected. For example, selecting Line Size Code 08 (1/2 in line size) and End Connection Form Code N (Nippon Super Pillar 300) results in a 1/2 inch Nippon Super Pillar 300 connector.
- Bare Teflon PFA adapter tubes can be provided for use with the Flare Tube or Nippon Fittings as accessories. The tubes are available in 1/2, 3/4, and 1 inch sizes. See Figure 2 and Table 7.
- Standard length integral cable is 10 ft (3 m). Specify Option -3 for longer integral cables.
- Mating patch cord required with integral connector selection 6. See Table 8.
- Refer to Option Selections and Accessories, and Dimensions-Nominal section for Optional Surface and Pipe Mounting Kits.
- Cable lengths up to 100 ft (30 m) may be specified when Termination Selection 1 or 2 is selected. Not applicable with Termination selection 6 (integral connector), refer to Table 8.
- The specific Sensor Geometric Cell Factor is determined experimentally. Contact Global Customer Support.

OPERATING, TRANSPORTATION, AND STORAGE CONDITIONS

Influence	Reference Operating Conditions	Operative Limits	Transportation and Storage Limits
Ambient Temperature	25 ±3°C (77 ±5°F)	-10 and +65°C (14 and 149°F)	-40 and +85°C (-40 and +185°F)
Process Temperature	25 ±3°C (77 ±5°F)	-5 and +140°C (a)(21 and 284°F)	Not Applicable
Process Pressure	0 psig	0 and 100 psig (b)	Not Applicable
Relative Humidity	50 ±10%	5 and 95% (c)	0 and 100%
Vibration	1 m/s ² (0.1 "g") (from 5 to 200 Hz)	10 m/s ² (1 "g") (from 5 to 500 Hz)	11 m/s ² (1.1 "g") (from 2.5 to 5 Hz) in shipping package
Transportation	Not Applicable	Not Applicable	1065 mm (42 in) drop in shipping package (d)
Mounting Position	Vertical, with Upward Flow	From vertical with upward flow to horizontal (no downward flow) (e)	Not Applicable

- The process temperature varies with line size and end connection type. The process temperature listed is at a derated process pressure. The process temperature is lower at the rated process pressure. Refer to Tables 5 and 6 for pressure/temperature ratings.
- The process pressure varies with line size and end connection type. The process pressure listed is the maximum allowed. Refer to Tables 5 and 6 for pressure/temperature values at derated pressures.
- A relative humidity of 20 to 80% is recommended during normal operation.
- Ten drops of the shipping package are made landing on faces, edges, and corners. After drops, tests are conducted to ensure no degradation in performance.
- Refer to Table 4 for mounting position restrictions.

STANDARD SPECIFICATIONS

Conductivity Measurement⁽³⁾ (with Models 870ITEC and 875EC)

Accuracy

For all tube/line sizes, using a decade box calibration method, the typical accuracy is $\pm 3\%$ of full scale, or better.

Repeatability

$< \pm 2\%$ of full scale

Ambient Temperature Effect

0.03%/°C (0.015%/°F), or 1 μS , whichever is larger

Solution Temperature Measurement⁽³⁾

This measurement is obtained using a 100 or 1000 ohm, 3-wire platinum RTD per DIN 43760, or IEC 751-1983. Refer to Table 1 for RTD resistance vs. temperature values.

Accuracy - Class B

$\pm (0.30 + [0.005][^{\circ}\text{C}])$
(Both Sensor Codes T and R use Class B, 3-wire RTDs)

Time Constant

< 80 s for 90% step response at 2 ft/s linear velocity

Table 1. RTD Resistance vs. Temperature Values

Resistance (Ω) when using a:		Temperature	
100 Ω RTD	1000 Ω RTD	°F	°C
100.00	1000.0	32	0
103.90	1039.0	50	10
107.79	1077.9	68	20
109.73	1097.3	77	25
111.67	1116.7	86	30
115.54	1155.4	104	40
119.40	1194.0	122	50
123.24	1232.4	140	60
127.07	1270.7	158	70
130.89	1308.9	176	80
134.70	1347.0	194	90
138.50	1385.0	212	100
142.28	1422.8	230	110
146.06	1460.6	248	120
149.82	1498.2	266	130
153.57	1535.7	284 (a)	140(a)

a. 284°F (140°C) is the maximum operative limit of the sensor.
Refer to pressure-temperature limits further in this document.

Temperature Coefficient of $C_{f_{geom}}$ ⁽³⁾

$< 0.014\%/^{\circ}\text{C}$ ($< 0.007\%/^{\circ}\text{F}$)

Geometric Cell Factor ($C_{f_{geom}}$)⁽³⁾

Determined individually for each sensor.

NOTE

A nominal geometric cell factor is provided for each sensor size, as shown in Table 2.
A specific individual sensor geometric cell factor can be provided by selecting Option - 4.

Cell Factors - $C_{f_{geom}}$ and $C_{f_{elec}}$

Geometric Cell Factors ($C_{f_{geom}}$) are used during bench calibration to calculate resistance values which correspond to the conductivity of various solutions.

Electrical Cell Factors ($C_{f_{elec}}$) are used for configuration of Model 870ITEC Intelligent Transmitters and Model 875EC Intelligent Analyzers. See Table 2 for Cell Factor values.

Full Scale Conductivity Ranges

Refer to Table 2.

Table 2. Geometric and Electrical Cell Factors Used with Models 870ITEC and 875EC and Full Scale Conductivity Ranges

Tube/ Line Size	Nominal Cell Factors		Full Scale Conductivity Range	
Inches	$C_{f_{geom}}$ cm^{-1}	$C_{f_{elec}}$	Minimum $\mu\text{S}/\text{cm}$	Maximum mS/cm
1/2	38.68	5.00	2000	2000
3/4	11.71	1.54	500	2000
1	8.08	1.21	500	2000

Fouling Effect

While the teflon tubing greatly minimizes the buildup of sedimentary deposits within the flowtube assembly, their presence will change the Cell Factor, and lead to inaccuracy varying with the buildup thickness. This necessitates in-line recalibration, as needed, depending on the magnitude of the fouling condition.

Entrained Air Effect

The presence of entrained air bubbles within the flowtube will lead to errors in measurement proportional to the fluid volume displaced by the bubbles. To minimize (or eliminate) this effect, the preferred sensor mounting position is vertical with an upward flow. Slope mounting with an upward flow, or even horizontal mounting is acceptable provided the process flow is sufficient to maintain a full tube. However, vertical or slope mounting with a downward flow are unacceptable mounting positions. Refer to purging section and Table 3 that follows. Also refer to Table 4.

Table 3. Minimum Recommended Purge Rates for Horizontal Sensor Mounting

Tube/Line Size	Nominal Purge Rate	
	ft/sec	US gpm
1/2 inch	5.35	1.9
3/4 inch	5.35	5.1
1 inch	5.35	10.1

Purging of Air Prior to Startup

To ensure that there is no entrained air in the sensor, purging of the sensor is required, but only if the sensor is mounted in the horizontal position. No purging is necessary for either vertical or slope mounting with an upward flow. As stated previously, vertical or slope mounting with a downward flow are unacceptable mounting positions. Refer to Table 3.

Dielectric Voltage Withstand Capability

Unshielded PVC Jacketed Cable

1000 V rms between any two cable conductors, or between any conductor and any shield.

Shielded Teflon Jacketed Cable

1000 V rms between any two cable conductors, or between any conductor or any inner shield or the overall shield, or between any two shields.

RFI Immunity

With 870ITEC

Output error of <5% of full scale when tested with field strength of 10 V/m (with 80% amplitude modulation) with conduit, from 26 to 1000 MHz.

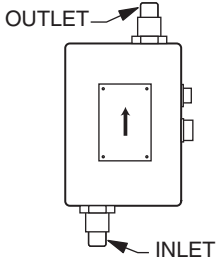
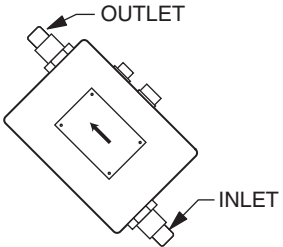
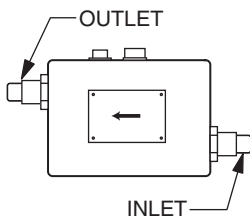
With 875 EC

Output error of <5% of full scale when tested with field strength of 10 V/m (with 80% amplitude modulation) with conduit from 80 to 1000 MHz at 1 kHz (IEC 61000-4-3).

NOTE

The RFI Immunity specifications are applicable to either the unshielded PVC jacket cable in a metal conduit, or to the shielded teflon jacketed cable.

Table 4. Minimum Flow Required with Different Sensor Mounting Positions (a)

Vertical Mounting Upward Flow (b)		Slope Mounting Upward Flow (c)		Horizontal Mounting (d)	
					
Tube/Line Size	Minimum Required Flow Rate	Tube/Line Size	Minimum Required Flow Rate	Tube/Line Size	Minimum Required Flow Rate
1/2 in	None. Only that flow which is sufficient to maintain process flow.	1/2 in	None. Only that flow which is sufficient to maintain process flow.	1/2 in	Once purged, only that flow which is sufficient to maintain process flow.
3/4 in		3/4 in		3/4 in	
1 in		1 in		1 in	

- a. Note that the inlet port must always be positioned below the outlet port.
- b. Vertical mounting with an upward flow is the preferred mounting position. An initial air purge is not required.
NOTE: Vertical mounting with a downward flow is an unacceptable mounting position.
- c. Slope mounting with an upward flow is an acceptable mounting position. An initial air purge is not required.
NOTE: Slope mounting with a downward flow is an unacceptable mounting position.
- d. Horizontal mounting is an acceptable mounting position provided the sensor is initially purged of air as listed in Table 3.

Pressure-Temperature Ratings

Refer to Tables 5 and 6.

Table 5. Pressure-Temperature Ratings using Flare Tube Fitting End Connections (a)

Tube/Line Size	Pressure/Temperature Rating Linearly Derated)
1/2 inch	100 psi to 194°F (90°C) Derated to 60 psi at 284°F (140°C)
3/4 inch	100 psi to 86°F (30°C) Derated to 76.5 psi at 140°F (60°C) Derated to 53 psi at 194°F (90°C) Derated to 33 psi at 248°F (120°C) Derated to 26 psi at 284°F (140°C) (b)
1 inch	75 psi to 75°F (24°C) Derated to 56 psi at 140°F (60°C) Derated to 40 psi at 194°F (90°C) Derated to 28 psi at 248°F (120°C)(b) Derated to 20 psi at 284°F (140°C)(b)

- a. At lower process pressures, ratings relate to process liquids.
b. Note that most aqueous solution vapor pressures will exceed the maximum allowable pressures at the maximum temperature limit.

Table 6. Pressure-Temperature Ratings using Nippon Super Pillar 300 Fitting End Connections

Tube/Line Size	Pressure-Temperature Rating Linearly Derated (a)
1/2 inch	100 psi to 140°F (60°C) Derated to 64 psi at 284°F (140°C)
3/4 inch	100 psi to 86°F (30°C) Derated to 76.5 psi at 140°F (60°C) Derated to 53 psi at 194°F (90°C) Derated to 33 psi at 248°F (120°C) Derated to 26 psi at 284°F (140°C) (b)
1 inch	100 psi to 140°F (60°C) Derated to 64 psi at 284°F (140°C)

- a. At lower process pressures, ratings relate to process liquids.
b. Note that most aqueous solution vapor pressures will exceed the maximum allowable pressures at the maximum temperature limit.

Enclosure Specifications

The enclosure meets IEC IP65, and the environmental and corrosion resistant protection of NEMA Type 4X.

Enclosure Material

Ultra High Molecular Weight Polyethylene (UHMWPE).

Process Wetted Material

PFA - Teflon Perfluoralkoxyethylene.

Signal and Calibration Connectors

Signal Connector

8-pin connector socket; nickel-plated brass

Calibration Connector

(with UHMWPE sealing cap having an integral Viton O-Ring)

4-pin connector socket; nickel-plated brass

Approximate Mass - Sensor

Nominal Line Size		Approximate Mass (a)	
Code	Size	lb	kg
08	1/2 in	2.9	1.3
12	3/4 in	3.6	1.6
16	1 in	8.5	3.9

- a. The mass may vary slightly depending on end connection selected.

Dimensions - Sensor

Refer to Dimensions - Nominal section; also to Dimensional Print DP 611-217.

PRODUCT SAFETY SPECIFICATIONS

Pressure Equipment Directive Compliance

All versions of the Model FT10 Sensors are in compliance with Pressure Equipment Directive (PED) 97/23/EC as Sound Engineering Practice (SEP).

Electrical Safety Approvals and Certifications

Refer to table below for Electrical Safety Specifications when the Model FT10 is used with an 870ITEC Intelligent Transmitter or with an 875EC Intelligent Analyzer.

Electrical Safety Specifications

Testing Laboratory, Type of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX intrinsically safe EEx ia IIC, Zone 0.	Connect to Instrument per MI 611-208. Temperature Class T4 - T6.	CS-E/AAA
ATEX Type n energy limited EEx nL IIC, Zone 2.	Connect to Instrument per MI 611-208. Temperature Class T4 - T6.	CS-E/ANN
CSA intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Connect to certified 870ITEC Transmitter per MI 611-206. Temperature Class T6.	CS-E/CAA
CSA nonincendive 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 875EC Analyzer or 870ITEC Transmitter per MI 611-206. Temperature Class T6.	CS-E/CNN
FM intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Connect to approved 870ITEC per MI 611-206. Temperature Class T6.	CS-E/FAA
FM nonincendive 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 875EC Analyzer or 870ITEC Transmitter per MI 611-206. Temperature Class T6.	CS-E/FNN
IECEx intrinsically safe Ex ia IIC, Zone 0.	Connect to certified 870ITEC Transmitter per MI 611-206. Temperature Class T4 - T6.	CS-E/DAA
IECEx Type n energy limited Ex nL IIC, Zone 2.	Connect to certified 875EC Analyzer or 870ITEC Transmitter per MI 611-206. Temperature Class T4 - T6.	CS-E/DNN

NOTE

The Model FT10 sensors have been designed to meet the electrical safety descriptions listed in the table above. For detailed information or status of testing laboratory approvals/certifications, contact Global Customer Support.

OPTION SELECTIONS AND ACCESSORIES

Option -1: Sensor Surface Mounting Kit

An optional sensor surface mounting kit is offered. Two brackets and mounting hardware are included in the kit. The mounting brackets are UHMWPE, the same material as the enclosure, and the mounting hardware is nylon.

Numerous sensor surface mounting configurations are achievable as shown in the DIMENSIONS-NOMINAL section. This kit can also be ordered separately by specifying part number BS812NP. An optional pipe mounting kit is also offered. See section below.

Option -2: Sensor Pipe Mounting Kit

For users who require pipe mounting of the sensor, an optional kit is offered for mounting to a nominal DN50 or 2 inch vertical or horizontal pipe. This kit includes two mounting brackets, two polyurethane U-bolts, and the hardware necessary to attach the bracket to the sensor and pipe. The brackets and hardware are the same material as in the surface mounting kit. Numerous mounting configurations are achievable as shown in the DIMENSIONS-NOMINAL section. This optional pipe mounting kit may be ordered by specifying part number BS812NQ.

Accessory: Adapter Tube Kit

Tube kits are offered for users who require tubes at the inlet and outlet ports. The tubes are made from pfa and vary according to the size and end connection used. See Table 7, and Figures 2 and 3.

Accessory: Calibration Cable

A calibration cable (Figure 4) is required for any in-line calibration at full scale conductivity range of the FT10 Sensor (unless using a precision calibration plug). A connector socket on one end of the cable connects to the calibration connection on the side surface of the sensor. Two unterminated wires at the other end of the cable connect to a decade resistance box provided by the user. The resistance required to calibrate the system at full scale value is then set at the decade box. Refer to the installation

instructions in MI 611-217 (or system calibration examples in MI 611-220) for this procedure. The cable is approximately 4 ft (1.22 m) long and is ordered by specifying Part Number BS807BD.

Table 7. Adapter Tube Kits

End Connection	Tube/Line Size	Adapter Tubes	Part Number
Flare Tube	1/2 inch	2 Tubes	BS812NS
Flare Tube	3/4 inch	2 Tubes	BS812NT
Flare Tube	1 inch	2 Tubes	BS812NU
Nippon	1/2 inch	2 Tubes	BS812NV
Nippon	3/4 inch	2 Tubes	BS812NW
Nippon	1 inch	2 Tubes	BS812NX

Figure 2. Adapter Tubes

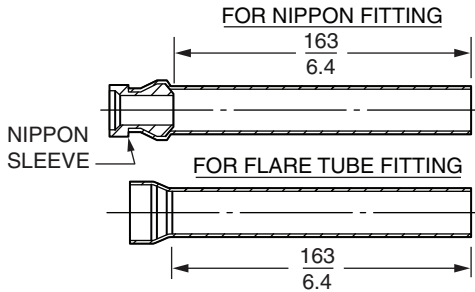


Figure 3. Adapter Tubes shown with Sensor Fittings.

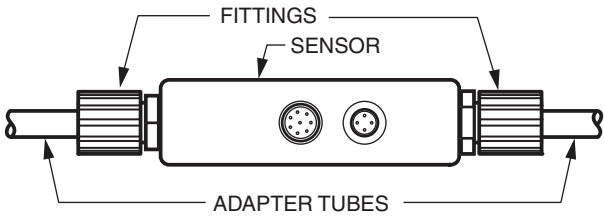
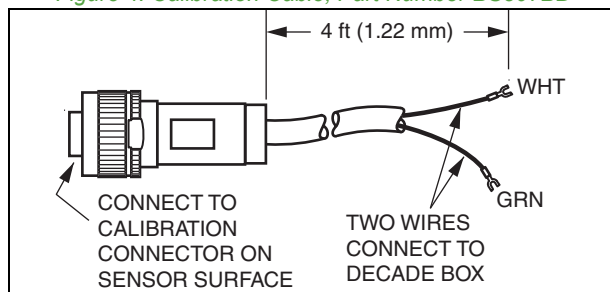


Figure 4. Calibration Cable, Part Number BS807BD

**Accessory: Calibration Plug**

For high precision, low end and/or full scale conductivity ranges, a calibration plug (Figure 5) is offered in lieu of the calibration cable described in the previous paragraph. A precision calibration plug is specific to an FT10 Sensor Model, and the desired conductivity value. The plug connects to the calibration connection on the side surface of the sensor, and calibration is in accordance with Instruction MI 611-220 or Instruction MI 611-217. Specify Calibration Plug Model EP485F, the FT10 Sensor Model Number, and the conductivity value desired.

NOTE

Precision resistance calibration plugs are provided with values within 10% of the requested conductivity. The precision resistor has an accuracy of $\pm 0.05\%$.

Accessory: Patch Cords

Patch cords (Figures 6 and 7) are used for system wiring to interconnect the sensor and 875EC Intelligent Analyzer or the 870ITEC Intelligent Transmitter. They are required when the sensor is provided with an integral connector (Termination Selection 6). See Model Code and Figure 1 (System Cabling Diagram).

They are available for standard or high temperature applications, and also in standard 10 ft (3 m) lengths, or sales order lengths up to 100 ft (30 m), in 1 ft (0.3 m) increments.

The standard temperature patch cord is a PVC-jacketed cable and may be used at ambient temperatures up to 105 °C (221 °F).

The high temperature patch cord is a shielded teflon-jacketed cable with integral RFI/EMI shielding and may be used at ambient temperatures up to 200 °C (392 °F).

All patch cords have a connector on the sensor end, and pin lugs on the other end for connection to the analyzer or transmitter. Refer to Installation Instruction MI 611-217. Refer to Table 8 for patch cords offered.

Figure 5. Calibration Plug

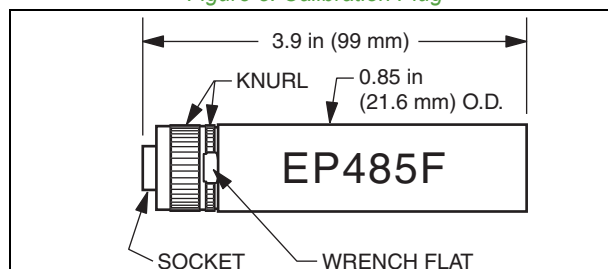


Figure 6. Standard Temperature Patch Cord (See Table 8)

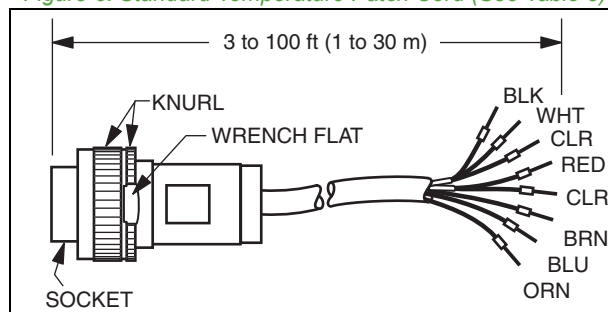


Figure 7. High Temperature Patch Cord (See Table 8)

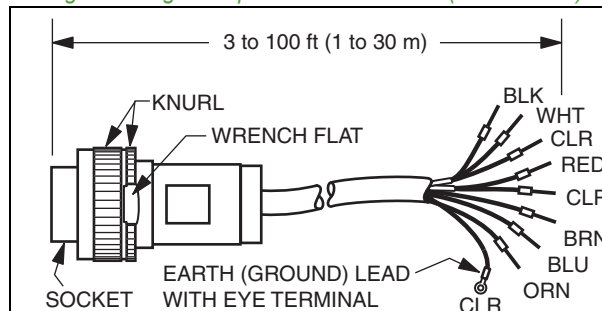
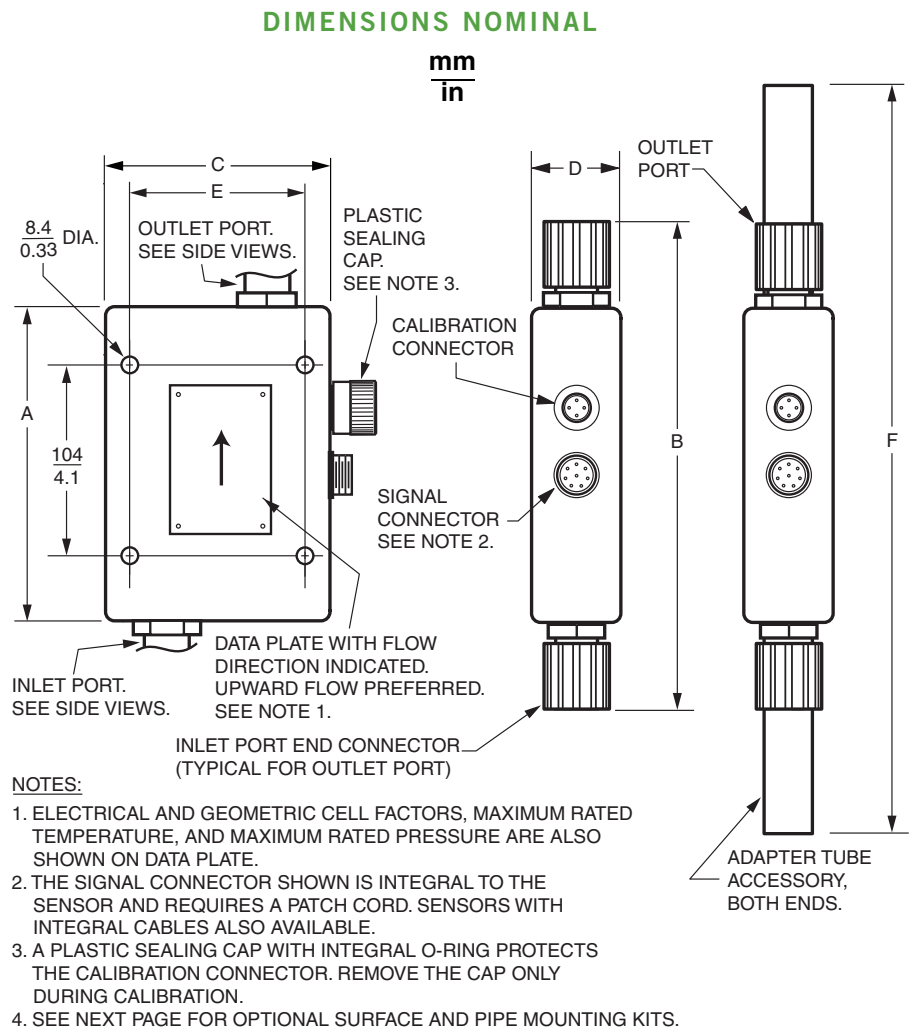


Table 8. Patch Cords (a)

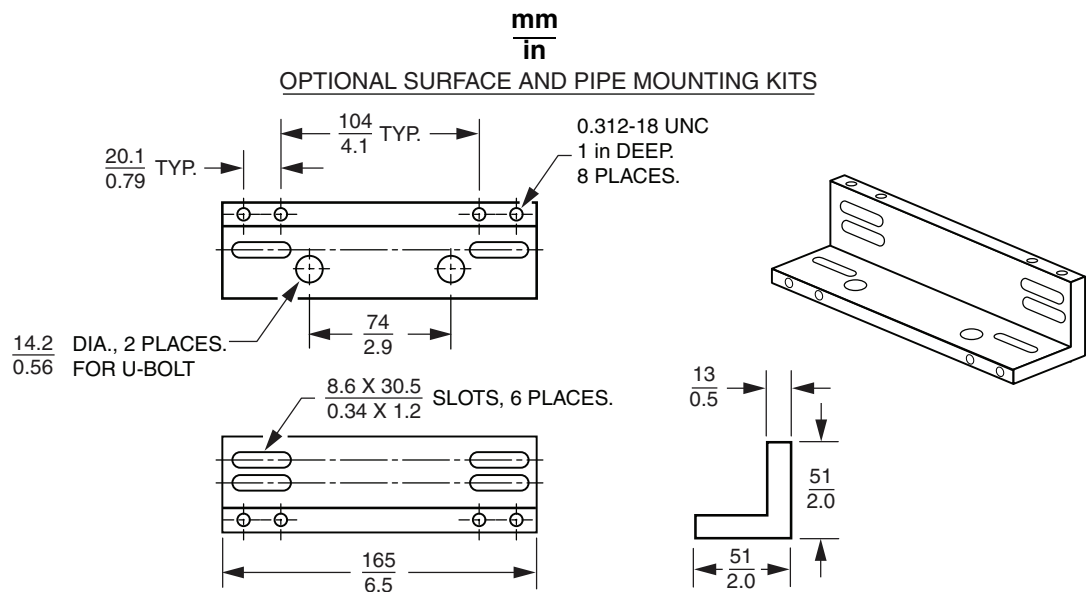
Cable Type	Cable Length	Cable Jacket (b)	Part No.
Std. Temp.	10 ft (3 m)	PVC	BS811VF
	3 to 100 ft (1 to 30 m)	PVC	BS811VE ^(b)
High Temp.	10 ft (3 m)	Teflon w/Integral RFI/EMI Shield	BS811VD
	3 to 100 ft (1 to 30 m)	Teflon w/Integral RFI/EMI Shield	BS811VG ^(b)

- a. Patch cords are required when Terminal Selection 6 (integral connector) is specified (see Model Code).
- b. For patch cord lengths between 3 and 100 ft (1 and 30 m), specify the part number listed, and length required.

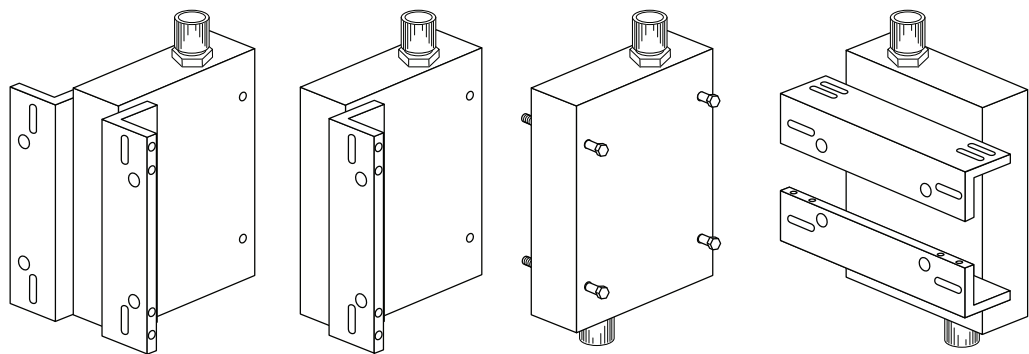


Dimensions Table

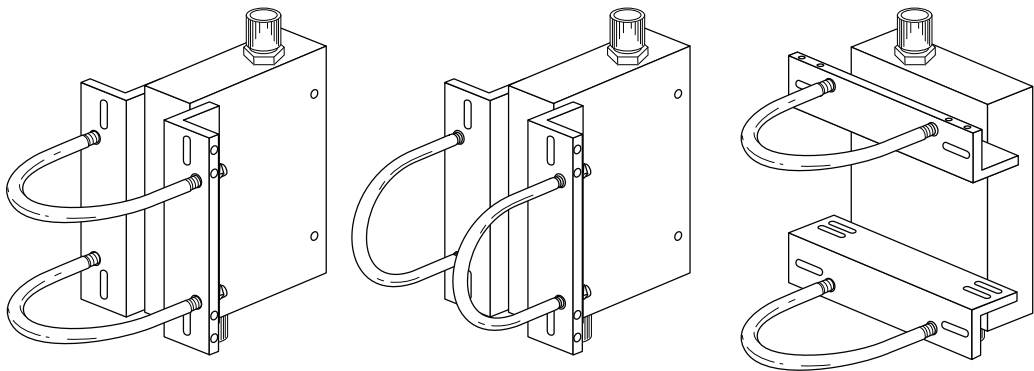
Tube/Line Size	Nominal Dimensions							
	A	B (Code F, Flare Tubes)	B (Code N, Nippon)	C	D	E	F (Code F, Flare Tubes)	F (Code N, Nippon)
1/2 in	$\frac{178}{7.0}$	$\frac{267}{10.5}$	$\frac{267}{10.5}$	$\frac{127}{5.0}$	$\frac{51}{2.0}$	$\frac{104}{4.1}$	$\frac{571}{22.5}$	$\frac{571}{22.5}$
3/4 in	$\frac{178}{7.0}$	$\frac{267}{10.5}$	$\frac{267}{10.5}$	$\frac{127}{5.0}$	$\frac{51}{2.0}$	$\frac{104}{4.1}$	$\frac{571}{22.5}$	$\frac{571}{22.5}$
1 in	$\frac{236}{9.3}$	$\frac{366}{14.4}$	$\frac{366}{14.4}$	$\frac{165}{6.5}$	$\frac{76}{3.0}$	$\frac{145}{5.7}$	$\frac{671}{26.4}$	$\frac{671}{26.4}$



TYPICAL SURFACE MOUNT CONFIGURATIONS



TYPICAL PIPE MOUNT CONFIGURATIONS



REFERENCE DOCUMENTS

Document	Description
PSS 6-2N1 C	875EC Intelligent Electrochemical Analyzer
PSS 6-3N2 A	870ITEC Intelligent Electrochemical Transmitter
Bulletin EP485F	Model EP485F Calibration Plugs
MI 611-217	Model FT10 Flow-Through Electrodeless Conductivity Sensors - Installation, Calibration, Troubleshooting, and Maintenance
MI 611-220	Electrodeless Conductivity System Calibration Examples
DP 611-217	Dimensional Print - Model FT10 Flow-Through Electrodeless Conductivity Sensors

NOTES



PRODUCT PATENT INFORMATION

This product and its components are protected by U.S. Patent Numbers 5157332, 7106067, and others pending.

RETURN POLICY

In compliance with U.S. Federal OSHA Standard 29CFR1910.1200, process information must be reviewed prior to receiving authorization to return material. Please note that No Product Exposed to Hydrofluoric Acid or Mercury Will Be Accepted back at for any reason.

WARRANTY

A one-year workmanship warranty applies to FT10-MT Sensors.

Foxboro sensors are offered in many variations and wetted material configurations. These sensors intended to service myriad of applications in many diverse industries. While some recommendation can be provided for selection of wetted materials for any application, the final materials compatibility decision, and ultimate use of any sensor rests with the end-user. Warranty offered is for workmanship related items.

ORDERING INSTRUCTIONS

1. Model Number (see Model Code).
2. Electrical Safety Design Code (see Electrical Safety Specifications section).
3. Calibration Cable or Precision Resistance Calibration Plug. See Option Selections and Accessories section.
4. Patch Cord for use with Terminal Selection 6 (integral connector). See Option Selections and Accessories section.
5. Other Accessories (contact Global Customer Support).
6. Customer 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:

www.fielddevices.foxboro.com