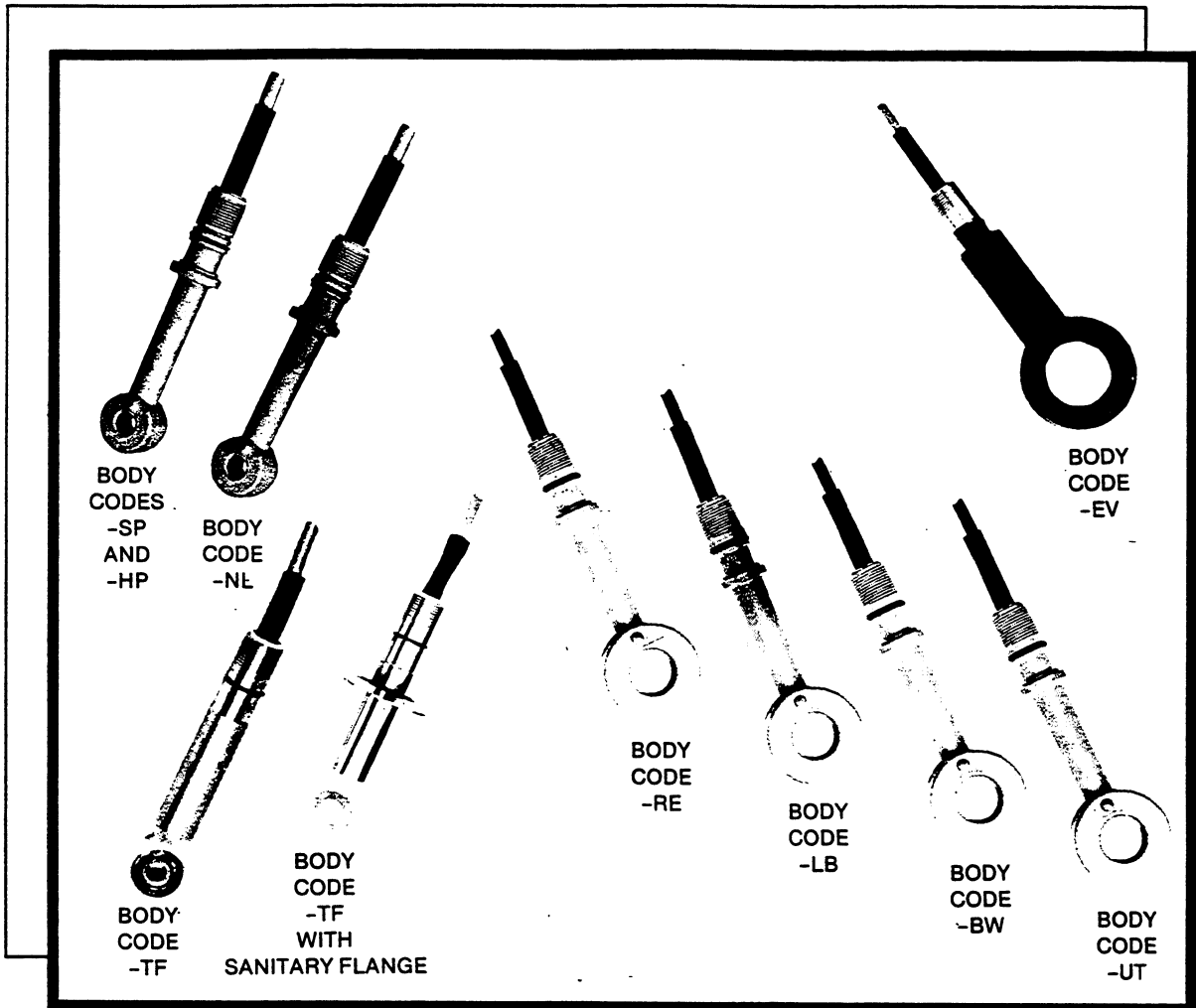


Instruction Book 2573

**871EC Electrodeless Conductivity
Sensors and Accessories**



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871EC Electrodeless Conductivity Sensors and Accessories

<u>DOCUMENT</u>	<u>DESCRIPTION</u>
MI 611-150	871EC Electrodeless Conductivity Sensors and Accessories - Installation and Maintenance
DP 611-011	871EC Electrodeless Conductivity Sensors - Dimensions
DP 611-092	Flanges (316 ss) - Dimensions
DP 611-105	Universal Mounting Bushing - Dimensions
DP 611-142	Ball Valve Assembly - Dimensions
DP 611-155	Ball Valve Assemblies for 871EC-NL/-HP/-SP Sensors - Dimensions
DP 611-156	Ball Valve Assembly for 871EC-TF Sensor - Dimensions

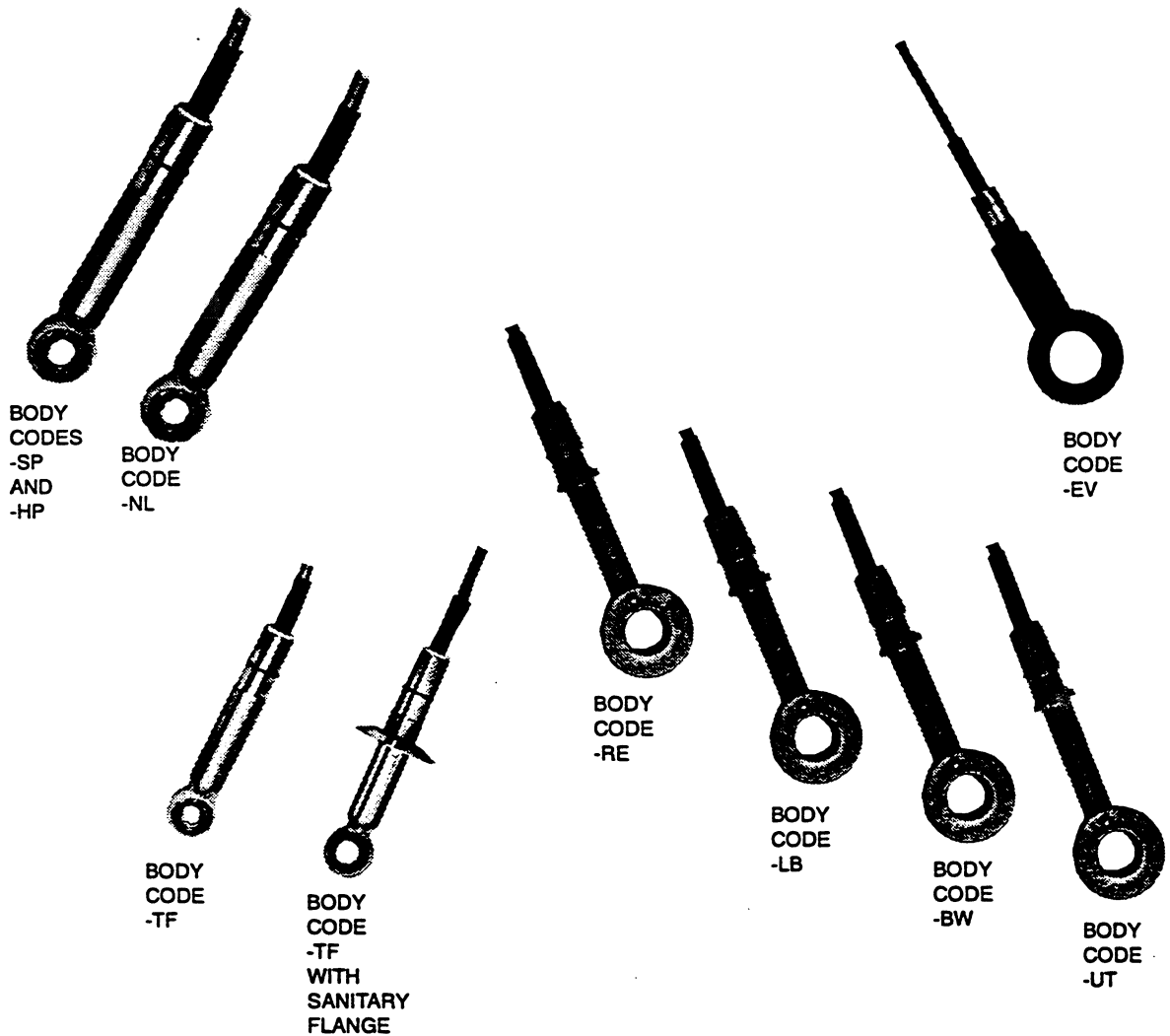
GENERAL INSTRUCTIONS

Foxboro designs, manufactures, and tests its products to meet many national and international standards. However, for these products to operate within their normal specifications, you must properly install, use, and maintain these products. The following instructions must be adhered to and integrated with your safety program when installing, using, and maintaining Foxboro products.

- Read and save all instructions prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, contact your Foxboro representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in Foxboro site planning/installation instructions and per applicable local/national codes. Connect all products to the proper electrical and/or pressure sources.
- Handle, move, and install each product using the appropriate number of personnel and moving devices/equipment (dolly, forklift, crane, etc.). Failure to do so could cause serious personal injury.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that the qualified service technician uses replacement parts specified by Foxboro. Unauthorized substitutions may result in fire, electrical shock, other hazards, or improper equipment operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified personnel, to prevent electrical shock and personal injury.

871EC Electrodeless Conductivity Sensors and Accessories

Installation and Maintenance



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DANGERS

1. An electrical shock hazard may be present under sensor fault conditions when sensor is located in process fluids at electrical potentials above 30 V rms or 60 V dc. In order to prevent electrical shock hazard, remove sensor from process or de-energize power to process prior to performing maintenance on the 870EC Transmitter or 872 Monitor.
2. Electrical shock potential can be detected while the sensor is in a potentialized solution by removing the transmitter or monitor field-terminal compartment cover and measuring between each of the sensor leads and ground (earth) with a voltmeter. If a potential above 30 V rms or 60 V dc is detected, an electrical shock hazard is present.
3. Certain units described in this instruction contain electrical shock hazard potential. Maintenance should be performed by qualified personnel only. During maintenance, remove power to avoid severe injury or death.
4. When performing maintenance, wear appropriate, protective clothing including safety goggles. Escaping chemicals under pressure can cause severe injury including blindness.

WARNINGS

1. Use care when connecting and disconnecting high pressure service connection. Use proper gloves and follow the recommended procedure to avoid severe injury to personnel or damage to equipment.
2. When processing hazardous liquids, follow the recommended procedures. Failure to do so could result in injury to personnel and damage to equipment.
3. Use only Foxboro recommended replacement parts. Substitution parts could result in damage to equipment, damage to the process, and/or injury to personnel.
4. Be careful to avoid touching exposed circuits and components. Potential shock hazards are present.

Introduction

General

The 871EC Sensors are used with Foxboro 873EC Electrochemical Analyzers or 870ITEC and 870EC Transmitters. Sensors are available in a number of configurations and materials suitable for a variety of conditions.

The sensors measure an induced current in a loop of solution. Two toroidally wound coils are encapsulated in close proximity within the sensor which is immersed in the solution. An ac signal, applied to one toroidal coil, induces a current in the second coil which is directly proportional to the conductance of the solution.

Reference Documents

Document	Document Description
MI 611-156	Instruction – 870EC Transmitters (Electrodeless Conductivity)
MI 611-212	Instruction – 870ITEC Intelligent Electrodeless Conductivity Transmitter
MI 611-167	Instruction – 873EC Electrochemical Analyzer for Electrodeless Conductivity Measurement
DP 611-011	Dimensional Print – 871EC Electrodeless Conductivity Sensors
DP 611-092	Dimensional Print – Flanges (316 ss) used with 871CC, 871EC, 910, 920m and 1210 Conductivity Sensors
DP 611-105	Dimensional Print – Universal Mounting Bushing used with 871CC, 871EC, 910, 920, and 1210 Conductivity Sensors
DP 611-155	Dimensional Print – Ball Valve Assembly for Electrodeless Conductivity Sensors (871EC-NL, -SP, and -HP)
DP 611-156	Dimensional Print – Ball Valve Assembly for Electrodeless Conductivity Sensors (1210TF and 871EC-TF)

Sensor Certification Specifications

Testing Laboratory, Types of Protection, And Area Classification	Conditions of Certification	Electrical Design Safety Code
FM intrinsically safe for Class I, Groups A, B, C, and D, Division 1, and Class II, Groups E and G, Division 1.	Not available for "-HP", "-BW", "-RE", and "-UT" Sensors. When "-LB" sensor is used, sensor must have current limiting diodes (Optional Selection Code -A). Connect to 870EC or 870ITEC Transmitter. Temperature Class T6.	CS-E/FB-A
CENELEC intrinsically safe EEx ia IIC, T6, for use in Zone 0 or in Zone 1, or in Zone 1 only, according to whether the power source is ia or ib respectively.	Not available for "-HP", "-BW", "-RE", "-LB", and "-UT" sensors. Connect to 870EC or 870ITEC Transmitter. Temperature Class T6.	CS-E/BA-E

NOTE: These sensors have been designed to meet the electrical safety descriptions noted in the table above. For detailed information or status of testing laboratory approvals and certifications, contact your Foxboro representative.

Sensor Identification

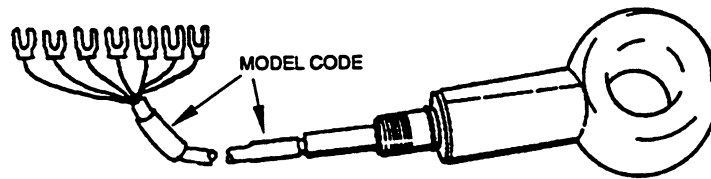


Figure 1. Sensor Identification

Standard Specifications

A sensor can be identified by the model code located on both ends of the sensor cable (see Figure 1). Refer to "Sensor Applications" section for sensor application information.

Wetted Parts

See Sensor Span Limits, Materials, Temperature Limits, Pressure Limits, and Temperature Compensator table below.

Cable

Integral, 6 m (20 ft) multi-screened (multi-shielded) cable with the following jacket material:

- ◆ For -NL, -TF, and -EV; PVC jacket
- ◆ For -SP, -RE, and -LB; irradiated polyolefin jacket
- ◆ For -HP, -BW, and -UT; ptfe jacket

Mounting

All sensor extensions contain an O-ring and 3/4 NPT pipe thread (pipe thread is full 3/4 NPT for sensor types -RE, -LB, -BW and -UT; truncated 3/4 NPT for sensor types -SP, -HP, -NL, -TF, and -EV).

Insertion Mounting: Sensors are used with threaded bushings or flanges that form a process seal against sensor O-ring.

In-situ Mounting: Mate to a user-supplied 3/4 in coupling and length of DN20 or 3/4 in pipe.

Ball Valve Mounting: Sensors are used with ball valve assemblies that contain connections for mating to the sensor.

NOTE: When mounted in-line, the sensors must be installed (centered) in these minimum pipe sizes to avoid pipe wall effects.

For -NL, -SP, -HP, and -TF; DN 80 (3 in)

For -RE, -LB, -BW, -UT, and -EV; DN 150 (6 in)

Sensor Span Limits, Materials, Temperature Limits, Pressure Limits, and Temperature Compensator

Sensor Body Code(a)	Span Limits	Wetted Parts	Temperature Limits	Pressure Limits	Temperature Compensator (Integral)
Standard Temperature PEEK - up to 120 °C (250 °F)					
-SP and -RE	0.5 mS/cm (500 μS/cm) minimum (b) and 2000 mS/cm max.	Glass-filled PEEK (Polyetheretherketone), EPR or Viton O-rings, as specified	-5 and +120 °C (20 and 250 °F)	-0.1 and +1.75 MPa (-15 and +250 psi) for -SP sensor. -0.1 and +2.41 MPa (-15 and +350 psi) for -RE and -LB sensors	100 kΩ thermistor for use with 873EC Analyzer or 870ITEC and 870EC Transmitters.
-LB	0.05 mS/cm (50 μS/cm) minimum (b) and 50 mS/cm max.				
High Temperature PEEK - up to 200 °C (390 °F)					
-HP and -BW	0.5 mS/cm (500 μS/cm) minimum (b) and 2000 mS/cm max.	Glass-filled PEEK (Polyetheretherketone); EPR or Viton O-rings, as specified	-5 and +200 °C (20 and 390 °F)	-0.1 and +1.75 MPa (-15 and +250 psi) for -HP sensor. -0.1 and +2.41 MPa (-15 and +350 psi) for -BW and -UT sensors	100 Ω platinum RTD for use with 873EC Analyzer and 870ITEC Transmitter.(c)
-UT	0.05 mS/cm (50 μS/cm) minimum (b) and 50 mS/cm max.				
Non-PEEK Versions					
-NL	0.5 mS/cm (500 μS/cm) minimum (b) and 2000 mS/cm max.	Glass-filled Noryl; EPR O-rings	-5 and +65 °C (20 and 150 °F)	-0.1 and +1.4 MPa (-15 and +200 psi)	100 kΩ thermistor for use with 873EC Analyzer or 870ITEC and 870EC Transmitters.
-TF		Fluorocarbon head; 316 ss or Carpenter 20 Cb(d) extension as specified; EPR or Viton(e) O-rings, as specified	-5 and +105 °C (20 and 225 °F)		
-EV	0.2 mS/cm (200 μS/cm) minimum (b) and 2000 mS/cm max.	Epoxy head; 316 ss extension; EPR O-rings		-0.1 and +0.7 MPa (-15 and +100 psi)	

- In process fluids operating at electrical potentials above 30 V rms or 60 V dc, refer to Foxboro.
- These minimum spans are for sensors used with 873 Analyzers and 870ITEC Transmitters. For minimum spans for sensors used with 870EC Transmitters, refer to ranges given in PSS 6-3C3 A.
- If "-HP", "-BW", or "-UT" sensor is to be used with 870EC Transmitter, no temperature compensation can be applied, so 870EC must have Model Code Suffix "A" for temperature compensation selection.
- For sulfuric acid (99.5 to 93%) and oleum ranges, use optional Carpenter 20 Cb mounting extension.
- For sulfuric acid (99.5 to 93%), oleum ranges, and petroleum applications, use optional Viton O-rings.

Sensor Applications

NOTES:

1. PEEK is a thermoplastic material with excellent strength and chemical resistance properties over a wide range of process temperatures and pressures. Foxboro recommends using PEEK preferentially for all applications that qualify.
 2. PEEK material displays excellent chemical resistance to most aqueous solutions of acids, bases, and salts. It is also excellent for organic solvents such as toluene, ethyl acetate, acetone, gasoline, and carbon tetrachloride. It is not recommended for sulfuric or nitric acid solutions above 70%, nor is it recommended for Oleum applications.
-

Table 1. Sensor Applications - Standard Temperature PEEK - up to 120 °C (250 °F)

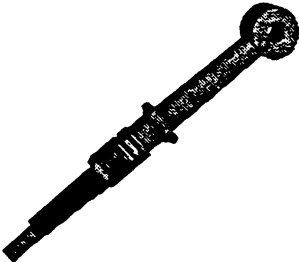


Sensor Body Code(a)	Application(a)	Sensor
-SP	<p>This small bore sensor is suitable for the majority of all electrodeless conductivity applications. Its compact size enables it to be mounted in a multitude of methods, including insertion (flange, bushing), retractable, and in-situ. Typical applications include salinity and brine measurements, steel pickling, scrubbing towers, ion exchange regeneration, plating baths, rinse water, caustic metal cleaning, and textile measurements in scouring, mercerizing, and carbonizing baths.</p>	
-RE	<p>This large bore sensor is recommended as a substitute for 871EC-EV Series sensors, both for new and existing installations. Its large bore makes it particularly suitable for measurements with very high levels of fouling materials, such as limestone. Pulp and paper applications include brown stock washing (filtrate) and paper machine (white water). Additional applications include lye peeling of fruits and vegetables, oil well drilling (mud-logging), waste stream monitoring, and spill detection.</p>	

Table 1. Sensor Applications - Standard Temperature PEEK - up to 120 °C (250 °F) (Continued)

Sensor Body Code(a)	Application(a)	Sensor
-LB	<p>This large bore sensor is used for low conductivity measurements where a sensitive range is required. It is often used in place of a conventional contacting conductivity measurement system to reduce maintenance, since fouling from oil, water treatment chemicals, particulates, etc., renders a contacting sensor inoperative. Typical applications involve water quality measurements such as boiler feedwater, steam condensate, rinse water, boiler blowdown, heat exchanger leakage, stream pollution, cooling towers, and evaporators.</p>	

(a) In process fluids operating at electrical potentials above 30 V rms or 60 V dc, contact Foxboro.

Table 2. Sensor Applications - High Temperature PEEK - up to 200 °C (390 °F)

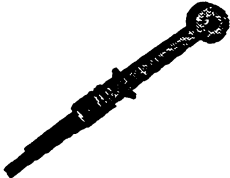


Sensor Body Code(a)	Application(a)	Sensor
-HP	<p>This small bore sensor is identical in physical size and appearance to the -SP sensor and may be applied to any of the -SP applications identified which have intermittent or continuously high temperatures. Additional high temperature applications for which this sensor is suited include alumina-to-caustic ratio in Bayer plants, boiler blowdown, and Clean-In-Place (CIP) measurements in food and related industries.</p>	
-BW	<p>This highly specialized, large bore sensor is intended for use in applications with a combination of both high temperatures and very high levels of fouling materials. Application areas overlap with those listed for the type -HP sensor. Additional applications include pulp and paper measurements in green liquor (dissolving tank), first and second causticizer, and white and black liquor (digester).</p>	

Table 2. Sensor Applications - High Temperature PEEK - up to 200 °C (390 °F) (Continued)

Sensor Body Code(a)	Application(a)	Sensor
-UT	<p>This large bore sensor is identical in physical size and appearance to the -LB sensor. Applications for this sensor are generically the same as those identified for the -LB unit (e.g., low conductivity), except that the -UT sensor should be specified for situations where high temperatures may be present, either intermittently or continuously.</p>	

(a) In process fluids operating at electrical potentials above 30 V rms or 60 V dc, contact Foxboro.

Table 3. Sensor Applications - Non-PEEK Version


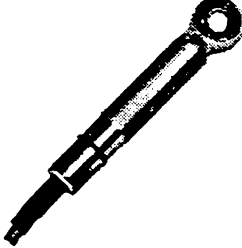

Sensor Body Code(a)	Application(a)	Sensor
-NL	<p>This general purpose, small bore sensor may be used for most routine applications involving low (<5%) concentrations of inorganic acids (hydrochloric, nitric, sulfuric, etc.), bases (caustic, calcium hydroxide, etc.), and salts (sodium chloride, calcium chloride, sodium sulfate, etc.). Not recommended where organic solvents are present. Not recommended in caustic applications above 50°C (122°F). When doubtful about the effect of high levels of chemicals, temperatures, or abrasion on the -NL sensor, specify a type -SP PEEK sensor as a preferred alternative.</p>	

Table 3. Sensor Applications - Non-PEEK Version (Continued)

Sensor Body Code(a)	Application(a)	Sensor
-TF	Used in oleum and concentrated (>90%) sulfuric acid applications. Used in the food and pharmaceutical industries when a sanitary mounting fitting (code 7) is required.	
-EV	This large bore sensor has been superseded by PEEK sensor type -RE. However, it should still be specified in beet sugar carbonation applications and in mining applications such as copper flotation, where highly abrasive slurries are present.	

(a) In process fluids operating at electrical potentials above 30 V rms or 60 V dc, contact Foxboro for applicable sensor.

Sensor Installation and Accessories

Proper installation of the sensor is important for efficient and accurate operation.

For all applications and sensor configurations, mounting arrangements must be located so that:

- ◆ Sample at the sensing area is representative of the solution.
- ◆ Solution circulates actively and continuously past the sensing area.
- ◆ Position and orientation of the sensor does not trap air bubbles within sensing area.
- ◆ Deposits of sediment or other foreign material do not accumulate within the sensing area.
- ◆ If cable is installed in metal conduit (recommended), either flexible conduit should be used or some other provision made for removal of sensor from the process.

Also lubricate all O-rings with a thin film of suitable grease.

Notes Specific to Sensor Types -NL, -SP, and -HP

This section applies to Sensor Types -NL, -SP, and -HP only (see Figure 2).

NOTES:

- 1. There are two grooves near the cable end of the sensor. The groove closest to the cable is **NOT** an O-ring groove and should remain unoccupied. The next groove, as shown in Figure 2, **IS** for the O-ring.*
 - 2. Ensure that the sensor received has the O-ring in the proper position.*
 - 3. Ensure that future O-ring replacement is in the proper position.*
-

WARNING: *Incorrect O-ring position as previously indicated could result in process leakage, causing injury to personnel.*

Notes Specific to Sensor Types -NL, -SP, -HP, -LB, -RE, -BW, and -UT

This section applies to Sensor Types -NL, -SP, -HP, -LB, -RE, -BW, and -UT only (see Figure 3).

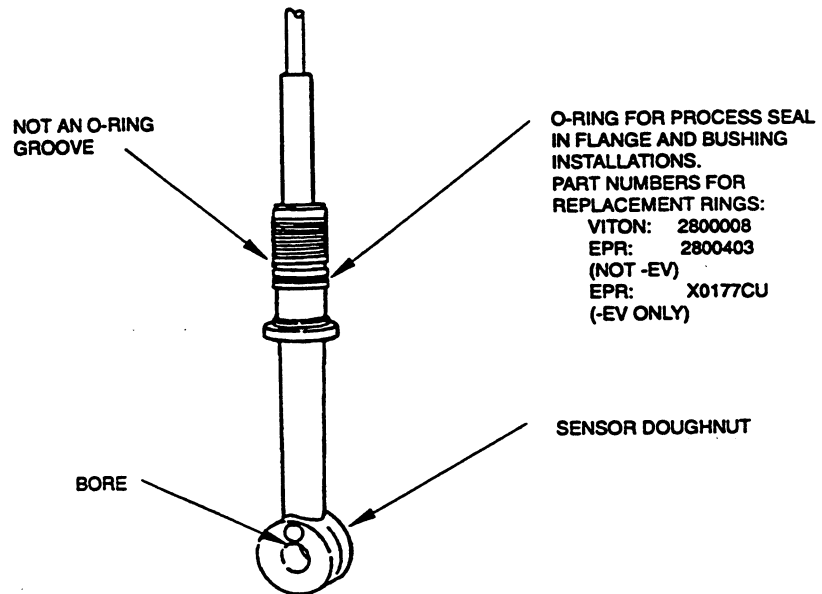


Figure 2. Sensor Types -NL, -SP, and -HP Mounting

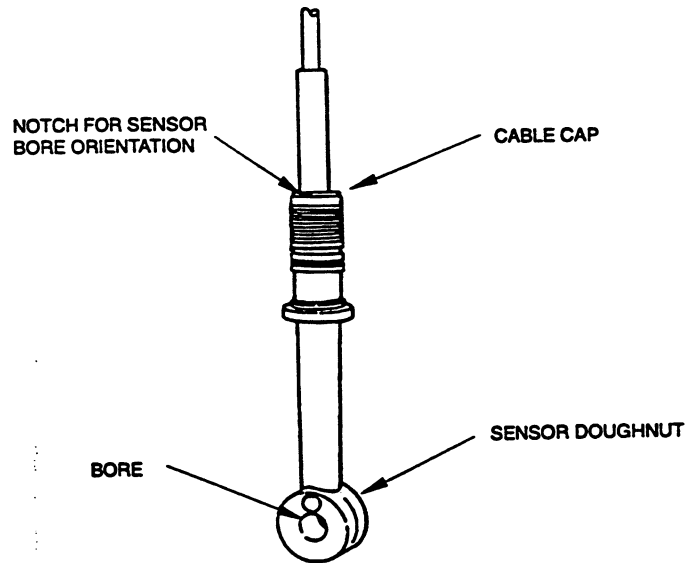


Figure 3. Sensor Types -NL, -SP, -LB, -RE, -BW, and -UT Mounting (Type -NL illustrated)

NOTES:

1. There are two notches at the cable cap that line up with the flat edges of the sensor "doughnut". These notches are an aid in positioning the sensor in a pipe or vessel. For example, the user should direct flow through sensor bore.
 2. Note that the temperature sensing device (thermistor or RTD) is strategically located in the thermistor/RTD housing (see Figure 3). The response to thermal changes is faster with the -NL, -SP, -HP, -LB, -RE, -BW, or -UT sensor than with other 871EC Sensors because of this design.
-

Ball Valve Assembly Installation

NOTE: Sensor types -TF, -SP, -NL, and -HP use 2 NPT Ball Valves. Sensor types -RE, -LB, -BW, and -UT use 3 NPT Ball Valves as shown in Table 4.

NOTE: A nonpurgeable ball valve assembly is illustrated, but these instructions are applicable to the purgeable ball valve assembly also. The purgeable ball valve assembly provides for two 1/4 NPT connections and shutoff valves (both user-supplied) to allow purging of dirty solutions, high suspended solids, and so forth, before insertion of the sensor and during operation.

WARNING: When using high temperature PEEK sensors (871EC-HP, -BW) for digester liquor measurements in pulp and paper processes, a ball valve installation is not recommended. Instead, use a metal bushing or an ANSI Class 300 Flange.

The ball valve assembly permits sensors to be removed from a process stream or tank under rated temperature and pressure without draining the system or resorting to a bypass arrangement. The assembly consists of the ball valve unit and a shaft assembly. Standard flexible conduit (user provided) can be used for cable protection. For ball valve assembly specifications, see Table 1.

A ball valve assembly installation must meet mounting arrangements specified under "Sensor Mounting" section, as well as the following requirements:

1. Direct the flow of the solution (as much as possible) toward the sensing area.
2. Provide a space for removal of the sensor in the ball valve unit (see Dimensional Prints DP 611-155 and DP 611-156).

Table 4. Ball Valve Assembly Specifications

Process Line Conn. (in)	Foxboro Part No.		Material of Processed Wetted Parts				Rated Pressure(c)		Max. Temp. at Rated Pressure (c)		Used with 871EC Body
	Purgeable Housing	Non-purgeable Housing	Process Conn. and Housing	Ball Seat	Ball Valve	O-Ring	Mpa	psi	°C	°F	Codes
2 NPT	BS805JV(a)	BS805JU(b)	316 ss	ptfe	316 ss	EPR	1.4	200	150	300	-TF,-SP -NL,-HP
2 NPT	BS805HX	--	316 ss	ptfe	poly-propylene	EPR	0.7 0.4 0.27	100 60 40	20 65 95	70 150 200	-TF,-SP -NL,-HP
3 NPT	BS806GE	--	316 ss	ptfe	316 ss	EPR	2.1 0.7	300 100	177 200	350 390	-RE, -LB -BW, -UT

(a) Previously specified as 0051383 and 0051382.

(b) Previously specified as 0051381 and 0051382.

(c) Actual application rating may be reduced by Sensor Pressure-Temperature rating.

Assembly of Sensor to Shaft Assembly

NOTE: This procedure is for a new installation. The process stream or tank is not filled or pressurized.

1. Feed the sensor cable through the shaft bushing assembly. Insert the sensor into the shaft bushing. Tighten the two setscrews to the 3/4 NPT end of the sensor. Wrap ptfe tape onto the threads of the shaft assembly, and tighten the shaft assembly to the shaft bushing connection (see Figure 4).

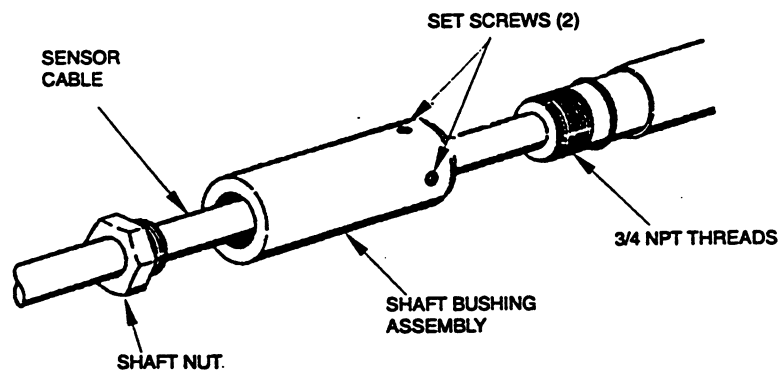


Figure 4. Assembly of Shaft Bushing to Sensor

2. Make sure the shaft assembly is pre-assembled as shown in Figure 5.
3. Lightly lubricate the shaft with silicone grease (or equivalent).

WARNING: Do not nick the O-rings. Damaged O-rings may result in liquid spillage, causing injury to personnel.

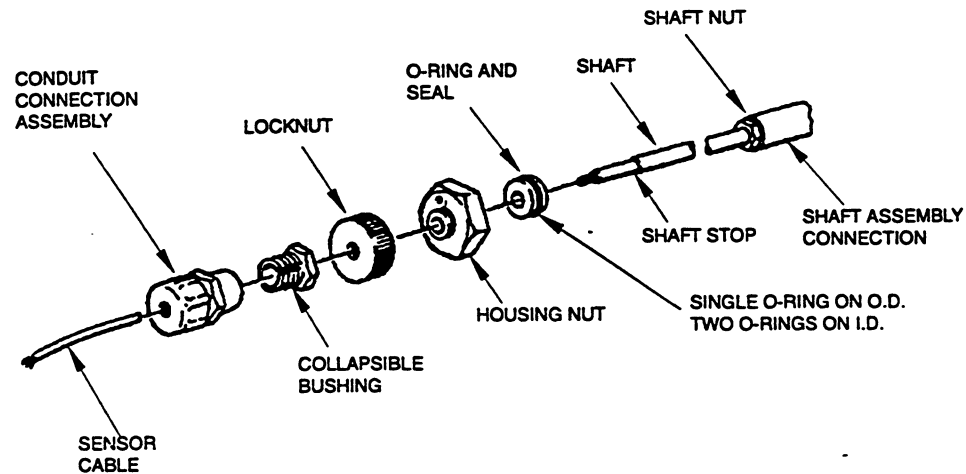


Figure 5. Pre-assembly of Shaft Assembly

Ball Valve Assembly Procedure

1. Turn the handle on top of the ball valve unit (see Figure 6) to the close position (indicated by an arrow on the handle).
2. Fill and pressurize the process line or tank as required. Check for and eliminate leaks.

WARNING: Do not exceed the sensor or ball valve temperature and pressure limits. Severe injury to personnel or death may result.

3. Insert the sensor into the housing isolation chamber until the O-ring and seal are seated into the end of the isolation chamber (see Figure 7).

WARNING: Do not nick the O-rings. Damaged O-rings may result in liquid spillage, causing injury to personnel.

4. Tighten the housing nut onto the end of the isolation chamber.

NOTE: The housing nut is supplied lubricated and it should be relubricated periodically to prevent galling.

5. Slowly turn the handle on top of the ball valve unit (see Figure 7) to the open position (indicated by an arrow on top of the handle).

WARNING: Personnel should stand to the side, not directly behind the assembly, during insertion and removal of the sensor.

6. Check for and eliminate leaks.

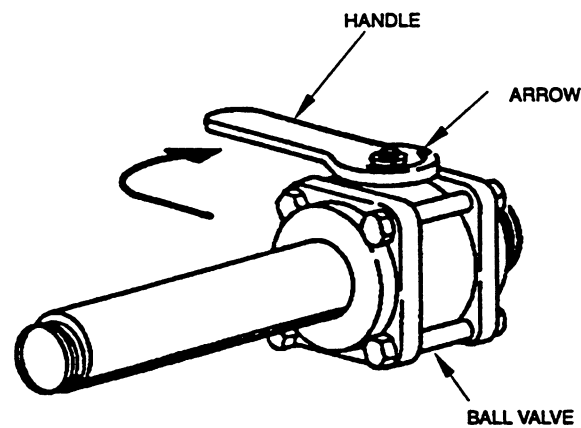


Figure 6. Closing the Ball Valve

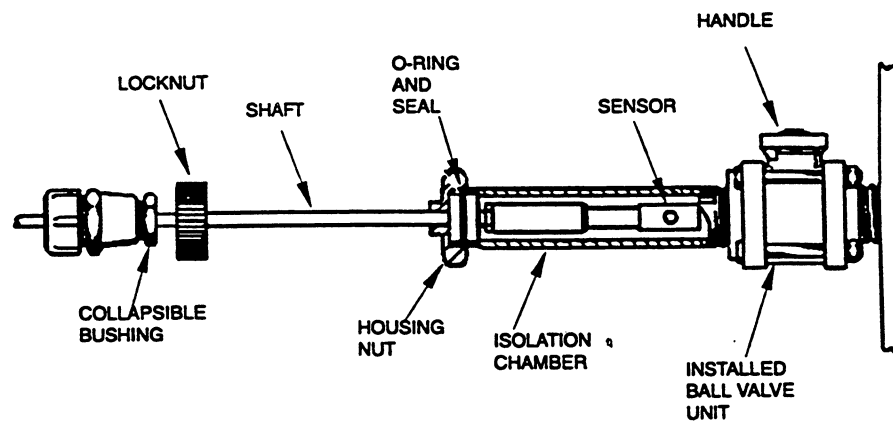


Figure 7. Ball Valve Assembly Shaft Installation

7. Insert the shaft slowly until the locknut reaches the housing nut. Tighten the locknut onto the housing nut.
8. Tighten the collapsible bushing against the locknut.
9. Assemble the conduit connection assembly to the collapsible bushing.

Removal of Ball Valve Shaft and Sensor

WARNING: Do not loosen the housing nut (see Figure 8) when the ball valve unit is open and the process line or tank is filled and pressurized. Severe injury to personnel may result.

WARNING: Personnel should stand to the side, not directly behind the assembly, during insertion and removal of the sensor.

1. Carefully loosen and detach the locknut only.
2. Allow the sensor to enter into the ball valve unit isolation chamber (see Figure 8).

NOTE: Ensure that the sensor is against the housing nut mechanical stop (and has cleared the valve). Approximately 63.5 mm (2.5 in) of the shaft will be exposed.

3. Turn the handle on top of the ball valve unit (see Figure 8) to the close position (indicated by an arrow on top of the handle).

WARNING: Do not loosen the housing nut if a continuous leakage is observed through the port on the housing nut. Severe injury to personnel may result.

4. Slowly loosen housing nut.

CAUTION: There will be a release of pressure, and therefore some leakage. Wait until leakage stops before removing the housing nut completely.

Check to be sure that the ball valve is completely closed. If the leakage continues, then the ball valve is not closing properly. The process line or tank may have to be emptied and depressurized.

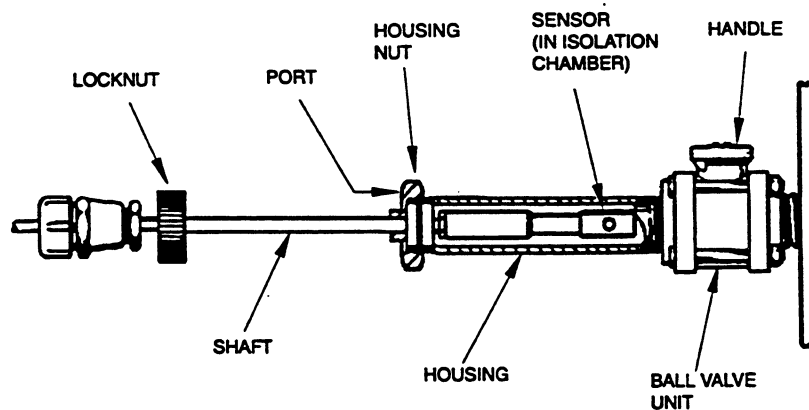


Figure 8. Ball Valve Shaft Removal

5. Remove the housing nut and withdraw the shaft assembly from the housing isolation chamber.

CAUTION: *The housing isolation chamber is normally filled with a process solution during operation. Be particularly careful when removing the sensor.*

Flange Installation (All Sensor Types)

Foxboro flanges are used for permanent installations in pipelines and tanks. Flanges are used with electrodeless conductivity sensors in systems using 2-inch and larger process piping. Flanges come complete with locknut and one or two spacers. Refer to Table 2 for flange specifications, and to Figure 9 for a typical flange installation.

NOTES:

1. One or two spacers are used depending on flange thickness. The O-ring must be positioned correctly for proper spacing.
 2. If the sensor will be exposed to moisture (e.g., rain, hosing, condensation, etc.), the cable end of the sensor must be further protected. Refer to "In-Situ Installation" section and perform Steps 1 through 9; replace support pipe with appropriate electrical conduit.
 3. If an 871EC-HP or -BW Sensor is to be installed in a digester line in the Pulp and Paper Industry, the use of an ANSI Class 300 Flange (NOT an MSS-SP-51 Class 150LW Flange) is recommended.
-

Table 5. Flange Specifications

Flange Size*	Foxboro Part	Flange Material	Used With 871EC Sensor Body Codes
2 in(a)	0051199	316 ss	-TF, -NL, -SP, -HP
2 in(c)	BS805PL	316 ss	-TF, -NL, -SP, -HP
DN 50(b)	BS805JL	316 ss	-TF, -NL, -SP, -HP
2 1/2 in(a)	0051196	316 ss	-TF, -NL, -SP, -HP
3 in(a)	0051197	316 ss	-TF, -NL, -SP, -HP
3 in(c)	BS805PM	316 ss	-TF, -NL, -SP, -HP
4 in(a)	0051198	316 ss	-EV, -TF, -NL, -SP, -HP
4 in(a)	BS805XQ	316 ss	-RE, -LB, -BW, -UT
4 in(c)	BS805PN	316 ss	-EV, -TF, -NL, -SP, -HP
4 in(c)	BS805XS	316 ss	-RE, -LB, -BW, -UT
DN 100(b)	BS805JM	316 ss	-EV, -TF, -NL, -SP, -HP

*Flange Pressure and Temperature Ratings are per Notes a, b, and c below:

(a)MSS-SP-51 Class 150LW

(b)DIN 2501, 10 bar

(c)ANSI Class 300

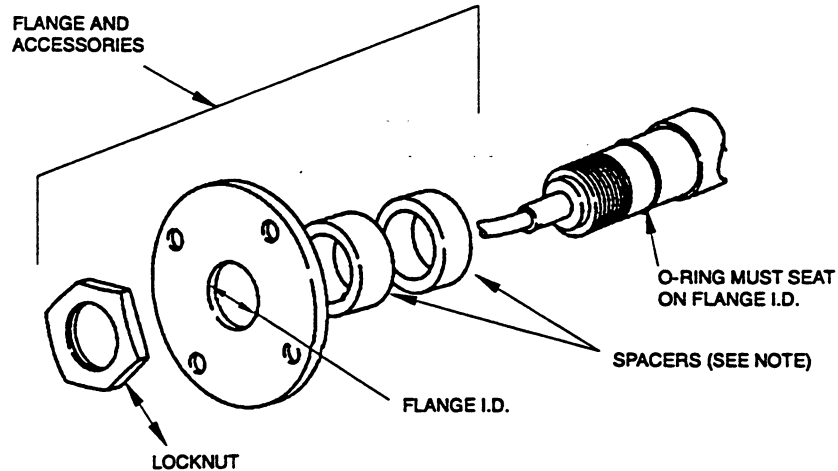


Figure 9. Typical Flange Installation

Bushing Installation (Sensor Types -TF, -SP, -NL, and -HP Only)

Foxboro bushings (locknuts supplied) are used for permanent installations in pipelines and tanks. Refer to Table 3 for bushing specifications and to Figure 10 for a typical bushing installation.

NOTE: If the sensor will be exposed to moisture (e.g., rain, hosing, condensation, etc.), the cable end of the sensor must be further protected.

Refer to "In-Situ Installation" section and perform Steps 1 through 9, except replace support pipe with appropriate electrical conduit.

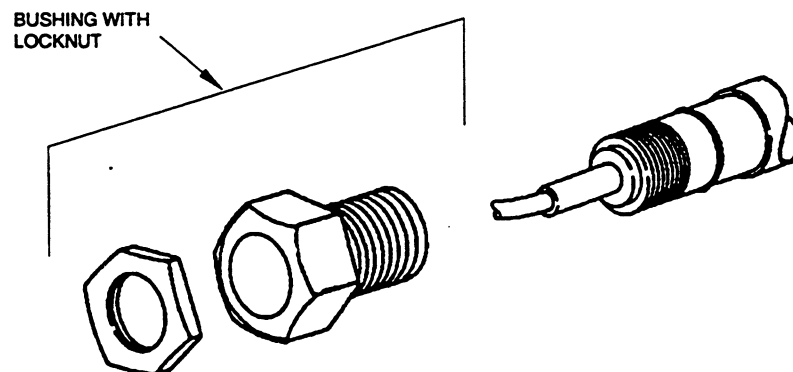


Figure 10. Typical Bushing Installation

Table 6. Hex-Head Bushing Specifications

Material	Foxboro Part	Thread Size	Rated Pressure		Maximum Temperature at Rated Pressure		Used with 871EC Sensor Body Codes
			MPa	psi	°C	°F	
316 ss	0051192 BS805JJ 0051193 BS805JC	1 1/2 NPT	1.75	250	200	390	-TF, -NL, -SP, -HP
		R 1 1/2 metric					
		2 NPT					
		R2 metric					
Carpenter 20 Cb	0051177 BS805JK 0051178 BS805JD	1 1/2 NPT	1.75	250	200	390	-TF, -NL, -SP, -HP
		R 1 1/2 metric					
		2 NPT					
		R2 metric					
Kynar	BS805JF BS805JH BS805HZ BS805JB	1 1/2 NPT	1.0	150	25	75	-TF, -NL, -SP, -HP
		R 1 1/2 metric	0.4	60	80	180	
		2 NPT	0.2	30	120	250	
		R2 metric					
Noryl	BS805JE BS805JG BS805HY BS805JA	1 1/2 NPT	1.0	200	25	75	-TF, -NL, -SP, -HP
		R 1 1/2 metric	0.7	100	80	180	
		2 NPT	0.3	50	105	220	
		R2 metric					

Optional Tri-Clamp Installation

Install the sensor to a 2 in Tri-Clamp flange (see Figure 11). The flange on the process tank, the gasket, and the clamp are supplied by the user.

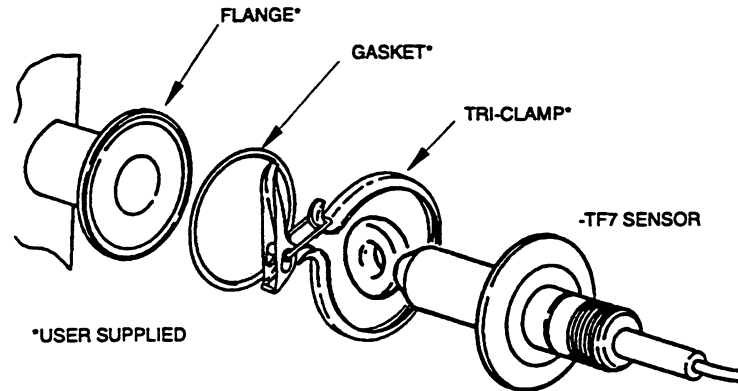


Figure 11. Optional Tri-Clamp Installation

In-Situ Installation

The sensor is supported by a length of DN 20 or 3/4 in pipe in a tank or stream. The sensor cable should be protected from damage by using flexible metal conduit.

NOTE: The end of the support pipe that is opposite from the sensor must be above the process solution (enough to prevent the process solution from entering into that end of the pipe).

CAUTION: To avoid damaging the sensor cable jacket, use care when removing the rubber strain relief.

1. Cut (as close to the end of the sensor as possible) and remove the rubber strain relief. See Figure 12(a).
2. Wrap several thicknesses of ptfе tape on the sensor threads. See Figure 12(b).

CAUTION: Do not damage the cable when installing the coupling.

3. Slide the 3/4 NPT coupling (user supplied) over the sensor cable and thread coupling onto sensor threads.

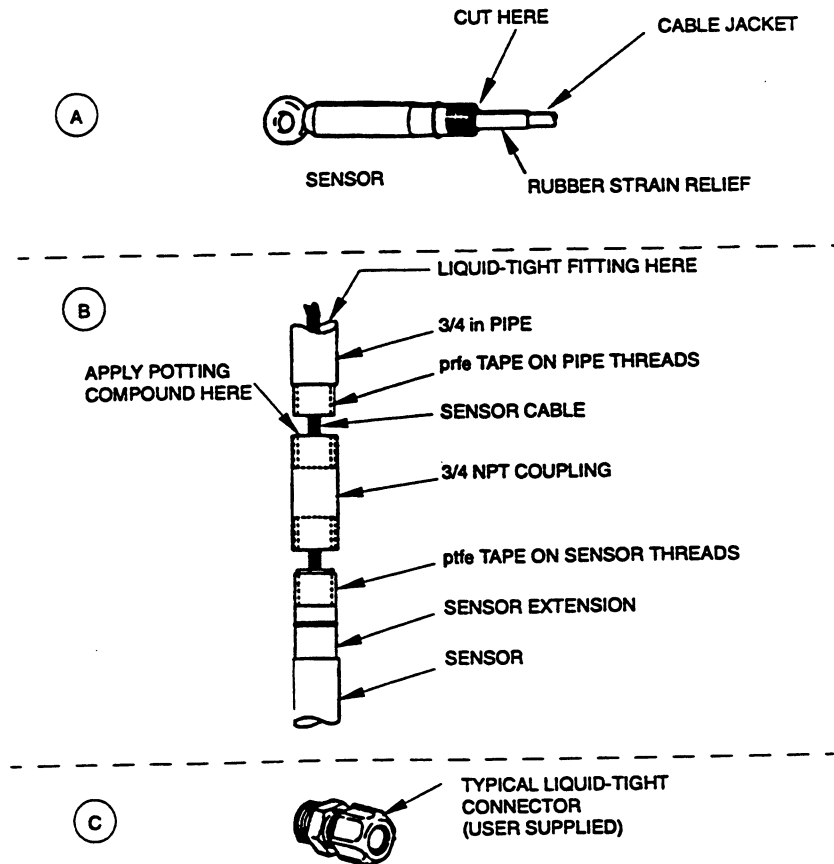


Figure 12. Typical In-Situ Installation

4. Prepare a potting compound (e.g., RTV or polyurethane). Follow manufacturer's instructions.
5. Pour potting compound into the top of the coupling. Fill to slightly below the top threads of the coupling.

NOTE: A DN 20 or 3/4 in pipe (user supplied) should be used to support the sensor and coupling.

6. Wrap ptfе tape on the pipe threads.
7. Slide the pipe over the sensor cable and thread the pipe to the 3/4 NPT coupling.
8. Install liquid-tight connector (user supplied) into the top of the pipe. See Figure 12(c).
9. Slide flexible conduit (user supplied) over the remainder of the cable up to the liquid-tight connector.

In-Line Installation

For in-line applications within a metal or plastic pipe (see Figure 13), the pipe must have a minimum inside diameter, as shown in Table 4, and the sensor should be aligned as closely as possible with the centerline of the pipe.

Table 7. Minimum Pipe Diameters

Sensor Body Code	Minimum Pipe Diameter
-HP	76 mm (3 in)
-NL	76 mm (3 in)
-SP	76 mm (3 in)
-TF	76 mm (3 in)
-AB	152 mm (6 in)
-BW	152 mm (6 in)
-EV	230 mm (9 in)
-LB	152 mm (6 in)
-RE	152 mm (6 in)
-UT	152 mm (6 in)

Larger pipe diameter should be used wherever possible.

NOTE: Whenever the minimum size pipe diameter is used, the system should be calibrated with the sensor in place and with a solution of known conductivity (within the range of the instrument's calibration).

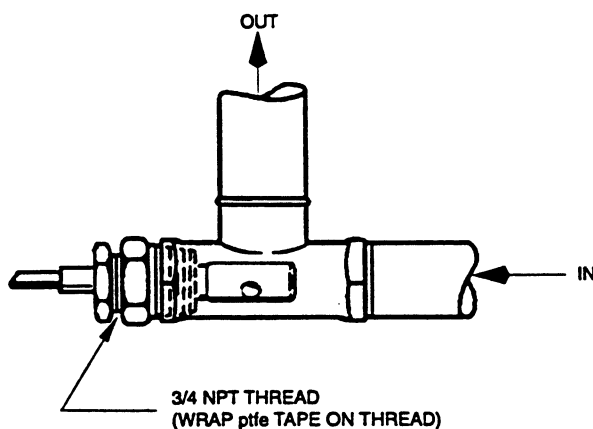


Figure 13. Typical In-Line Installation

Junction Box Installation

Junction Box Mounting

The junction box is used when the distance between sensor and monitor or transmitter is more than the maximum length of the sensor cable away.

NOTE: Maximum separation between sensor and monitor or transmitter is 30 m (100 ft).

CAUTION: Cable length must be considered so that connections can be made without exposing cable to damage.

1. Select a rigid surface and a position protected from damage or exposure to excessive moisture and corrosive fumes.
2. Position the junction box against the mounting surface and mark the location of the mounting holes.
3. Drill the mounting holes on the marked centers.
4. Mount the junction box with appropriate hardware (user supplied).

Junction Box Wiring

1. Remove the junction box cover and loosen the cable connectors (see Figure 14).
2. Insert the sensor cable through the appropriate connector and connect the numbered terminals of the sensor cable to the corresponding numbered terminals on the terminal strip.

NOTE: Sensor may not be located more than 30 m (100 ft) from 870EC Transmitter, 870ITEC Transmitter, or 873EC Analyzer.

3. Insert extension cable assembly through appropriate connector and connect the numbered terminals of extension cable assembly opposite the corresponding number.

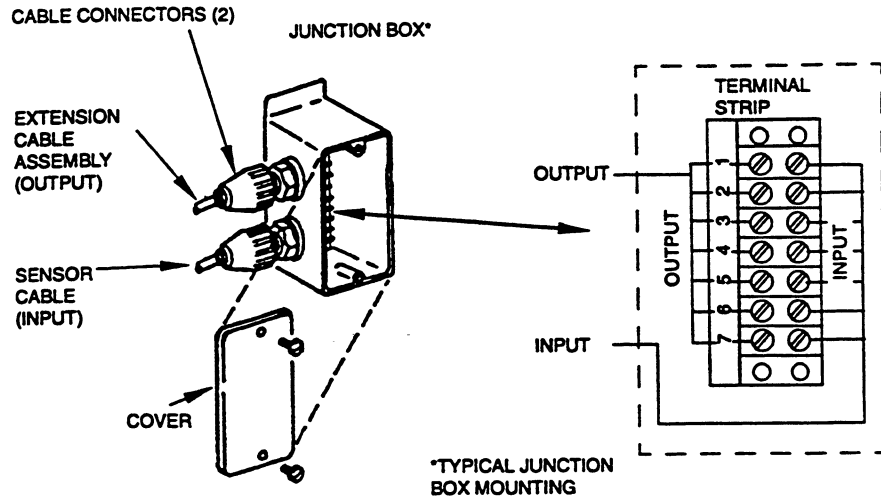


Figure 14. Junction Box Wiring

Degaussing

To degauss a sensor, use a degaussing tool such as that used for erasing magnetic tape. With degaussing tool power on, bring the tool close to the sensor and move the tool slowly around the sensor in close proximity. Then slowly move the tool far away from the sensor. Turn tool power off.

Sensor Resistance Check

NOTE: Use a high impedance meter when making these checks because a low impedance meter can cause the probe to become magnetized. Refer to Figure 15 for sensor cable resistances.

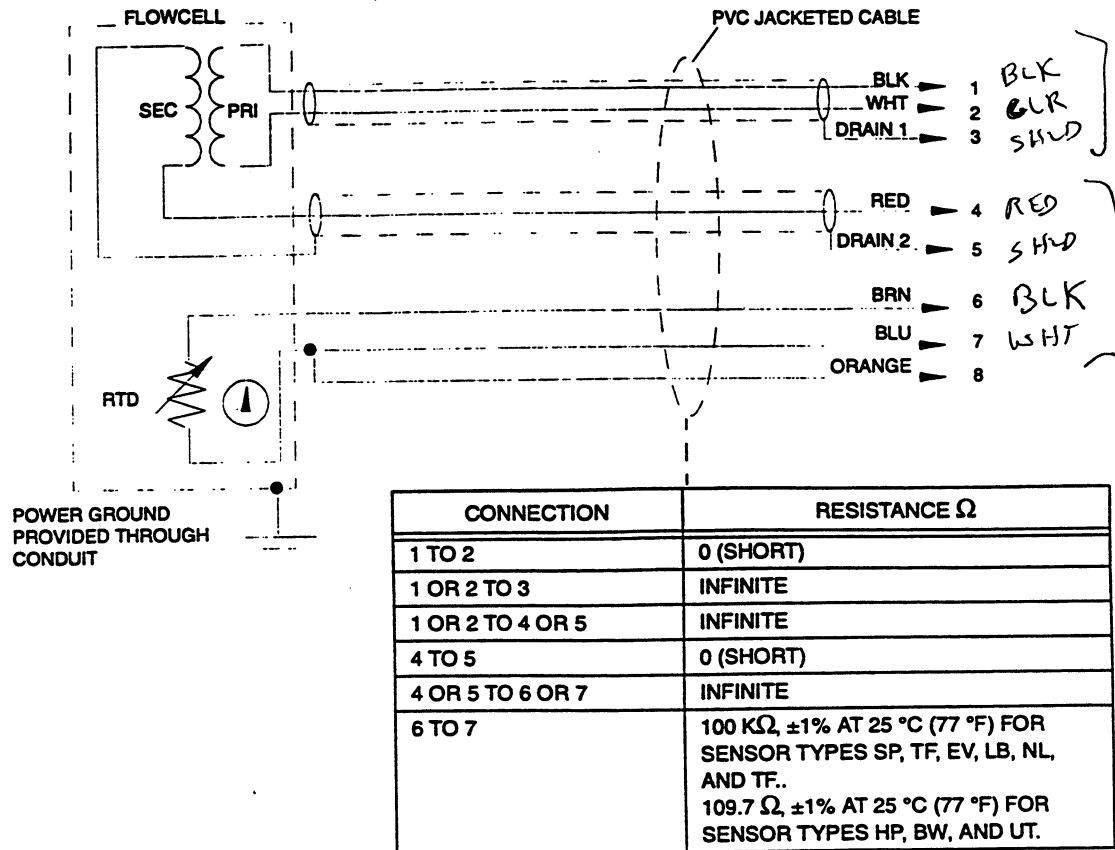


Figure 15. Sensor Cable Resistances

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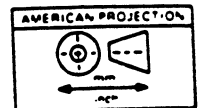
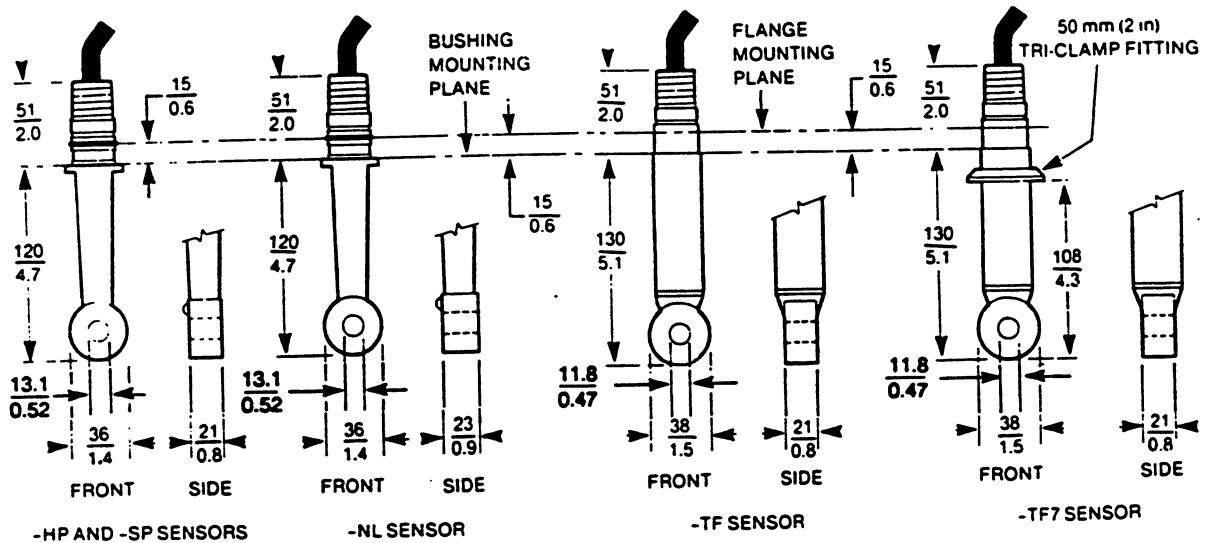
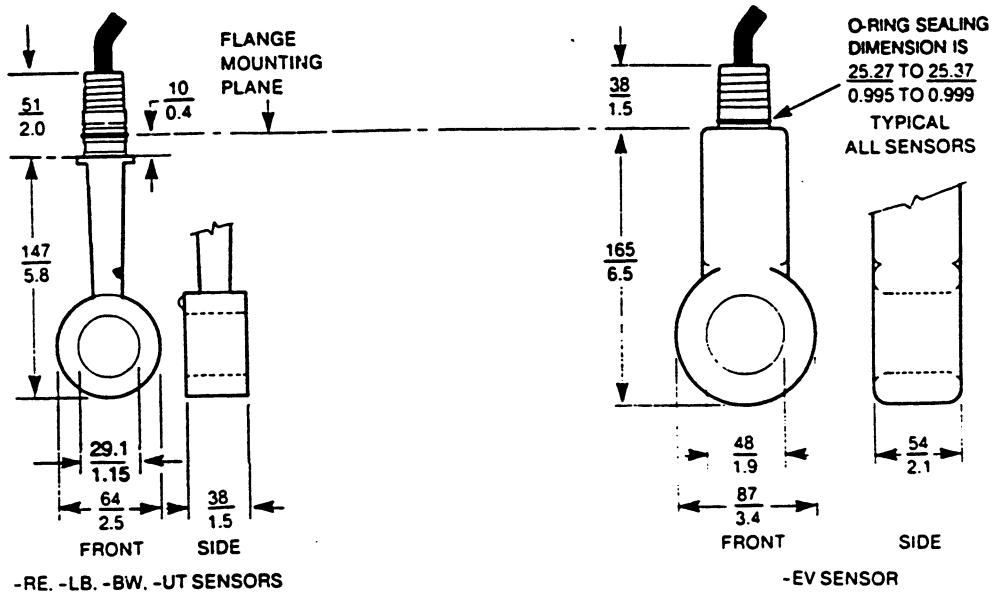
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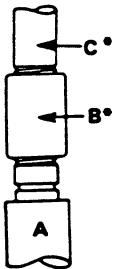
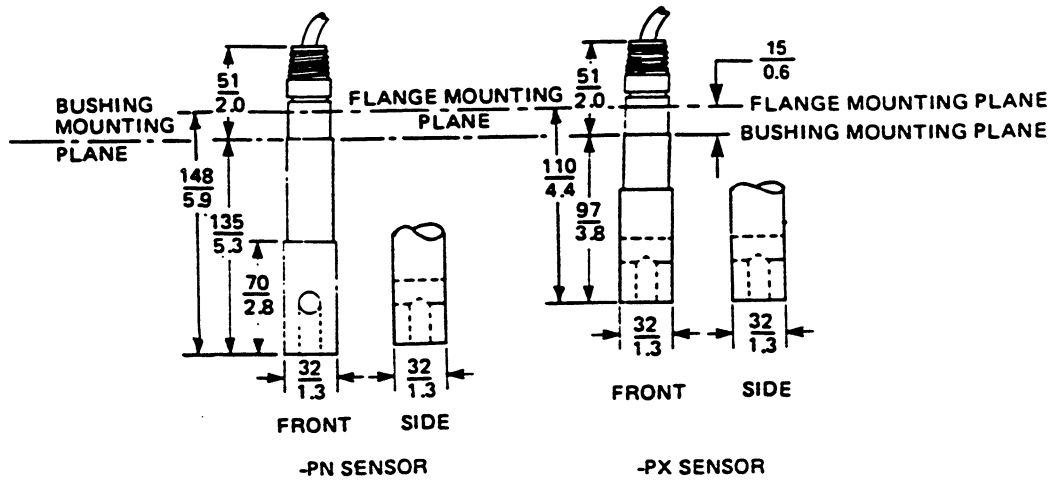
871EC ELECTRODELESS CONDUCTIVITY SENSORS

- NOTES: 1. SPACERS PROVIDED WITH FLANGE MUST BE UTILIZED.
 2. ALL FLANGE MOUNTING DIMENSIONS SHOWN ARE MAXIMUM VALUES.

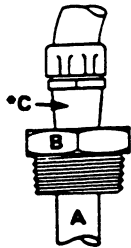


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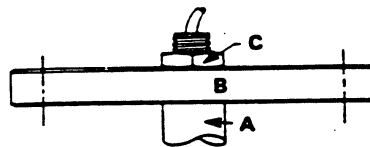
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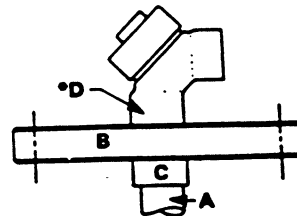
871EC SENSOR (A)
MOUNTED ON 3/4 NPT
COUPLING (B) AND
DN 20 OR 3/4 in PIPE (C)
FOR IN-SITU USE



-NL, -HP, -SP, -TF, -PN, OR -PX
SENSOR (A) MOUNTED ON
APPROPRIATE BUSHING (B)
USING CONDUIT CONNECTOR (C)



-RE, -LB, -UT, -BW, -EV, OR -AB SENSOR (A)
MOUNTED ON 4 in FLANGE (B)
USING LOCKNUT (C), OR -NL.
-HP, -SP, -TF, -PN OR -PX SENSOR
MOUNTED ON APPROPRIATE FLANGE



871EC SENSOR (A) MOUNTED ON
APPROPRIATE FLANGE (B)
WITH SPACER (C) USING
JUNCTION BOX (D)

* DENOTES USER PROVIDED EQUIPMENT

Tri-Clamp is a trademark of Tri-Clover Incorporated.

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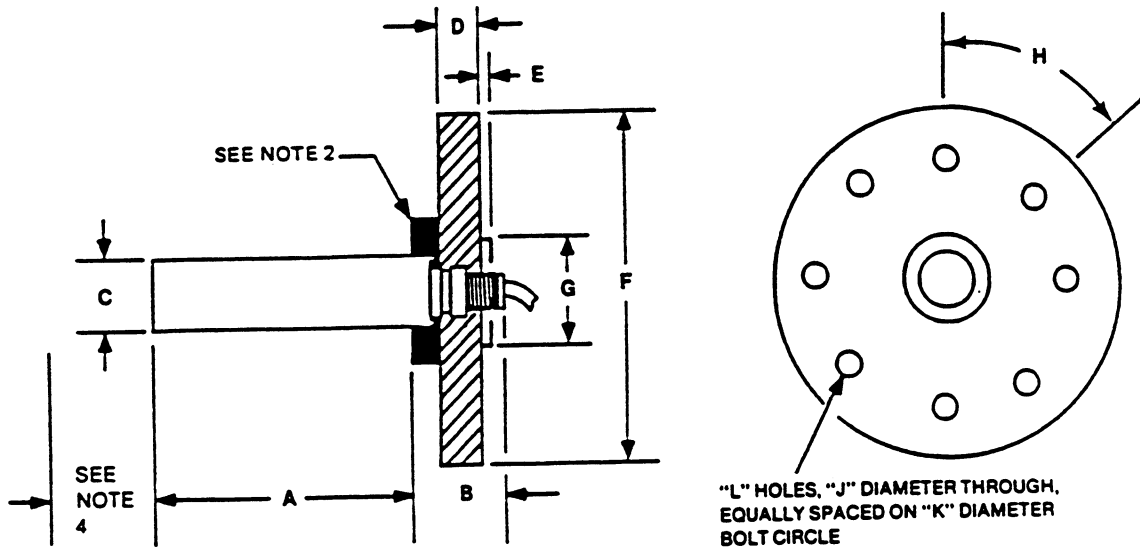
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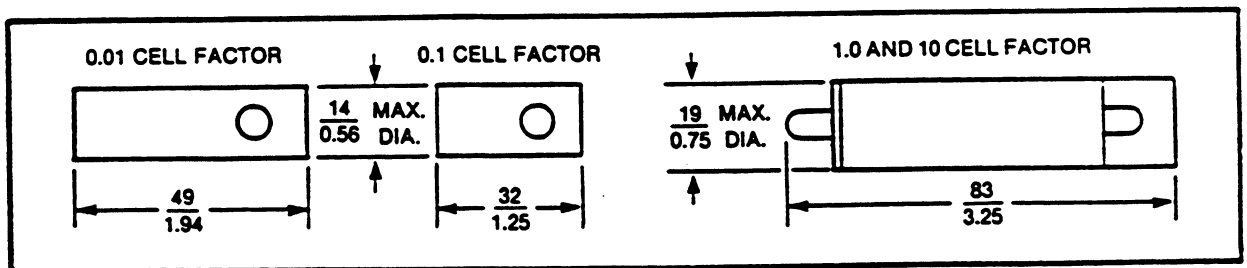
PAGE 1 OF 3

FLANGES (316 SS) USED WITH 871CC, 871EC, 910, 920, AND 1210 CONDUCTIVITY SENSORS



NOTES:

1. A 4 in FLANGE IS SHOWN WITH AN 871CC-B SENSOR. REFER TO TABLE 1 FOR OTHER APPLICABLE INSTALLATION DIMENSIONS.
2. NONE, ONE, OR TWO SPACERS ARE USED DEPENDING ON THE FLANGE THICKNESS (SEE TABLES 1, 2, OR 3).
3. THE SENSOR O-RING MUST BE POSITIONED CORRECTLY FOR PROPER SPACING.
4. FOR TOTAL SENSOR LENGTH (WHERE APPLICABLE), ADD CELL FACTOR LENGTH (SHOWN BELOW) TO THE LEFT OF THE SENSOR.



(Not for construction unless certified.)

CUSTOMER _____ I.R. _____
 CUSTOMER ORDER _____ FOXBORO ORDER _____
 ITEM-TAG _____

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Table 1. MSS-SP-51 Class 150LW

Size	Flange Part Number	Used With Sensor	Dimensions																Quantity of Holes L	Spacers						
			A		B		C		D		E		F		G		M	J		K		Quantity	mm	in		
			mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	Degrees	mm		in	mm				in	
2 in	0051199	871CC-B	64	2.5	51	20	27	1.1	13	0.50	9	0.34	152	6	44	1.73	90	19	0.75	121	4.75	4	1	4.8	0.19	
		871CC-J	64	2.5	51	20	27	1.1															1	9.5	0.38	
		871EC-NL	120	4.7	51	20	36	1.4																		
		871EC-HP	120	4.7	51	20	36	1.4																		
		871EC-SP	120	4.7	51	20	36	1.4																		
		871EC-PN	135	5.3	51	20	32	1.3																		
		871EC-PX	97	3.8	51	20	32	1.3																		
		871EC-TF	130	5.1	51	20	38	1.5																		
		910-EB	64	2.5	51	20	27	1.1																		
		910-MB	64	2.5	51	20	27	1.1																		
		920-EB	64	2.5	51	20	27	1.1																		
		920-MB	64	2.5	51	20	27	1.1																		
		1210PN	135	5.3	51	20	32	1.3																		
		1210PX	135	5.3	51	20	32	1.3																		
1210TF	130	5.1	51	20	38	1.5																				
2 1/2 in	0051196	871CC-B	64	2.5	51	20	27	1.1	14	0.56	9	0.34	178	7	44	1.73	90	19	0.75	140	5.50	4	1	4.8	0.19	
		871CC-J	64	2.5	51	20	27	1.1															1	9.5	0.38	
		871EC-NL	120	4.7	51	20	36	1.4																		
		871EC-HP	120	4.7	51	20	36	1.4																		
		871EC-SP	120	4.7	51	20	36	1.4																		
		871EC-PN	135	5.3	51	20	32	1.3																		
		871EC-PX	97	3.8	51	20	32	1.3																		
		871EC-TF	130	5.1	51	20	38	1.5																		
		910-EB	64	2.5	51	20	27	1.1																		
		910-MB	64	2.5	51	20	27	1.1																		
		920-EB	64	2.5	51	20	27	1.1																		
		920-MB	64	2.5	51	20	27	1.1																		
		1210PN	135	5.3	51	20	32	1.3																		
		1210PX	135	5.3	51	20	32	1.3																		
1210GL	64	2.5	51	20	41	1.6																				
1210TF	130	5.1	51	20	38	1.5																				
3 in	0051197	871CC-B	64	2.5	51	20	27	1.1	16	0.62	9	0.34	191	7.5	44	1.73	90	19	0.75	152	6.0	4	1	9.5	0.38	
		871CC-J	64	2.5	51	20	27	1.1																		
		871EC-NL	120	4.7	51	20	36	1.4																		
		871EC-HP	120	4.7	51	20	36	1.4																		
		871EC-SP	120	4.7	51	20	36	1.4																		
		871EC-PN	135	5.3	51	20	32	1.3																		
		871EC-PX	97	3.8	51	20	32	1.3																		
		871EC-TF	130	5.1	51	20	38	1.5																		
		910-EB	64	2.5	51	20	27	1.1																		
		910-MB	64	2.5	51	20	27	1.1																		
		920-EB	64	2.5	51	20	27	1.1																		
		920-MB	64	2.5	51	20	27	1.1																		
		1210PN	135	5.3	51	20	32	1.3																		
		1210PX	135	5.3	51	20	32	1.3																		
1210GL	64	2.5	51	20	41	1.6																				
1210TF	130	5.1	51	20	38	1.5																				
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		871CC-J	64	2.5	51	20	27	1.1																		
		871EC-NL	120	4.7	51	20	36	1.4																		
		871EC-HP	120	4.7	51	20	36	1.4																		
		871EC-SP	120	4.7	51	20	36	1.4																		
		871EC-PN	135	5.3	51	20	32	1.3																		
		871EC-PX	97	3.8	51	20	32	1.3																		
		871EC-TF	130	5.1	51	20	38	1.5																		
		871EC-EV	165	6.5	38	1.5	87	3.4	18	0.69	9	0.34	229	9	44	1.73	45	19	0.75	191	7.5	8	0	-	-	
		871EC-AB	171	6.8	35	1.4	94	3.7																		
		910-EB	64	2.5	51	20	27	1.1	18	0.69	9	0.34	229	9	44	1.73	45	19	0.75	191	7.5	8	1	9.5	0.38	
		910-MB	64	2.5	51	20	27	1.1																		
		920-EB	64	2.5	51	20	27	1.1																		
		920-MB	64	2.5	51	20	27	1.1																		
1210PN	135	5.3	51	20	32	1.3																				
1210PX	135	5.3	51	20	32	1.3																				
1210GL	64	2.5	51	20	41	1.6																				
1210TF	130	5.1	51	20	38	1.5																				
4 in	B5805XQ	871EC-RE	147	5.8	51	20	64	2.5	18	0.69	9	0.34	229	9	44	1.73	45	19	0.75	191	7.5	8	1	9.5	0.38	
		871EC-LB																								
		871EC-BW																								
		871EC-UT																								

Table 2. DN 2501, 10 bar Flanges

Size	Flange Part Number	Used With Sensor	Dimensions																		Quantity of Holes L	Spacers					
			A		B		C		D		E		F		G		H	J		K		Quantity	mm	in			
			mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	Degrees	mm	in	mm					in		
DIN 50	BS805JL	871CC-B	64	2.5	51	2.0	27	1.1	18	0.71	9	0.34	165	6.5	44	1.73	90	18	0.71	125	4.9	4	1	95	0.38		
		871CC-J	64	2.5	51	2.0	27	1.1																			
		871EC-PN	135	5.3	51	2.0	32	1.3																			
		871EC-PX	97	3.8	51	2.0	32	1.3																			
		871EC-NL	120	4.7	51	2.0	36	1.4																			
		871EC-HP	120	4.7	51	2.0	36	1.4																			
		871EC-SP	120	4.7	51	2.0	36	1.4																			
		871EC-TF	130	5.1	51	2.0	38	1.5																			
		910-EB	64	2.5	51	2.0	27	1.1																			
		910-HB	64	2.5	51	2.0	27	1.1																			
		920-EB	64	2.5	51	2.0	27	1.1																			
		920-HB	64	2.5	51	2.0	27	1.1																			
		1210PN	135	5.3	51	2.0	32	1.3																			
		1210PX	135	5.3	51	2.0	32	1.3																			
1210TF	130	5.1	51	2.0	38	1.5																					
DIN 100	BS805JM	871CC-B	64	2.5	51	2.0	27	1.1	20	0.79	9	0.34	220	8.7	44	1.13	45	18	0.71	180	7.1	8	1	95	0.38		
		871CC-J	64	2.5	51	2.0	27	1.1																			
		871EC-NL	120	4.7	51	2.0	36	1.4																			
		871EC-HP	120	4.7	51	2.0	36	1.4																			
		871EC-SP	120	4.7	51	2.0	36	1.4																			
		871EC-PN	135	6.3	51	2.0	32	1.3																			
		871EC-PX	97	3.8	51	2.0	32	1.3																			
		871EC-TF	130	5.1	51	2.0	38	1.5																			
		871EC-EV	165	6.5	38	1.5	87	3.4																			
		871EC-AB	171	6.8	35	1.4	94	3.7																			
		910-EB	64	2.5	51	2.0	27	1.1																			
		910-HB	64	2.5	51	2.0	27	1.1																			
		920-EB	64	2.5	51	2.0	27	1.1																			
		920-HB	64	2.5	51	2.0	27	1.1																			
		1210PN	135	5.3	51	2.0	32	1.3																			
		1210PX	135	5.3	51	2.0	32	1.3																			
		1210GL	64	2.5	51	2.0	41	1.6																			
		1210TF	130	5.1	51	2.0	38	1.5																			

Table 3. ANSI Class 300 Flanges

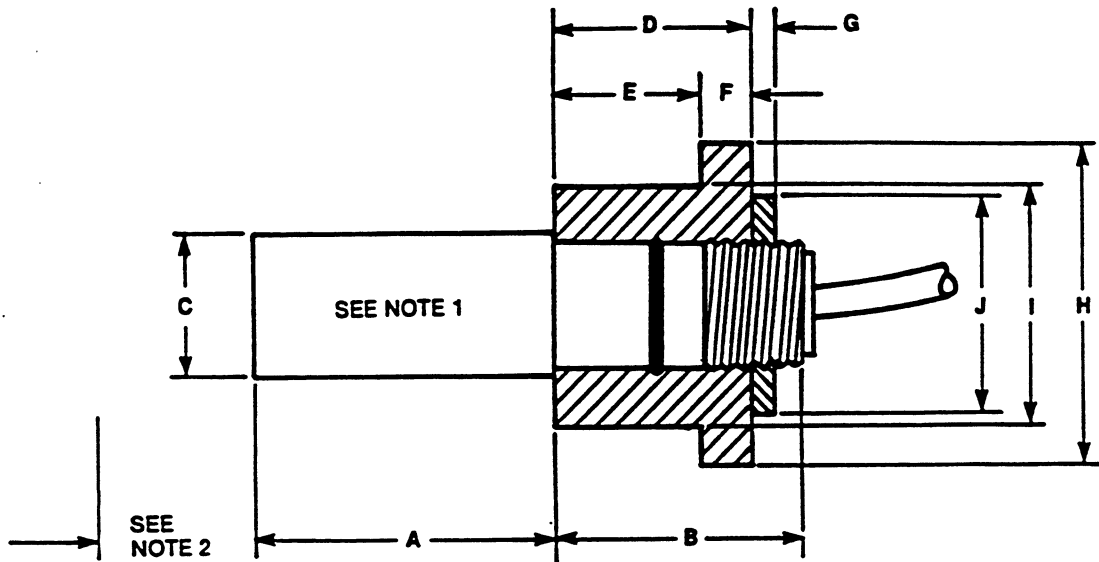
Size	Flange Part Number	Used With Sensor	Dimensions																		Quantity of Holes L	Spacers				
			A		B		C		D		E		F		G		H	J		K		Quantity	mm	in		
			mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	Degrees	mm	in	mm	in							
2 in	BS805PL	871EC-HP	120	4.7	51	2.0	36	1.4	22	0.87	9	0.34	165	6.5	44	1.73	45	19	0.75	127	5.00	8	1	95	0.38	
		871EC-SP																								
3 in	BS805PM	871EC-HP	120	4.7	51	2.0	36	1.4	28	1.12	9	0.34	208	8.2	44	1.73	45	22	0.87	168	6.62	8	1	4.8	0.19	
		871EC-SP																								
4 in	BS805PN	871EC-HP	120	4.7	51	2.0	36	1.4	32	1.25	9	0.34	254	10	44	1.73	45	22	0.87	200	7.87	8	1	4.8	0.19	
		871EC-SP																								
4 in	BS805XS	871EC-RE	147	5.8	51	2.0	64	2.5	32	1.25	9	0.34	254	10	44	1.73	45	22	0.87	200	7.87	8	1	4.8	0.19	
		871EC-LB																								
		871EC-BW																								
		871EC-UT																								



Dimensional Print

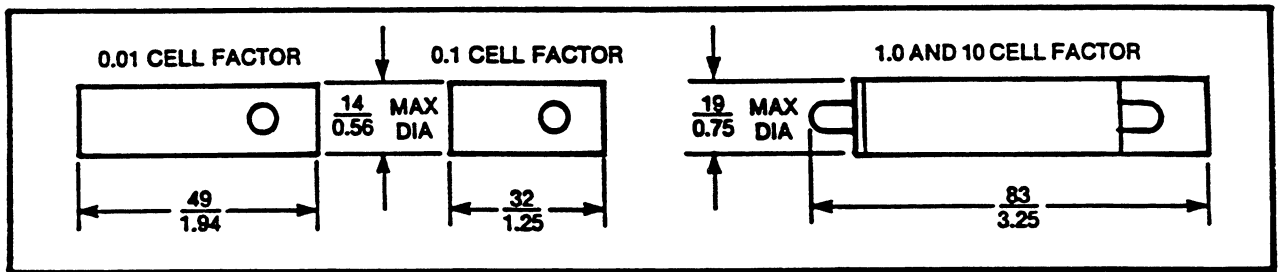
DP
611-105
JANUARY 1987
PAGE 1 OF 4

UNIVERSAL MOUNTING BUSHING USED WITH 871CC, 871EC, 910, 920, AND 1210 CONDUCTIVITY SENSORS



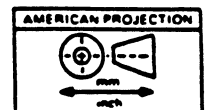
NOTES:

1. AN 871CC (MODEL CODE -B or -J) SENSOR IS ILLUSTRATED. REFER TO TABLE 1 FOR APPLICABLE USER'S INSTALLATION.
2. FOR TOTAL SENSOR LENGTH (WHERE APPLICABLE), ADD CELL FACTOR LENGTH (SHOWN BELOW) TO THE LEFT OF THE SENSOR.



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 ITEM-TAG _____



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MB 123

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Table 1. Universal Mounting Bushing

Thread Size (In)	Material	Bushing Part Number	Used With Sensor	Dimensions																						
				A		B		C		D		E		F		G		H		I		J				
				mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In			
1 1/4 NPT	316 ss	0051191	871CC-B	64	2.5	51	2.0	27	1.1	35	1.37	21	0.81	14	0.56	9	0.34	51	2.02	42	1.66	44	1.73			
			871CC-J	64	2.5	51	2.0	27	1.1																	
			871EC-PN	135	5.3	51	2.0	32	1.3																	
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			910-EB	64	2.5	51	2.0	27	1.1																	
			910-HB	64	2.5	51	2.0	27	1.1																	
			920-EB	64	2.5	51	2.0	27	1.1																	
			920-HB	64	2.5	51	2.0	27	1.1																	
			1210PN	135	5.3	51	2.0	32	1.3																	
			1210PX	97	3.8	51	2.0	32	1.3																	
1 1/4 NPT	Carpenter 20 Cb	0051176	871CC-B	64	2.5	51	2.0	27	1.1	35	1.37	21	0.81	14	0.56	9	0.34	51	2.02	42	1.66	44	1.73			
			871CC-J	64	2.5	51	2.0	27	1.1																	
			871EC-PN	135	5.3	51	2.0	32	1.3																	
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			910-EB	64	2.5	51	2.0	27	1.1																	
			910-HB	64	2.5	51	2.0	27	1.1																	
			920-EB	64	2.5	51	2.0	27	1.1																	
			920-HB	64	2.5	51	2.0	27	1.1																	
			1210PN	135	5.3	51	2.0	32	1.3																	
			1210PX	97	3.8	51	2.0	32	1.3																	
1 1/2 NPT	316 ss	0051192	871CC-B	64	2.5	51	2.0	27	1.1	38	1.50	22	0.88	16	0.62	9	0.34	59	2.31	48	1.90	44	1.73			
			871CC-J	64	2.5	51	2.0	27	1.1																	
			871EC-AM	130	5.1	51	2.0	38	1.5																	
			871EC-NL	120	4.7	51	2.0	36	1.4																	
			871EC-HP	120	4.7	51	2.0	36	1.4																	
			871EC-SP	120	4.7	51	2.0	36	1.4																	
			871EC-PN	135	5.3	51	2.0	32	1.3																	
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			871EC-TF	130	5.1	51	2.0	38	1.5																	
			910-EB	64	2.5	51	2.0	27	1.1																	
			910-HB	64	2.5	51	2.0	27	1.1																	
			920-EB	64	2.5	51	2.0	27	1.1																	
			920-HB	64	2.5	51	2.0	27	1.1																	
			1210PN	135	5.3	51	2.0	32	1.3																	
1210PX	97	3.8	51	2.0	32	1.3																				
1210TF	130	5.1	51	2.0	38	1.5																				
1 1/2 NPT	Carpenter 20 Cb	0051177	871CC-B	64	2.5	51	2.0	27	1.1	38	1.50	22	0.88	16	0.62	9	0.34	59	2.31	48	1.90	44	1.73			
			871CC-J	64	2.5	51	2.0	27	1.1																	
			871EC-AM	130	5.1	51	2.0	38	1.5																	
			871EC-NL	120	4.7	51	2.0	36	1.4																	
			871EC-HP	120	4.7	51	2.0	36	1.4																	
			871EC-SP	120	4.7	51	2.0	36	1.4																	
			871EC-PN	135	5.3	51	2.0	32	1.3																	
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			871EC-TF	130	5.1	51	2.0	38	1.5																	
			910-EB	64	2.5	51	2.0	27	1.1																	
			910-HB	64	2.5	51	2.0	27	1.1																	
			920-EB	64	2.5	51	2.0	27	1.1																	
			920-HB	64	2.5	51	2.0	27	1.1																	
			1210PN	135	5.3	51	2.0	32	1.3																	
1210PX	97	3.8	51	2.0	32	1.3																				
1210TF	130	5.1	51	2.0	38	1.5																				
2 NPT	316 ss	0051193	871CC-B	64	2.5	51	2.0	27	1.1	41	1.63	24	0.94	18	0.69	9	0.34	73	2.89	60	2.38	44	1.73			
			871CC-J	64	2.5	51	2.0	27	1.1																	
			871EC-AM	130	5.1	51	2.0	38	1.5																	
			871EC-NL	120	4.7	51	2.0	36	1.4																	
			871EC-HP	120	4.7	51	2.0	36	1.4																	
			871EC-SP	120	4.7	51	2.0	36	1.4																	
			871EC-PN	135	5.3	51	2.0	32	1.3																	
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			871EC-TF	130	5.1	51	2.0	38	1.5																	
			910-EB	64	2.5	51	2.0	27	1.1																	
			910-HB	64	2.5	51	2.0	27	1.1																	
			920-EB	64	2.5	51	2.0	27	1.1																	
			920-HB	64	2.5	51	2.0	27	1.1																	
			1210PN	135	5.3	51	2.0	32	1.3																	
1210PX	97	3.8	51	2.0	32	1.3																				
1210GL	64	2.5	51	2.0	41	1.6																				
1210TF	130	5.1	51	2.0	38	1.5																				

Table 1. Universal Mounting Bushing (Cont.)

Thread Size (in)	Material	Bushing Part Number	Used With Sensor	Dimensions																						
				A		B		C		D		E		F		G		H		I		J				
				mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in			
2 NPT	Carpenter 20 Cb	0051178	871CC-B	64	2.5	51	2.0	27	1.1	41	1.63	24	0.94	18	0.69	9	0.34	73	2.89	60	2.38	44	1.73			
			871CC-J	64	2.5	51	2.0	27	1.1																	
			871EC-AM	130	5.1	51	2.0	38	1.5																	
			871EC-NL	120	4.7	51	2.0	36	1.4																	
			871EC-HP	120	4.7	51	2.0	36	1.4																	
			871EC-SP	120	4.7	51	2.0	36	1.4																	
			871EC-PN	135	5.3	51	2.0	32	1.3																	
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			871EC-TF	130	5.1	51	2.0	38	1.5																	
			910-EB	64	2.5	51	2.0	27	1.1																	
			910-HB	64	2.5	51	2.0	27	1.1																	
			920-EB	64	2.5	51	2.0	27	1.1																	
			920-HB	64	2.5	51	2.0	27	1.1																	
			1210PN	135	5.3	51	2.0	32	1.3																	
			1210PX	97	3.8	51	2.0	32	1.3																	
1210GL	64	2.5	51	2.0	41	1.6																				
1210TF	130	5.1	51	2.0	38	1.5																				
1 1/2 NPT	Kynar Noryl	BS805JF BS805JE	871EC-PN	135	5.3	51	2.0	32	1.3	38	1.51	22	0.88	16	0.63	9	0.34	59	2.31	48	1.90	44	1.73			
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			871EC-NL	120	4.7	51	2.0	36	1.4																	
			871EC-HP	120	4.7	51	2.0	36	1.4																	
			871EC-SP	120	4.7	51	2.0	36	1.4																	
			871EC-TF	130	5.1	51	2.0	38	1.5																	
			1210PN	135	5.3	51	2.0	32	1.3																	
			1210PX	97	3.8	51	2.0	32	1.3																	
1210TF	130	5.1	51	2.0	38	1.5																				
2 NPT	Kynar Noryl	BS805HZ BS805HY	871EC-PN	135	5.3	51	2.0	32	1.3	39	1.55	23	0.92	16	0.63	9	0.34	73	2.89	60	2.38	44	1.73			
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			871EC-NL	120	4.7	51	2.0	36	1.4																	
			871EC-HP	120	4.7	51	2.0	36	1.4																	
			871EC-SP	120	4.7	51	2.0	36	1.4																	
			871EC-TF	130	5.1	51	2.0	38	1.5																	
			1210PN	135	5.3	51	2.0	32	1.3																	
			1210PX	97	3.8	51	2.0	32	1.3																	
			1210TF	130	5.1	51	2.0	38	1.5																	
R 1 1/2 Metric	316 ss Carpenter 20 Cb	BS805JJ BS805JK	871CC-B	64	2.5	51	2.0	27	1.1	36	1.4	20	0.77	16	0.63	9	0.34	59	2.31	48	1.90	44	1.73			
			871CC-J	64	2.5	51	2.0	27	1.1																	
			871EC-PN	135	5.3	51	2.0	32	1.3																	
			871EC-PX	97	3.8	51	2.0	32	1.3																	
			871EC-NL	120	4.7	51	2.0	36	1.4																	
			871EC-HP	120	4.7	51	2.0	36	1.4																	
			871EC-SP	120	4.7	51	2.0	36	1.4																	
			871EC-TF	130	5.1	51	2.0	38	1.5																	
			910-EB	64	2.5	51	2.0	27	1.1																	
			910-HB	64	2.5	51	2.0	27	1.1																	
			920-EB	64	2.5	51	2.0	27	1.1																	
			920-HB	64	2.5	51	2.0	27	1.1																	
			1210PN	135	5.3	51	2.0	32	1.3																	
			1210PX	97	3.8	51	2.0	32	1.3																	
			1210TF	130	5.1	51	2.0	38	1.5																	

Table 1. Universal Mounting Bushing (Cont.)

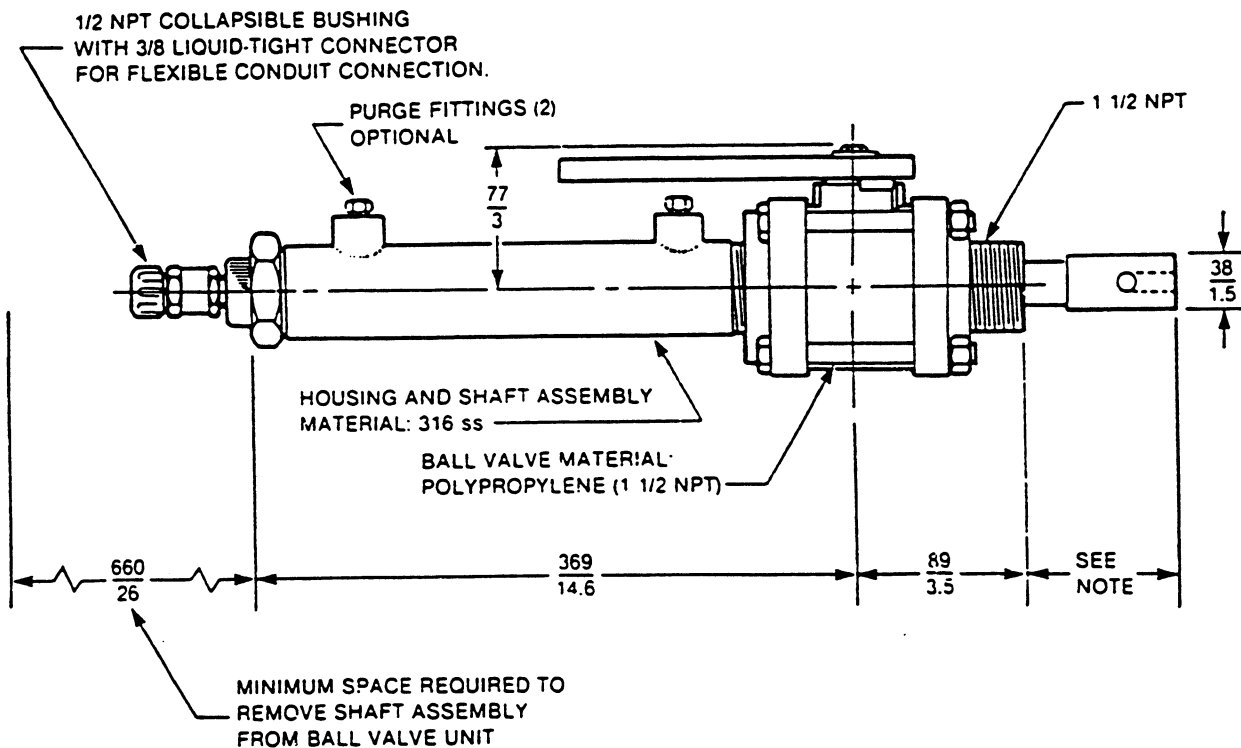
Thread Size (In)	Material	Bushing Part Number	Used With Sensor	Dimensions																			
				A		B		C		D		E		F		G		H		I		J	
				mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In
R 1 1/2 Metric	Kynar Noryl	BS805JH	871EC-PN	135	5.3	51	2.0	32	1.3	36	1.4	20	0.77	16	0.63	9	0.34	59	2.31	48	1.90	44	1.73
			871EC-PX	97	3.8	51	2.0	32	1.3														
		BS805JG	871EC-NL	120	4.7	51	2.0	36	1.4														
			871EC-HP	120	4.7	51	2.0	36	1.4														
			871EC-SP	120	4.7	51	2.0	36	1.4														
			871EC-TF	130	5.1	51	2.0	38	1.5														
			1210PN	135	5.3	51	2.0	32	1.3														
			1210PX	97	3.8	51	2.0	32	1.3														
			1210TF	130	5.1	51	2.0	38	1.5														
R 2 Metric	316 ss Carpenter 20 Cb	BS805JC	871CC-B	64	2.5	51	2.0	27	1.1	39	1.55	23	0.92	16	0.63	9	0.34	73	2.89	60	2.38	44	1.73
			871CC-J	64	2.5	51	2.0	27	1.1														
		BS805JD	871EC-PN	135	5.3	51	2.0	32	1.3														
			871EC-PX	97	3.8	51	2.0	32	1.3														
			871EC-NL	120	4.7	51	2.0	36	1.4														
			871EC-HP	120	4.7	51	2.0	36	1.4														
			871EC-SP	120	4.7	51	2.0	36	1.4														
			871EC-TF	130	5.1	51	2.0	38	1.5														
			910-EB	64	2.5	51	2.0	27	1.1														
			910-HB	64	2.5	51	2.0	27	1.1														
			920-EB	64	2.5	51	2.0	27	1.1														
			920-HB	64	2.5	51	2.0	27	1.1														
			1210PN	135	5.3	51	2.0	32	1.3														
			1210PX	97	3.8	51	2.0	32	1.3														
			1210GL	64	2.5	51	2.0	41	1.6														
			1210TF	130	5.1	51	2.0	38	1.5														
R 2 Metric	Kynar Noryl	BS805JB	871EC-PN	135	5.3	51	2.0	32	1.3	39	1.55	23	0.92	16	0.63	9	0.34	73	2.89	60	2.38	44	1.73
			871EC-PX	97	3.8	51	2.0	32	1.3														
		BS805JA	871EC-NL	120	4.7	51	2.0	36	1.4														
			871EC-HP	120	4.7	51	2.0	36	1.4														
			871EC-SP	120	4.7	51	2.0	36	1.4														
			871EC-TF	130	5.1	51	2.0	38	1.5														
			1210PN	135	5.3	51	2.0	32	1.3														
			1210PX	97	3.8	51	2.0	32	1.3														
			1210GL	64	2.5	51	2.0	41	1.6														
			1210TF	130	5.1	51	2.0	38	1.5														

Dimensional Print

DP
611-142
 February 1991

BALL VALVE ASSEMBLY FOR ELECTRODELESS CONDUCTIVITY SENSORS

USED WITH 871EC-PN SENSOR



NOTE:

THIS DIMENSION NORMALLY 77 (3). LONGER INSERTION LENGTHS AVAILABLE ON SPECIAL ORDER.

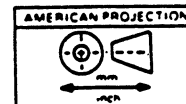
DESCRIPTION	FOXBORO PART
WITH PURGEABLE HOUSING	BS805JS(a)
WITH NONPURGEABLE HOUSING	BS805JR(b)

(a) PREVIOUSLY SPECIFIED AS 0051380 PLUS 0051363.

(b) PREVIOUSLY SPECIFIED AS 0051361 PLUS 0051363.

(Not for construction unless certified.)

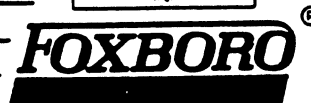
CUSTOMER _____ I.R. _____
 CUSTOMER ORDER _____ FOXBORO ORDER _____
 ITEM-TAG _____



CERTIFIED BY _____ DATE _____

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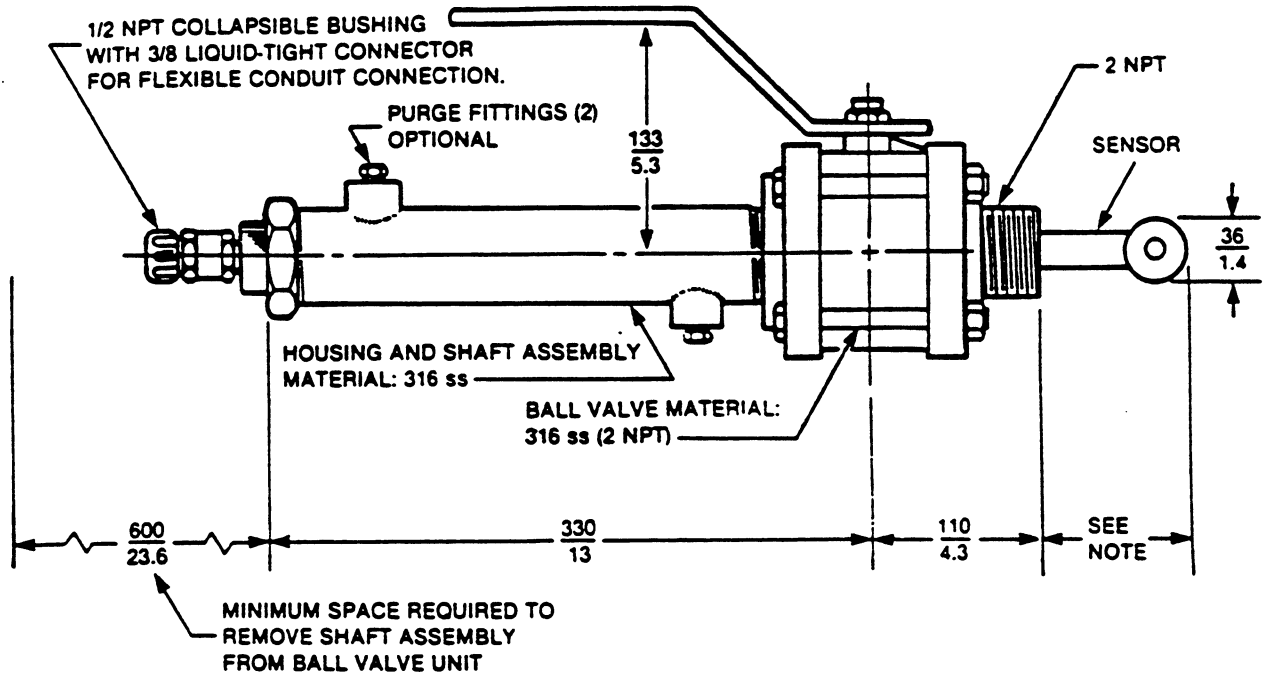
Dimensional Print

DP

611-155
JANUARY 1987

BALL VALVE ASSEMBLY FOR ELECTRODELESS CONDUCTIVITY SENSORS

BALL VALVE ASSEMBLY (PART BS805JV OR BS805JU) WITH SENSORS 871EC-NL, -HP, OR -SP



NOTE:

THIS DIMENSION NORMALLY 66 (2.5) LONGER INSERTION LENGTHS AVAILABLE ON SPECIAL ORDER.

BALL VALVE ASSEMBLY DESCRIPTION	BALL VALVE MATERIAL	FOXBORO PART
WITH PURGEABLE HOUSING	316 ss	BS805JV ^(a)
WITH NONPURGEABLE HOUSING	316 ss	BS805JU ^(b)

^(a)PREVIOUSLY SPECIFIED AS 0051383 PLUS 0051382.

^(b)PREVIOUSLY SPECIFIED AS 0051381 PLUS 0051382.

(Not for construction unless certified.)

CUSTOMER _____ I.R. _____

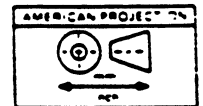
CUSTOMER ORDER _____ FOXBORO ORDER _____

ITEM-TAG _____

CERTIFIED BY _____ DATE _____

MB 123

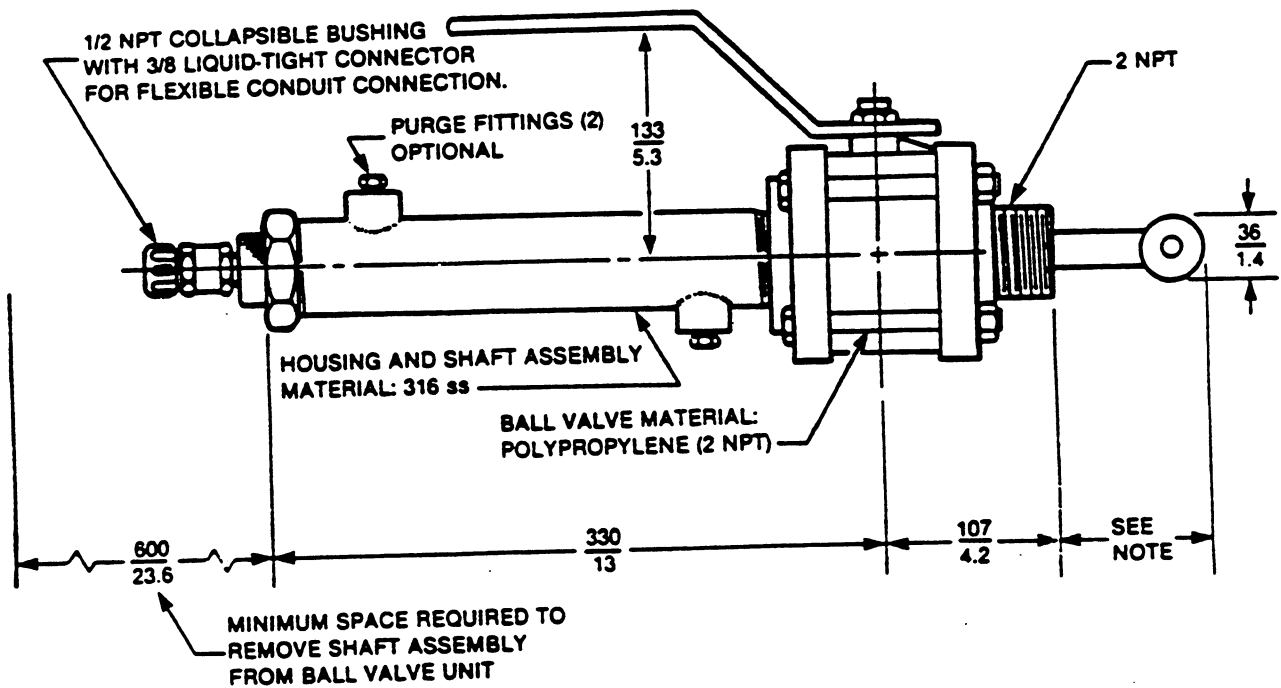
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BALL VALVE ASSEMBLY (PART BS805HX) WITH SENSOR 871EC-NL, -HP, OR -SP



NOTE:
THIS DIMENSION NORMALLY 69 (2.7) LONGER INSERTION LENGTHS AVAILABLE ON SPECIAL ORDER.

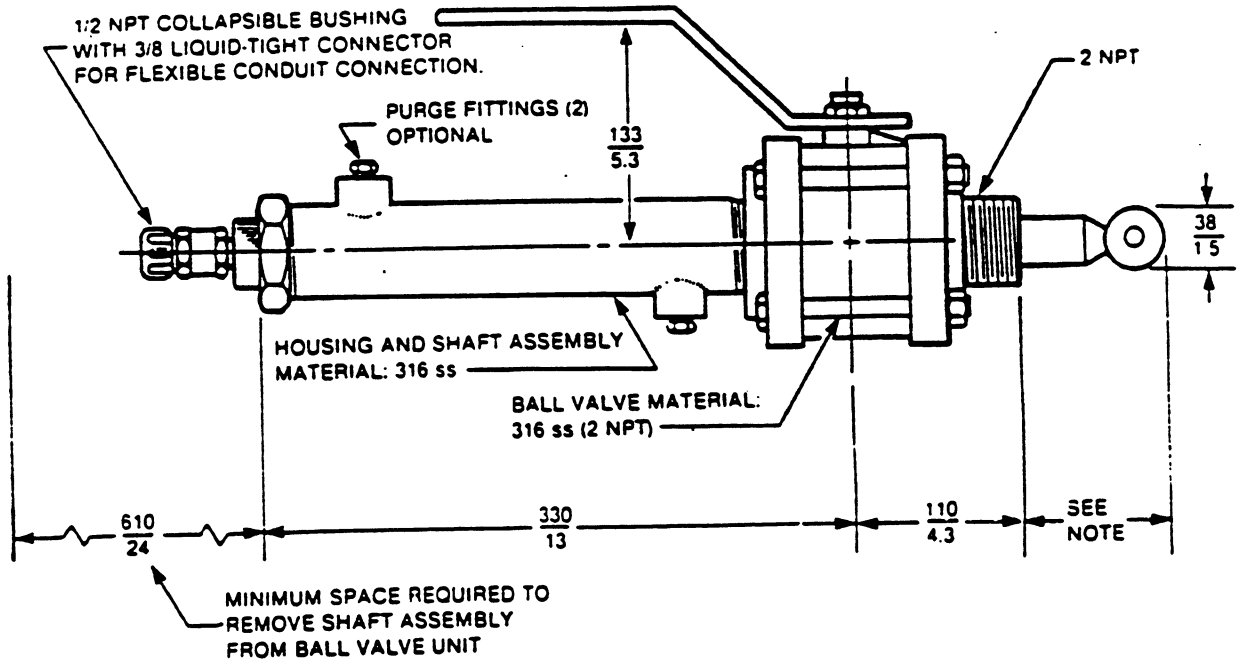
BALL VALVE ASSEMBLY DESCRIPTION	BALL VALVE MATERIAL	FOXBORO PART
WITH PURGEABLE HOUSING	POLYPROPYLENE	BS805HX

Dimensional Print

DP
611-156
JULY 1985

BALL VALVE ASSEMBLY FOR ELECTRODELESS CONDUCTIVITY SENSORS

1210TF AND 871EC-TF



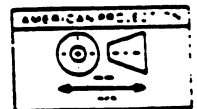
NOTE:
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DESCRIPTION	FOXBORO PART
WITH PURGEABLE HOUSING	BS805JV ^(a)
WITH NONPURGEABLE HOUSING	BS805JU ^(b)

^(a) PREVIOUSLY SPECIFIED AS 0051383 PLUS 0051382.
^(b) PREVIOUSLY SPECIFIED AS 0051381 PLUS 0051382.

(Not for construction unless certified)

CUSTOMER _____ I.R. _____
CUSTOMER ORDER _____ FOXBORO ORDER _____
ITEM-TAG _____



FOXBORO [®]

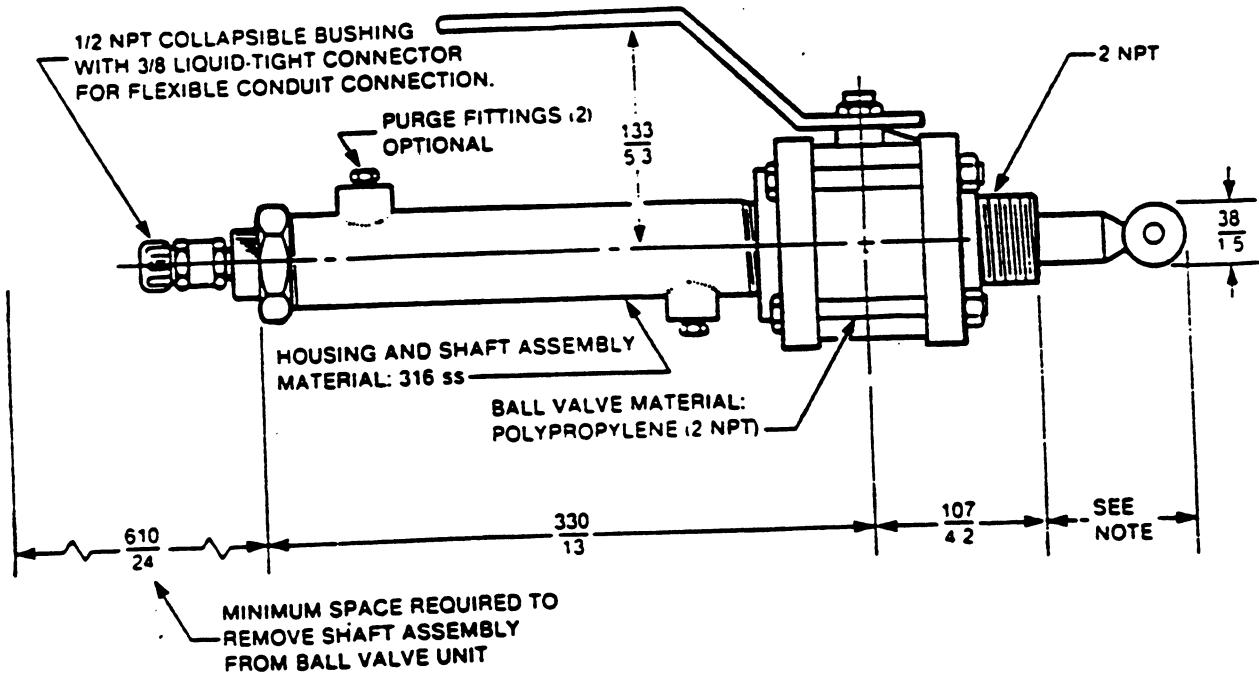
CERTIFIED BY _____ DATE _____

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1210TF AND 871EC-TF



NOTE:
THIS DIMENSION NORMALLY 79 (3) LONGER INSERTION LENGTHS AVAILABLE ON SPECIAL ORDER.

DESCRIPTION	FOXBORO PART
WITH PURGEABLE HOUSING	BS805HX

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