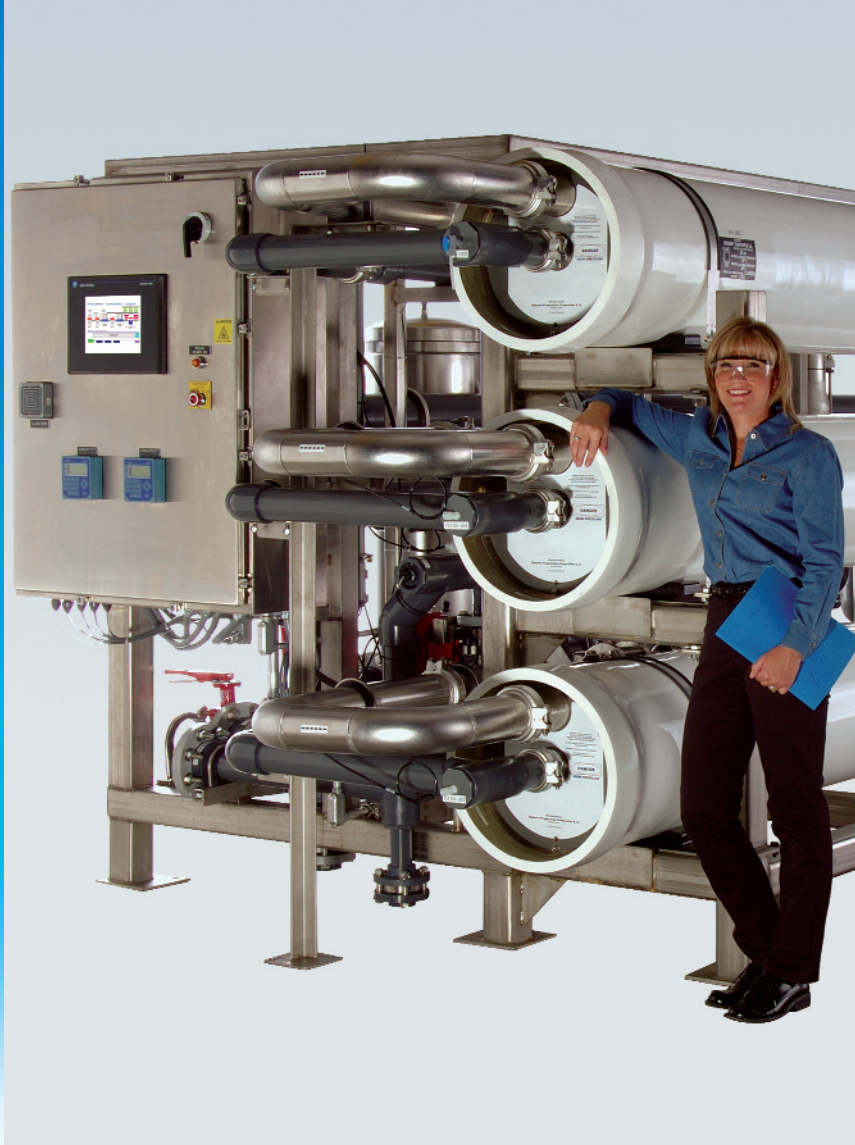


Smart Conductivity



THORNTON

Leading Pure Water Analytics

770MAX Conductivity/ Resistivity Sensors

ASTM & NIST Traceable Calibration

Smart Sensor Technology

Two & Four Electrode Designs

NPT & Tri-Clamp Connections



Reliable and Accurate Conductivity/Resistivity Measurement

METTLER TOLEDO

Sensor Selection Criteria

- Conductivity or resistivity range — resistivity (Mohm-cm) = 1/conductivity ($\mu\text{S}/\text{cm}$)
- Mounting type — Insertion, retractable or submersion
- Pipe connection type and size
- Chemical compatibility, including cleaning and disinfection processes. Rely on process experience or consult Thornton for unusual process composition. PEEK is recommended for exposure to ozone and other oxidizers. Monel is recommended for exposure to hydrofluoric acid.
- Temperature requirements, including steam and/or hot chemical cleaning
- Suspended solids — 234-series four-electrode sensors have flat surfaces which are less likely to accumulate solids and are easier to clean than others.

Thornton conductivity sensors are industry standards for determining water purity and solution concentration. Smart conductivity sensors are a key part of the 770MAX Multiparameter Analyzer/Transmitter measuring system. Each sensor includes data stored in its non-volatile memory which is communicated to the instrument as soon as it is connected. Data includes measurement identification, cell and temperature calibration constants, date of last calibration, serial number, etc., to provide especially fast, simple and reliable startup and documentation. In addition, all wiring is conveniently handled through connectors.

Thornton ISO9001 factory calibrations are NIST and ASTM traceable using Thornton's unique ultrapure auto-loop calibration system. High installed accuracy is supported through four-wire measurement technology for both conductivity/resistivity and temperature.

USP pharmaceutical water monitoring requirements are met by 233-series sensors which provide accurate conductivity and temperature measurement. 316L Tri-Clamp mounting sensors have a Roughness Average (Ra) of 8 microinch surface finish. 234- Series four-electrode sensors are ideal for monitoring clean-in-place (CIP) solution concentrations.

Auto-loop Conductivity Sensor Calibration System





230-531
50 Constant



230-431
10 Constant



233E223
0.1 Constant Sanitary



3/4" NPT
0.1 Constant



234-631
4-Electrode



230-211 in 1000-30
Flow Chamber



230-207
Submersible



234-633
4-Electrode Sanitary



230-212 in 1000-41
Retractable Housing

Cell Constant Accuracy: ± 1%; ± 5% system accuracy for 4-E and 230-431 Sensors
Cell Constant Repeatability: ± 0.25%; ± 2% for 4-E and 230-431 Sensors
Temperature Sensor: Pt1000 RTD, IEC 746, Class A, except thermistor for 230-531
Temperature Accuracy: ± 0.1 °C at 25 °C, except 230-531 and 4E Sensors
Cable Jacket Material: 230- and 234-series - PVC, 80 °C rating; 233-series - Teflon, 200 °C rating
Connector Rating: NEMA 4X, IP65
Maximum Sensor Distance: 300 ft (91 m), except 4-Electrode sensors, which have reduced accuracy with patch cord length greater than 50 ft (15 m) at high conductivity.

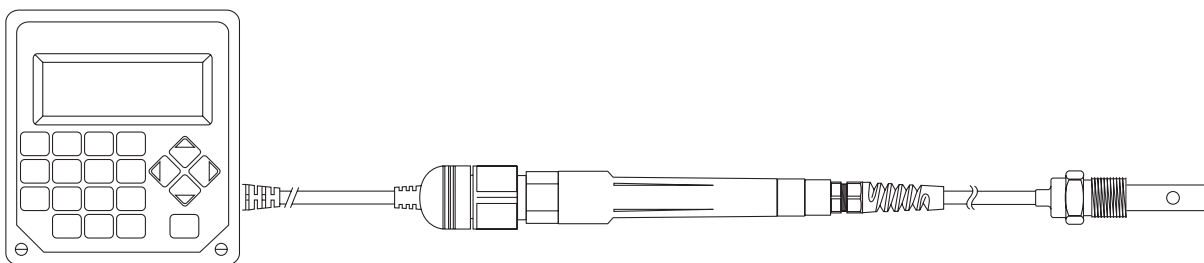
Surface Finish (metal sanitary sensors): Ra 8 microinches (0.2 micrometers), 316L SS is electropolished

Fitting	Insertion Length "X" in (mm)	Cable Length ft (mm) / Connector	Fitting Material	Range (µS/cm)*	Cell Const. (cm ⁻¹)	Electrode Material	Insulator Material	Max Pressure/Temp Psig (bar) at °F (°C)	Part No.
3/4" NPTM	1.15 (29)	10 (3)	PVDF	0.01-3000	0.1	Titanium	PEEK	100 (7) at 203 (95) & 500 (34) at 77 (25)	230-207
3/4" NPTM	1.14 (29)	1.5 (0.5)	Noryl	0.01-3000	0.1	Titanium	PEEK	250 (17) at 200 (93)	230-210
3/4" NPTM	1.35 (34)	1.5 (0.5)	Teflon/SS	0.01-3000	0.1	Titanium	PEEK	250 (17) at 200 (93)	230-211
Retractable for 1000-4X housing	2.75 (70)	1.5 (0.5)	SS	0.01-3000	0.1	316L SS	PEEK	58 (4) at 268 (131) & 100 (7) at 203 (95) & 250 (17) at 77 (25)	230-212
1/2" NPTM	1.14 (29)	1.5 (0.5)	Teflon/SS	0.01-3000	0.1	Titanium	PEEK	250 (17) at 200 (93)	230-216
3/4" NPTM	1.35 (34)	1.5 (0.5)	Teflon/SS	0.01-3000	0.1	Monel	PEEK	250 (17) at 200 (93)	230-251
3/4" NPTM	5.19 (132)	1.5 (0.5)	Teflon/SS	0.01-3000	0.1	Monel	PEEK	250 (17) at 200 (93)	230-261
3/4" NPTM	5.19 (132)	1.5 (0.5)	Teflon/SS	0.01-3000	0.1	Titanium	PEEK	250 (17) at 200 (93)	230-271
3/4" NPTM	2.38 (60)	1.5 (0.5)	Teflon/SS	0.001-2000	0.01	Titanium	PEEK	250 (17) at 200 (93)	230-101**
3/4" NPTM	3.41 (87)	1.5 (0.5)	Teflon/SS	10-200,000	10	Graphite	Noryl	250 (17) at 200 (93)	230-431
1" NPTM	4.90 (125)	1.5 (0.5)	PVDF	10-1,000K	50	Graphite	Epoxy	100 (7) at 200 (93)	230-531
1" NPTM	1.1 (28)	10 (3)	PEEK	10-800,000†	4-E	Hastelloy	PEEK	100 (7) at 200 (93) & 200 (14) at 77 (25)	234-630***
1" NPTM	1.1 (28)	10 (3)	CPVC	10-800,000†	4-E	316L SS	CPVC	50 (3.5) at 176 (80) & 200 (14) at 77 (25)	234-631***
1" NPTM	1.1 (28)	10 (3)	CPVC	10-800,000†	4-E	Hastelloy	CPVC	100 (7) at 77 (25)	234-635***
1.5" Tri-Clamp	3.38 (86)	1.5 (0.5)	Titanium	0.01-3000	0.1	Titanium	PEEK	150 (10) at 311 (155) & 200 (14) at 77 (25)	233E221***
1.5" Tri-Clamp	3.38 (86)	1.5 (0.5)	316L SS	0.01-3000	0.1	316L SS	PEEK	450 (31) at 77 (25)	233E223***
2.0" Tri-Clamp	4.13 (105)	1.5 (0.5)	316L SS	0.01-3000	0.1	316L SS	PEEK		233E227***
1.5" Tri-Clamp	1.00 (25)	1.5 (0.5)	PEEK	10-800,000†	4-E	316L SS	PEEK		234-633***
2.0" Tri-Clamp	1.00 (25)	1.5 (0.5)	PEEK	10-800,000†	4-E	316L SS	PEEK	200 (14) at 122 (50) & 200 (14) at 77 (25)	234-634***
1.5" Tri-Clamp	1.00 (25)	1.5 (0.5)	PEEK	10-800,000†	4-E	Hastelloy	PEEK	70 (4.8) at 284 (140)	234-636***
1.5" Tri-Clamp	0.50 (12)	1.5 (0.5)	PEEK	10-800,000†	4-E	316L SS	PEEK		234-638***

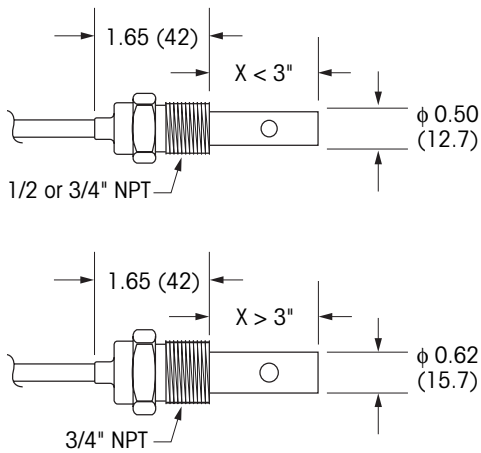
* Megohm-cm = 1/(µS/cm)
 ** Recommended for non-aqueous samples
 *** Includes material certification to meet EN10204 3.1B & USP<88> Class VI

† For measurements above 400,000 µS/cm, 770MAX software version must be 2.4 or higher (after July 2002).
 Certification of calibration included with all 0.1 and 0.01 constant and 4-E sensors; may be requested at additional cost on others.

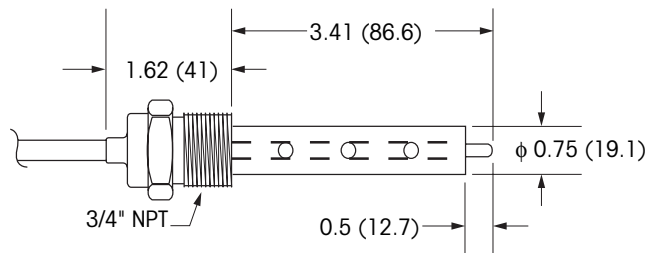
Smart Sensor Wiring



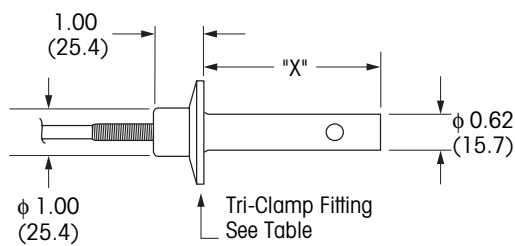
NPT 0.01 and 0.1 Constant



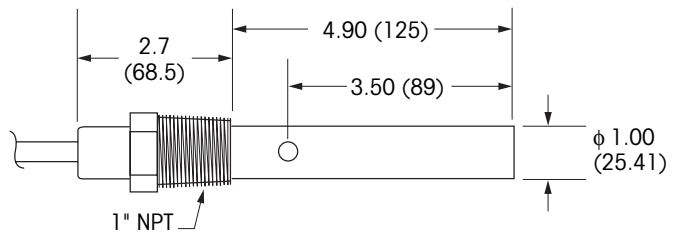
10 Constant 230-431



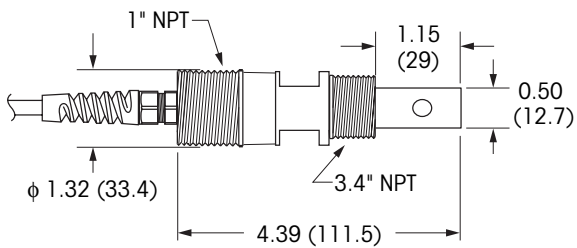
Sanitary 0.1 Constant 233-___



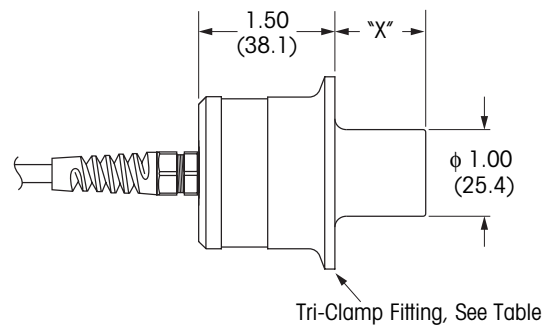
50 Constant 230-531



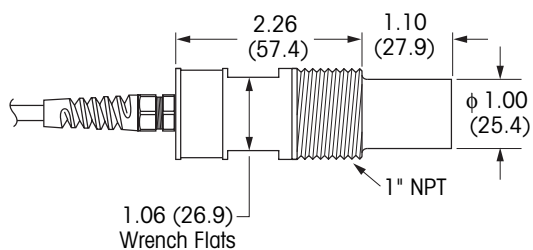
Submersion 0.1 Constant 230-207



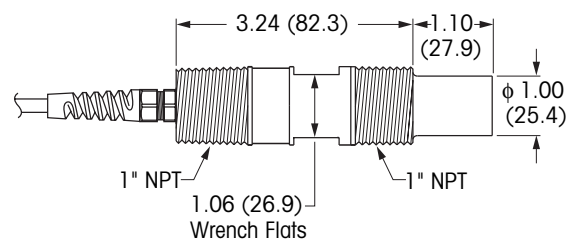
Sanitary 4-Electrode 234-633, -634, -636 & -638



NPT 4-Electrode 234-630

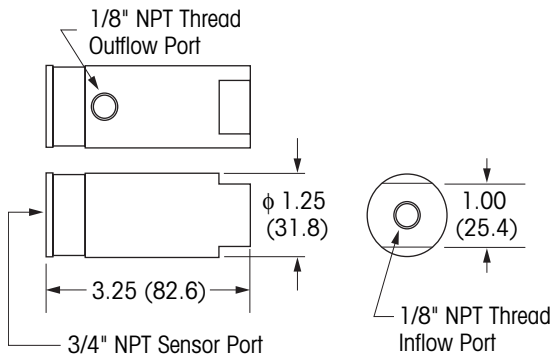


NPT 4-Electrode 234-631 & 234-635

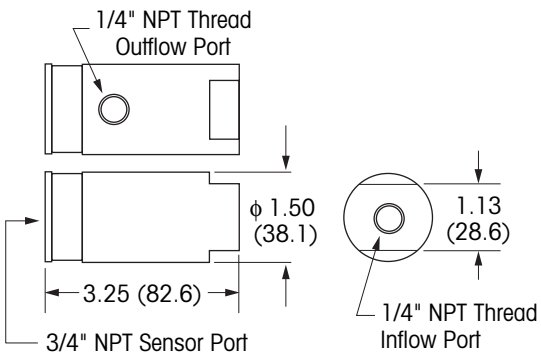


Dimensions: inches (mm). See sensor table for "X" dimensions.

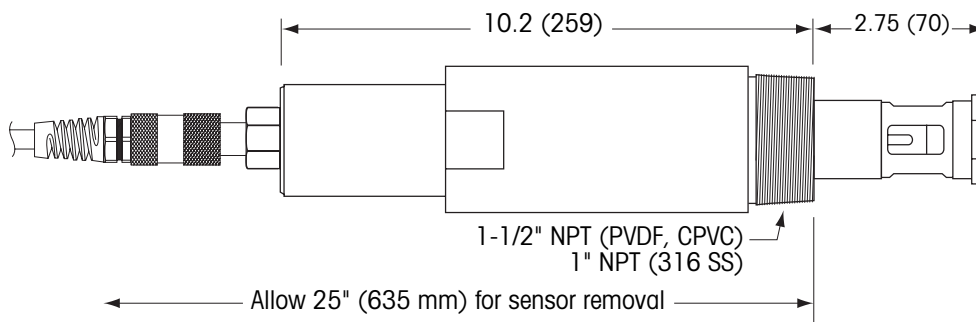
316SS Flow Housing 1000-30



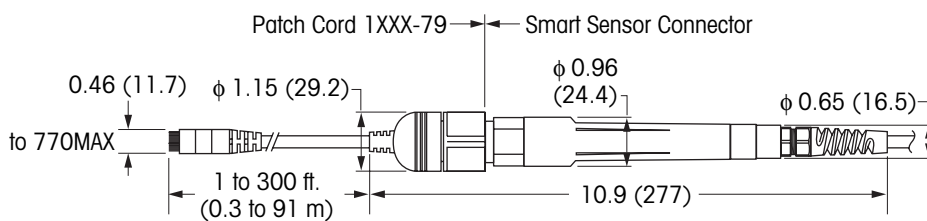
PVDF Flow Housing 1000-31



230-212 Sensor and 1000-4_ Retractable Housing



Smart Sensor Connector and Patch Cord



Accessories

Description	Part No.
Conductivity Flow Housing - 316 Stainless Steel, 1/8" NPTF inlet/outlet, 3/4" NPTF sensor port	1000-30
Conductivity Flow Housing - PVDF, 1/4" NPTF inlet/outlet, 3/4" NPTF sensor port	1000-31
CPVC Retractable Housing (for 230-212) - 1-1/2"NPTM 75 psi (5 bar), -5 to 80 °C, Viton o-rings	1000-40
PVDF Retractable Housing (for 230-212) - 1-1/2" NPTM 75 psi (5 bar), -5 to 100 °C, Viton o-rings	1000-41
316 SS Retractable Housing (for 230-212) - 1" NPTM 100 psi (7 bar), -5 to 100 °C, Viton o-rings	1000-42

Smart Sensor Patch Cords

Length	Part No.
1 ft. (0.3 m)	1001-79
5 ft. (1.5 m)	1005-79
10 ft. (3 m)	1010-79
15 ft. (4.5 m)	1015-79
25 ft. (7.6 m)	1025-79
50 ft. (15.2 m)	1050-79
100 ft. (30.5 m)	1100-79
150 ft. (45.6 m)	1115-79
200 ft. (61 m)	1120-79
300 ft. (91 m)	1130-79

Observe length limitations of 4-electrode sensors.

Conductivity Standard Solutions

Provided for sensor verification and recalibration, conductivity standards are produced, analyzed, and documented in the Mettler-Toledo Thornton ISO 9001 certified facility with processes similar to those used to calibrate high accuracy Thornton conductivity sensors. They are provided with label and certificate with lot number, certified value, expiration date, plus ASTM and NIST traceability data. These standards are analyzed and used at equilibrium with the atmosphere.

Standard	Accuracy	Shelf Life	Part No.
25 µS/cm, 500 mL, HCl	± 3%	6 mo	58 078 001
100 µS/cm, 500 mL, KCl	± 1%	12 mo	58 078 002
1000 µS/cm, 500 mL, KCl	± 1%	12 mo	58 078 003
10,000 µS/cm, 500 mL, KCl	± 1%	12 mo	58 078 004
100,000 µS/cm, 500 mL, KCl	± 1%	12 mo	58 078 005



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Quality certificate.

Development, production and testing to ISO 9001.



A certified ServiceXXL provider.