

Smart Conductivity



THORNTON

Leading Pure Water Analytics

770MAX
Conductivity/Resistivity Sensors

ASTM & NIST Traceable Calibration

Smart Sensor Technology

NPT & Tri-Clamp Connections



Conductivity/Resistivity Measurement

Reliable and Accurate

METTLER TOLEDO

Sensor Selection Criteria

- **Conductivity or resistivity range — resistivity (Mohm-cm) = 1/conductivity (μS/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 — 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 Multi-parameter 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 Sanitary two electrode sensors which provide accurate conductivity and

temperature measurement. 316L Sanitary sensors have a Roughness Average (Ra) of 8 microinch surface finish. Sanitary four-electrode sensors are ideal for monitoring clean-in-place (CIP) solution concentrations.



Auto-loop Conductivity Sensor Calibration System



50 Constant



10 Constant



0.1 Constant Sanitary



3/4" NPT
0.1 Constant



4-Electrode



Flow Housing & Sensor



Submersible



4-Electrode Sanitary



Retractable Housing & Sensor

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 - PTFE, 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
Insulator Material	PEEK (0.1 and 0.01 cm-1 Sensors)

Fitting	Insertion Length "X" in (mm)	Cable Length ft (m)	Fitting Material	Range (µS/cm)*	Cell Const. (cm ⁻¹)	Electrode Material	Max Pressure/Temp Psig (bar) at °F (°C)	US & Canada Part No.	International Part No.
3/4" NPTM	1.15 (29)	10 (3)	PVDF	0.01-3000	0.1	Titanium	100 (7) at 203 (95) & 500 (34) at 77 (25)	230-207	58 031 002
3/4" NPTM	1.14 (29)	1.5 (0.5)	Noryl	0.01-3000	0.1	Titanium	250 (17) at 200 (93)	230-210	58 031 003
3/4" NPTM	1.35 (34)	1.5 (0.5)	PTFE/SS	0.01-3000	0.1	Titanium	250 (17) at 200 (93)	230-211	58 031 004
Retractable for 1000-4X housing	2.75 (70)	3 (1.0)	SS	0.01-3000	0.1	316L SS	58 (4) at 268 (131) & 100 (7) at 203 (95) & 250 (17) at 77 (25)	230-212	58 031 005
1/2" NPTM	1.14 (29)	1.5 (0.5)	PTFE/SS	0.01-3000	0.1	Titanium	250 (17) at 200 (93)	230-216	58 031 006
3/4" NPTM	1.35 (34)	1.5 (0.5)	PTFE/SS	0.01-3000	0.1	Monel	250 (17) at 200 (93)	230-251	58 031 007
3/4" NPTM	5.19 (132)	1.5 (0.5)	PTFE/SS	0.01-3000	0.1	Monel	250 (17) at 200 (93)	230-261	58 031 008
3/4" NPTM	5.19 (132)	1.5 (0.5)	PTFE/SS	0.01-3000	0.1	Titanium	250 (17) at 200 (93)	230-271	58 031 009
3/4" NPTM	2.38 (60)	1.5 (0.5)	PTFE/SS	0.001-30	0.01	Titanium	250 (17) at 200 (93)	230-101**	58 031 010
3/4" NPTM	3.41 (87)	1.5 (0.5)	PTFE/SS/Noryl	10-200,000	10	Graphite	250 (17) at 200 (93)	230-431	58 031 011
1" NPTM	4.90 (125)	1.5 (0.5)	PVDF/Epoxy	10-1,000K	50	Graphite	100 (7) at 200 (93)	230-531	58 031 012
1" NPTM	1.1 (28)	10 (3)	PEEK	10-800,000	4-E	Hastelloy	100 (7) at 200 (93) & 200 (14) at 77 (25)	234-630***	58 031 021
1" NPTM	1.1 (28)	10 (3)	CPVC	10-800,000	4-E	316L SS	50 (3.5) at 176 (80) & 100 (7) at 77(25)	234-631***	58 031 022
1" NPTM	1.1 (28)	10 (3)	CPVC	10-800,000	4-E	Hastelloy	100 (7) at 77(25)	234-635***	58 031 023
1.5" Tri-Clamp	3.38 (86)	1.5 (0.5)	Titanium	0.01-3000	0.1	Titanium		233E221***	58 031 013
1.5" Tri-Clamp	3.38 (86)	1.5 (0.5)	316L SS	0.01-3000	0.1	316L SS	150 (10) at 311 (155) &	233E223***	58 031 014
2.0" Tri-Clamp	4.13 (105)	1.5 (0.5)	316L SS	0.01-3000	0.1	316L SS	450 (31) at 77 (25)	233E227***	58 031 015
ISO-DN 25 bund	2.37(60)	1.5 (0.5)	316L SS	0.01-3000	0.1	316L SS		233E323***	58 031 016
ISO-DN 50 bund	2.76 (70)	1.5 (0.5)	316L SS	0.01-3000	0.1	316L SS		233E327***	58 031 017
1.5" Tri-Clamp	1.00 (25)	1.5 (0.5)	PEEK	10-800,000	4-E	316L SS		234-633***	58 031 024
2.0" Tri-Clamp	1.00 (25)	1.5 (0.5)	PEEK	10-800,000	4-E	316L SS	200 (14) at 122 (50) &	234-634***	58 031 025
1.5" Tri-Clamp	1.00 (25)	1.5 (0.5)	PEEK	10-800,000	4-E	Hastelloy	70 (4.8) at 284 (140)	234-636***	58 031 026
1.5" Tri-Clamp	0.50 (12)	1.5 (0.5)	PEEK	10-800,000	4-E	316L SS		234-638***	58 031 028

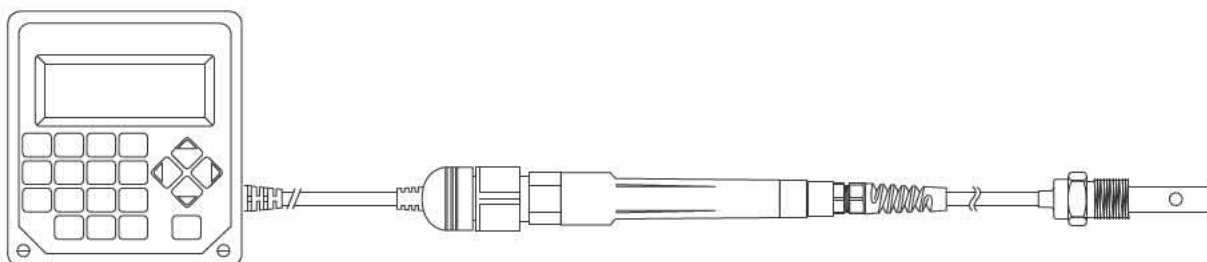
* Megohm-cm = 1/(µS/cm)

** Recommended for non-aqueous samples

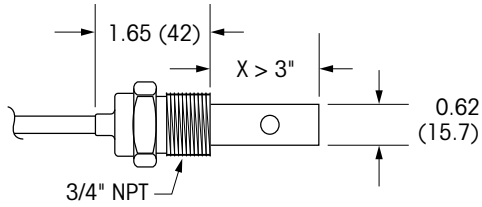
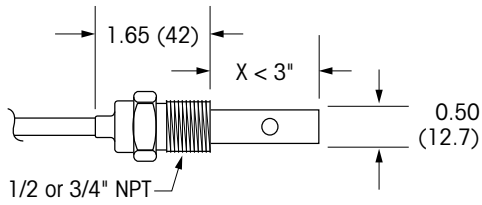
*** Includes material certification to meet EN10204 3.1B & USP<88> Class VI

Certification of calibration included with all 0.1 and 0.01 constant and 4-E sensors; may be requested at additional cost on others.

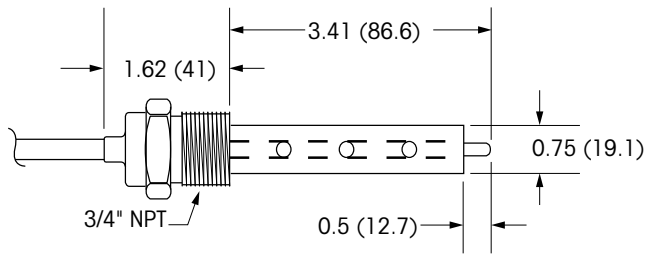
Smart Sensor Wiring



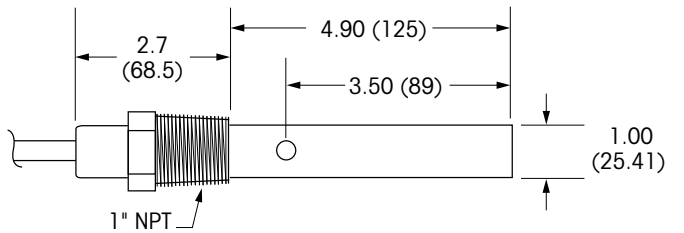
NPT 0.01 and 0.1 Constant



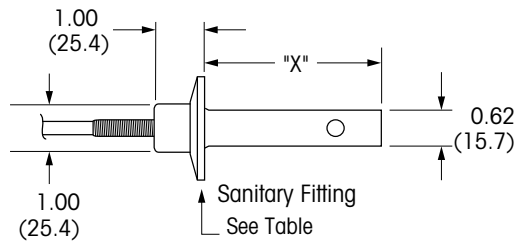
10 Constant



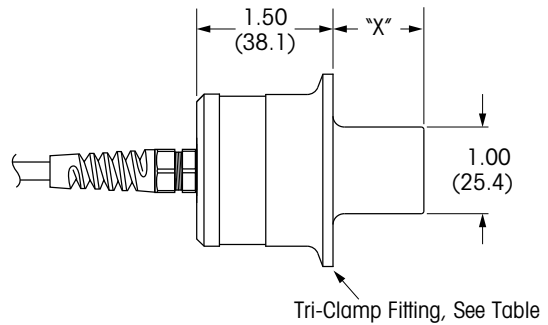
50 Constant



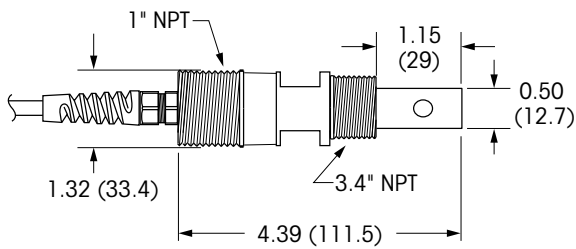
Sanitary 0.1 Constant



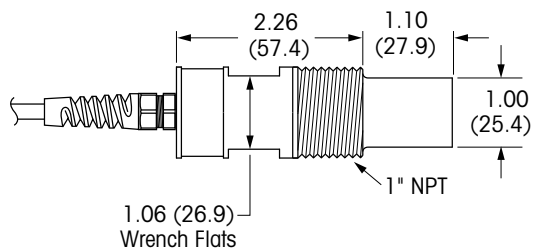
Sanitary 4-Electrode



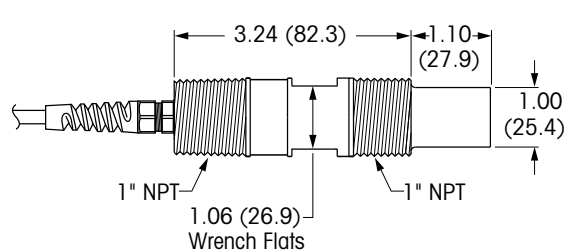
Submersion 0.1 Constant 230-207



NPT 4-Electrode, PEEK

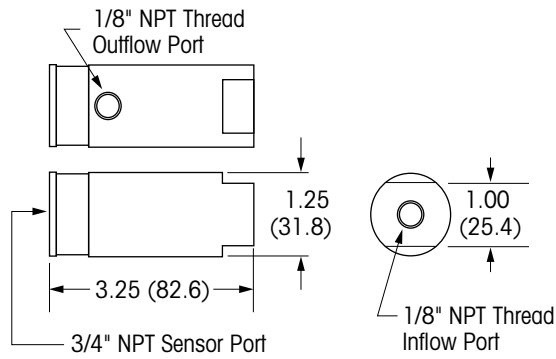


NPT 4-Electrode, CPVC

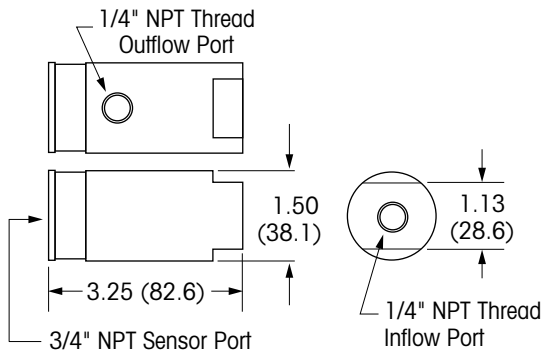


Dimensions: inches (mm). See sensor table for "X" dimensions.

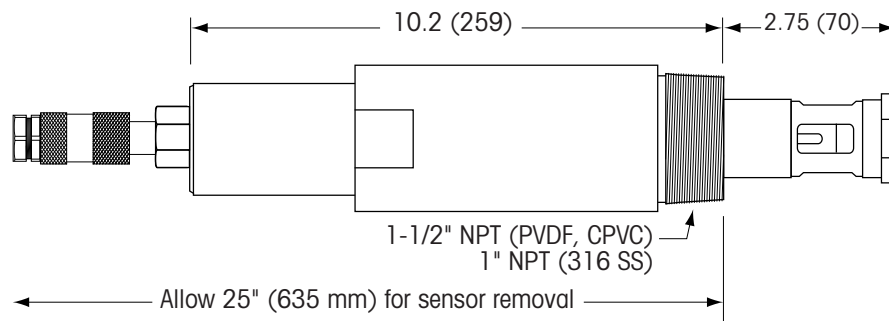
316SS Flow Housing



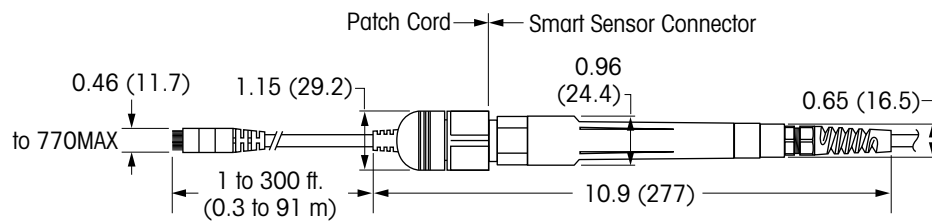
PVDF Flow Housing



Sensor and Retractable Housing



Smart Sensor Connector and Patch Cord



Accessories

Description	US & Canada	International
	Part No.	Part No.
Conductivity Flow Housing - 316 Stainless Steel, 1/8" NPTF inlet/outlet, 3/4" NPTF sensor port	1000-30	58 084 000
Conductivity Flow Housing - PVDF, 1/4" NPTF inlet/outlet, 3/4" NPTF sensor port	1000-31	58 084 001
CPVC Retractable Housing (for 230-212) - 1-1/2"NPTM 75 psi (5 bar), -5 to 80 °C, Viton o-rings	1000-40	58 084 002
PVDF Retractable Housing (for 230-212) - 1-1/2" NPTM 75 psi (5 bar), -5 to 100 °C, Viton o-rings	1000-41	58 084 003
316 SS Retractable Housing (for 230-212) - 1" NPTM 100 psi (7 bar), -5 to 100 °C, Viton o-rings	1000-42	58 084 004

Smart Sensor Patch Cords

Length	US & Canada Part No.	International Part No.
1 ft. (0.3 m)	1001-79	58 080 000
5 ft. (1.5 m)	1005-79	58 080 001
10 ft. (3 m)	1010-79	58 080 002
15 ft. (4.5 m)	1015-79	58 080 003
25 ft. (7.6 m)	1025-79	58 080 004
50 ft. (15.2 m)	1050-79	58 080 005
100 ft. (30.5 m)	1100-79	58 080 006
150 ft. (45.6 m)	1115-79	58 080 007
200 ft. (61 m)	1120-79	58 080 008
300 ft. (91 m)	1130-79	58 080 009

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

www.mt.com/thornton

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