Conductivity / Resistivity Systems
When Optimal Performance Is Essential

Electrolytic conductivity is a widely used analytical parameter for water purity analysis, monitoring of reverse osmosis, cleaning procedures, control of chemical processes, and in industrial wastewater.

Commonly used techniques
Electrolytic conductivity is a measure of the total ionic content of a solution. Two main methodologies to measure conductivity are:
- 2-electrode sensors are for measurements in high purity water and relatively low conductivity ranges
- 4-electrode sensors are for mid to high ranges. They are more resistant to fouling than two-electrode designs

METTLER TOLEDO offers both methodologies.

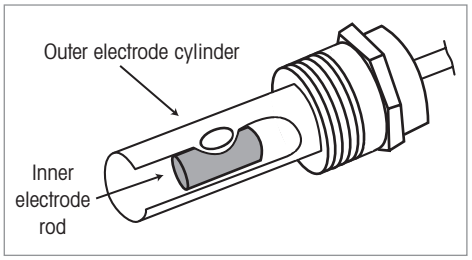


Fig. 1: Concentric 2-electrode design

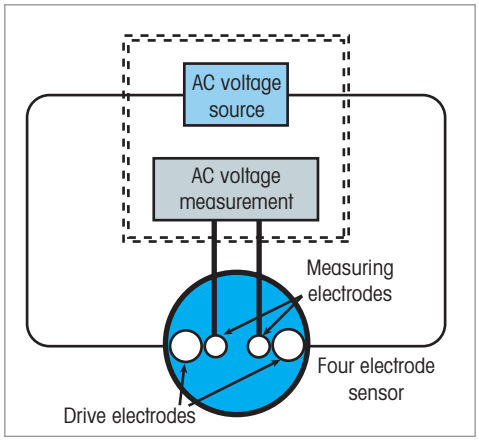


Fig. 2: 4-electrode sensor design

2-electrode sensor design (Fig.1)
An AC voltage is applied across the 2 electrodes, and the resistance between them is measured. The built-in temperature sensor provides fast accurate measurement. The cell geometry and the high solution resistance allow for very accurate and precise conductivity determination.

Sensors are used for water conditioning and purification stages where they are capable of detecting minute levels of impurities in ultrapure water.

4-electrode sensor design (Fig.2)
An AC voltage is applied across the 2 outside electrodes. The principle is to measure the voltage drop across the 2 inner electrodes. Therefore, polarization errors are eliminated. Since this technique measures potential drop, the measurement remains accurate. It permits easier in-line cleaning and it can be installed in smaller piping than inductive sensors.

These sensors are used for concentration measurement of acids, alkalis, and salt process streams.

UniCond® Conductivity/Restivity Sensors with ISM® (Fig.3)
The UniCond conductivity/resistivity sensor advancement integrates the measuring circuit and the physical sensor into a single unit. UniCond conductivity/resistivity sensors provide exceptionally wide measurement ranges due to their advanced built-in measuring circuit. The on-board measuring circuit eliminates interference from lead wire resistance and capacitance. Only digital signals go back to the transmitter. The UniCond design mitigates the effects of polarization enabling the upper range of the conductivity sensor to be greatly expanded. UniCond sensors provide the ability to accurately measure from ultrapure water to brackish water (up to 50,000 µS/cm) with a single integrated sensor, greatly simplifying water treatment instrumentation.

Fig. 3: UniCond®

Application guide for conductivity sensors

Where to use	THORNTON sensors NPT titanium 0.1 cm^{-1} sensors	Sanitary 316L SS 0.1cm^{-1} sensors	NPT CPVC & PEEK 4-E sensors	Sanitary PEEK 4-E sensors
Pure and ultrapure water	•	•		
Sanitary		•		•
Water purification	•			
SIP		•		•
Industrial wastewater			•	
Medium/high conductivity			•	•
Agressive chemicals			•	
Chemical applications			•	
Pharmaceutical water		•		
High conductivity			•	•
Chemical concentration			•	•

Continuous conductivity monitoring according to USP <645>

USP guideline <645> sets a standard for the quality assessment of USP waters based on measurement of the electrolytic conductivity. There is a 3-stage test in which stage 1 allows on-line, non-temperature compensated conductivity measurement. There are specific requirements for the sensors and transmitters (see table below).

Thornton instruments fulfill all these requirements. In addition, Thornton instruments provide USP and EP set-points for convenience.

58 031 409 4-electrode sanitary

Specification	USP <645>
Conductivity sensor and cell constant accuracy	Verify cell constant within ±2 % using a reference solution
Conductivity meter calibration	NIST traceable 0.1 % precision resistors in place of sensor
Instrument resolution	0.1 µS/cm
Instrument accuracy at 1.3 µS/cm	0.1 µS/cm
Temperature compensation	Must be read uncompensated
Instrument dynamic range	10^2

240-201 243E233

METTLER TOLEDO instruments meet USP <645> water conductivity requirements

UniCond® Conductivity/Resistivity Sensors
For M800 & M300 Transmitters with ISM

UniCond conductivity/resistivity sensors for the METTLER TOLEDO Thornton M800 and M300 ISM provide exceptionally wide measurement ranges due to their advanced built-in measuring circuit. The on-board measuring circuit eliminates interference from leadwire resistance and capacitance. Only digital signals go back to the transmitter. Advanced measuring techniques further contribute to superior accuracy over the expanded range.

Specifications

Cell constant accuracy	0.01 cm^{-1} sensor: ± 1 % 0.1 cm^{-1} sensors: ± 1 % for 0.02 – 5,000 µS/cm; ±3 % > 5,000 µS/cm 4-E ± 4%
Cell constant repeatability	±0.25%; ±2% for 4-E
Temperature sensor	Pt 1000 RTD, IEC 60751, Class A, with NIST-traceable calibration
Temperature accuracy	±0.1 °C at 25 °C; ±0.5 °C for 4-E
Maximum cable length	91 m (300 ft)
Finish (Sanitary 0.1 cm^{-1} sensors)	Ra 0.2 micrometers (8 microinches), 316 L SS is electropolished
Insulator material	PEEK; body material for 4-E
Response time	90 % of value in < 5 sec.
Connector	IP 65, mates with 58 080 27X series cable

Features Overview

– Plug and Measure functionality
– Integral high-performance measuring circuit
– Robust digital output signal
– Calibration data stored internally
– System calibration in-line

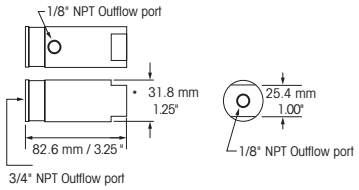
Other Highlights

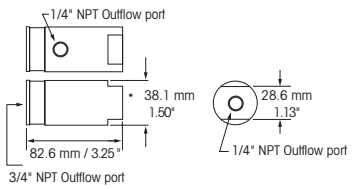
– Extremely wide rangeability: ultrapure to sea water
– Highest accuracy
– NPT and TriClamp connections

Flow Housings

1000-31 1000-30

Dimensions of the 316SS flow housing (1000-30)
(for 0.1 constant 3/4" short conductivity sensors only)





Dimensions of the PVDF flow housing (1000-31)
(for 0.1 constant 3/4" short conductivity sensors only)

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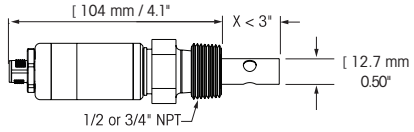
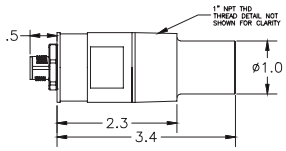
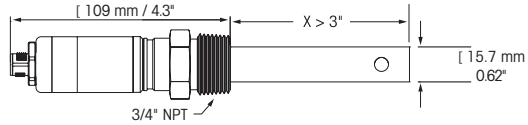


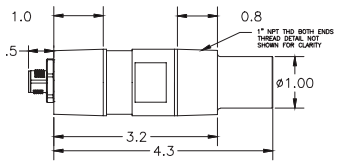
Dimensions of UniCond NPT 0.01 and 0.1 constant conductivity sensors

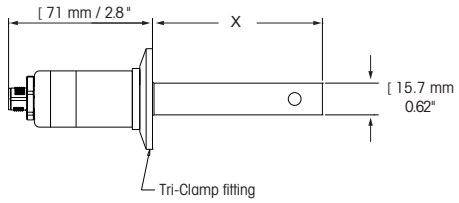


Dimensions of UniCond NPT 4-E conductivity sensors

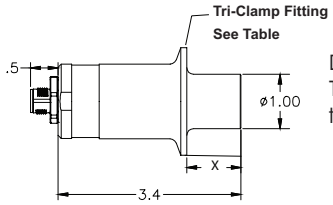


Dimensions of UniCond NPT 0.1 constant conductivity sensors





Dimensions of the UniCond sanitary 0.1 constant conductivity sensor



Dimensions of UniCond Tri-Clamp 4-E conductivity sensors

Ordering Information

Fitting	Insertion Length "X" mm (inch)	Fitting/Body material	Range (µS/cm)*	Cell Const. (cm^{-1})	Electrode Material	Max Pressure/Temp Psig [bar(g)] at °C (°F)	Order Number
2-Electrode Sensors							
¾" NPTM	34 (1.35)	PTFE/SS	0.01–50,000	0.1	Titanium	250 (17) at 93 (200)	58 031 404
¾" NPTM	132 (5.19)	PTFE/SS	0.01–50,000	0.1	Titanium	250 (17) at 93 (200)	58 031 409
¾" NPTM	34 (1.35)	PTFE/SS	0.01–50,000	0.1	Monel	250 (17) at 93 (200)	58 031 407
¾" NPTM	132 (5.19)	PTFE/SS	0.01–50,000	0.1	Monel	250 (17) at 93 (200)	58 031 408
½" NPTM	29 (1.14)	PTFE/SS	0.01–50,000	0.1	Titanium	250 (17) at 93 (200)	58 031 406
¾" NPT	86 (2.38)	PTFE/SS	0.001–500	0.01	Titanium	250 (17) at 93 (200)	58 031 410
1½" Tri-Clamp®	86 (3.38)	Titanium	0.01–50,000	0.1	Titanium	203 (14) at 130 (266) & 450 (31) at 25 (77)	58 031 413†
1½" Tri-Clamp	86 (3.38)	316L SS	0.01–3,000	0.1	316L SS	203 (14) at 130 (266) & 450 (31) at 25 (77)	58 031 414†
2" Tri-Clamp	105 (4.13)	316L SS	0.01–3,000	0.1	316L SS	203 (14) at 130 (266) & 200 (31) at 25 (77)	58 031 415†
4-Electrode Sensors							
1" NPTM	28 (1.1)	PEEK	10-1,000,000	4-E	Hastelloy	100 (7) / 93 (200) 200 (14) / 25 (77)	58 031 421
1" NPTM	28 (1.1)	CPVC	10-1,000,000	4-E	316L SS	50 (3.5) / 80 (176) &	58 031 422
1" NPTM	28 (1.1)	CPVC	10-1,000,000	4-E	Hastelloy	100 (7) / 25 (77)	58 031 423
1.5" Tri-Clamp®	25 (1.0)	PEEK	10-1,000,000	4-E	316L SS	200 (14) / 122 (50) &	58 031 424†
2" Tri-Clamp®	25 (1.0)	PEEK	10-1,000,000	4-E	316L SS	70 (4.8) / 284 (140)	58 031 425†
1.5" Tri-Clamp®	25 (1.0)	PEEK	10-1,000,000	4-E	Hastelloy		58 031 426†

* Megohm-cm = 1/µS/cm

† FDA compliant materials with certification to meet EN10204 3.1B. & USP <88> Class VI

® Tri-Clamp is a registered trademark of Apha Laval

UniCond® Conductivity Sensor Calibration Module

- Provides the unique capability to calibrate the digital UniCond® sensor measuring circuit to meet USP <645> and other regulatory requirements.
- Includes resistances for all ranges of conductivity/resistivity and temperature
- Connects between UniCond® conductvity sensor and an ISM transmitter
- With NIST-traceable certificate of calibration

p/n: 58 082 305

Conductivity Sensors for M300

A Comprehensive Series to Meet Industry Requirements

58 031 234 | 58 031 201 | 58 031 242 | 58 031 202

METTLER TOLEDO Thornton provides a full complement of conductivity/resistivity sensors for M300 with NPT or sanitary fittings. They include various lengths, cell constants and materials to match the application: titanium concentric electrodes for high purity water; monel electrodes for rinse waters containing HF; highly polished 316L stainless steel (SS) electrodes for pharmaceutical waters; CPVC and PEEK sensors with four flush electrodes for solutions with higher conductivity and/or suspended material; and an epoxy sensor which can also measure chemical concentration. Also available with "Intelligent Sensor Management" (ISM) for "Plug And Measure" capability.

Specifications

Cell constant accuracy	± 1 %, except ± 5 % system accuracy for 4-electrode & 10 constant
Cell constant repeatability	± 0.25 %, except ± 2 % for 4-electrode & 10 constant
Temperature sensor	Pt1000 RTD, IEC 60751, Class A, except 50 constant
Temperature accuracy at 25 °C (77 °F)	± 0.1 °C (± 0.2 °F), except 4-electrode sensors
Cable jacket material	NPT: PVC, 80 °C (176 °F) rating Sanitary: PTFE, 200 °C (392 °F) rating
Max. sensor distance	60 m (200 ft), except 15 m (50 ft) for 244-Series
Finish	N4 (R_a < 0.2 µm/R_a < 8 µin), 316L SS is electropolished
Insulator material	PEEK (0.01 & 0.1 constant); Noryl (10 constant)

Sensor Selection Criteria

Thornton offers a wide variety of conductivity/resistivity sensors to accomodate most applications. Use the following criteria to select the appropriate sensor for your installation:

- Conductivity or resistivity range
- Transmitter
- Mounting type: insertion, retractable or submersion
- Pipe connection and size
- Chemical compatibility, including cleaning and disinfection processes
- Temperature requirements, including steam and/or hot chemical cleaning

Features Overview

- Precise factory calibration and certification of each cell constant and RTD
- Optimized 4-wire measuring circuitry provides exceptional rangeability and accuracy, eliminating cable effects
- Quick and easy installation

Typical Applications

- Pharmaceutical water
- Power and steam generation
- Semiconductor water treatment
- Recycle and reclaim water
- Wastewater treatment

For detailed information about conductivity sensors for M300:
Please refer to pages 18-19 for ordering information and drawings

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Calibration of Conductivity Sensors

Thornton Auto-loop Factory Calibration System

Thornton conductivity sensors are industry standards for determining water purity and solution concentration. Thornton ISO 9001 factory calibration and certification are NIST and ASTM traceable using Thornton's unique ultrapure auto-loop calibration system. Certification includes test and accuracy, plus materials as noted in sensor specifications.

USP pharmaceutical water monitoring requirements are met with sanitary sensors which provide accurate conductivity and temperature measurement. 316L stainless steel Tri-Clamp mounting sensors have an electropolished finish with roughness average (R_a) <0.2 µm, <8 µin.

4-electrode sensors are ideal for monitoring high conductivity applications, clean-in-place (CIP) solutions and deionizer regenerant concentrations.

Did You Know
Thornton conductivity systems are routinely used by other instrument suppliers as the reference to provide traceability when calibrating their instrumentation.

Conductivity Standard Solutions

Provided for sensor verification and recalibration, conductivity standards are produced, analyzed and documented in the METTLER TOLEDO Thornton ISO9001 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.

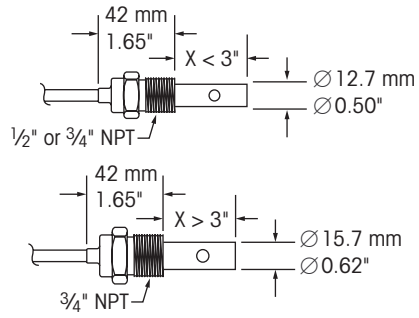
Specifications

Standard	Accuracy	Shelf Life	Order Number
25 µS/cm, 500 ml, HCl	± 3 %	6 months	58 078 001
100 µS/cm, 500 ml, KCl	± 1 %	12 months	58 078 002
1000 µS/cm, 500 ml, KCl	± 1 %	12 months	58 078 003
10,000 µS/cm, 500 ml, KCl	± 1 %	12 months	58 078 004
100,000 µS/cm, 500 ml, KCl	± 1 %	12 months	58 078 005

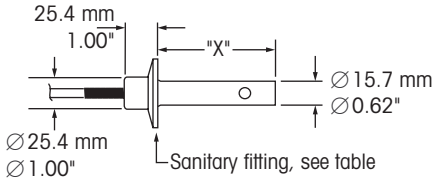
Conductivity Sensors for M300

Drawings

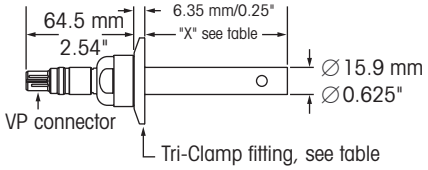
NPT 0.01 and 0.1 Constant



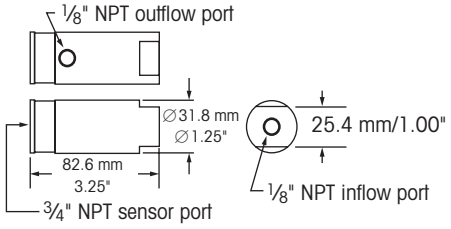
Sanitary, Standard



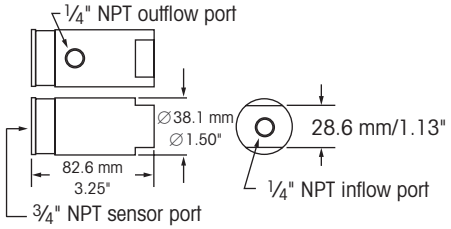
Sanitary, VP



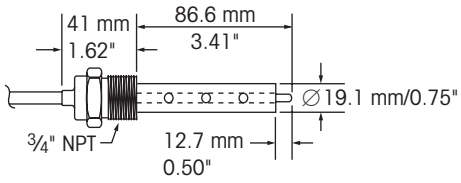
316SS Flow Housing (58 084 000)



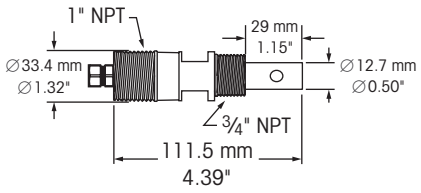
PVDF Flow Housing (58 084 001)



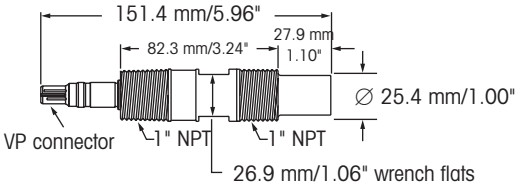
10 Constant



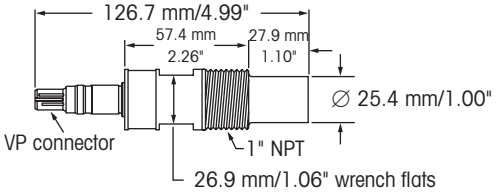
Submersion 0.1 Constant



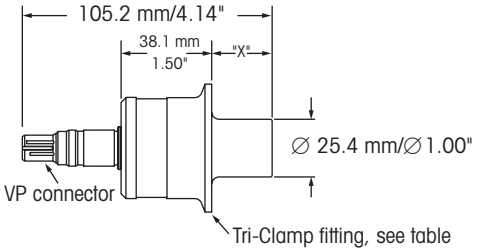
NPT 4-Electrode, CVPC



NPT 4-Electrode, PEEK



Sanitary 4-Electrode



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Ordering Information

Electrode Material	Maximum Pressure		Process Connection – Fitting	– Material	Insertion Length "x"	Cable Length	Connector	Order Number
2-Electrode Sensors								
– Measuring range 0.02–2,000 µS/cm (cell constant 0.1 cm^{-1})[a]								
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	34 mm (1.35")	0.5 m (1.5 ft)	S	240-201
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	132 mm (5.19")	0.5 m (1.5 ft)	S	240-202
Monel	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	34 mm (1.35")	0.5 m (1.5 ft)	S	240-203
Monel	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	132 mm (5.19")	0.5 m (1.5 ft)	S	240-204
Titanium	7 bar(g) at 95 °C 34 bar(g) at 25 °C	(100 psig at 203 °F) (500 psig at 77 °F)	¾" NPTM	PVDF	29 mm (1.15")	–	S	240-207
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	½" NPTM	Noryl	29 mm (1.14")	0.5 m (1.5 ft)	S	240-213
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	Noryl	29 mm (1.14")	0.5 m (1.5 ft)	S	240-214
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	34 mm (1.35")	3 m (10 ft)	S	240-215
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	½" NPTM	PTFE/SS	29 mm (1.14")	0.5 m (1.5 ft)	S	240-216
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	34 mm (1.35")	6.1 m (20 ft)[c]		240-217
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	½" NPTM	PTFE/SS	29 mm (1.14")	3 m (10 ft)[c]		240-218
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	34 mm (1.35")	9 m (30 ft)[c]		240-220
Titanium	10 bar(g) at 155 °C 31 bar(g) at 25 °C	(150 psig at 311 °F) (450 psig at 77 °F)	1.5" Tri-Clamp	Titanium	86 mm (3.38")	0.5 m (1.5 ft)	S	243E221[d]
316L SS	10 bar(g) at 155 °C 31 bar(g) at 25 °C	(150 psig at 311 °F) (450 psig at 77 °F)	1.5" Tri-Clamp	316L SS	86 mm (3.38")	0.5 m (1.5 ft)	S	243E223[d]
316L SS 31 bar(g) at 25 °C	10 bar(g) at 155 °C	(150 psig at 311 °F) (450 psig at 77 °F)	2" Tri-Clamp	316L SS	105 mm (4.13")	0.5 m (1.5 ft)	S	243E227[d]
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	34 mm (1.35")	0.5 m (1.5 ft)	VP	240-231
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	132 mm (5.19")	0.5 m (1.5 ft)	VP	240-236
316L SS	10 bar(g) at 155 °C 31 bar(g) at 25 °C	(150 psig at 311 °F) (450 psig at 77 °F)	1.5" Tri-Clamp	316L SS	85 mm (3.35")	–	VP	243E233[d]
316L SS	10 bar(g) at 155 °C 31 bar(g) at 25 °C	(150 psig at 311 °F) (450 psig at 77 °F)	2" Tri-Clamp	316L SS	104 mm (4.10")	–	VP	243E237[d]
– Measuring range 0.002–200 µS/cm (cell constant 0.01 cm^{-1})[a]								
Titanium	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	60 mm (2.38")	0.5 m (1.5 ft)	S	240-101
– Measuring range 50–40,000 µS/cm (cell constant 10 cm^{-1})[a]								
Graphite	17 bar(g) at 93 °C	(250 psig at 200 °F)	¾" NPTM	PTFE/SS	86 mm (3.38")	0.5 m (1.5 ft)	S	240-401
4-Electrode Sensors[e]								
– Measuring range 10–650,000 µS/cm								
316L SS[d]	5 bar(g) at 150 °C 14 bar(g) at 50 °C	(70 psig at 302 °F) (200 psig at 122 °F)	1" NPTM	PEEK	25 mm (1.00")	–	VP	244-633
316L SS[d]	5 bar(g) at 150 °C 14 bar(g) at 50 °C	(70 psig at 302 °F) (200 psig at 122 °F)	2" Tri-Clamp	PEEK	25 mm (1.00")	–	VP	244-634
Hastelloy C[d]	5 bar(g) at 150 °C 14 bar(g) at 50 °C	(70 psig at 302 °F) (200 psig at 122 °F)	1.5" Tri-Clamp	PEEK	25 mm (1.00")	–	VP	244-636
316L SS[d]	5 bar(g) at 150 °C 14 bar(g) at 50 °C	(70 psig at 302 °F) (200 psig at 122 °F)	1.5" Tri-Clamp	PEEK	12 mm (0.50")	–	VP	244-638
Hastelloy C	7 bar(g) at 93 °C 14 bar(g) at 25 °C	(100 psig at 200 °F) (200 psig at 77 °F)	1" NPTM	PEEK	28 mm (1.10")	–	VP	240-630
316L SS	3.5 bar(g) at 80 °C 7 bar(g) at 25 °C	(50 psig at 176 °F) (100 psig at 77 °F)	1" NPTM	CPVC	28 mm (1.10")	–	VP	244-631
Hastelloy C	3.5 bar(g) at 80 °C 7 bar(g) at 25 °C	(50 psig at 176 °F) (100 psig at 77 °F)	1" NPTM	CPVC	28 mm (1.10")	–	VP	244-635

a MΩ × cm = 1/(µS/cm)

b See pages 34-35 for retractable housing (also used for pH and ORP)

c Tinned leads – no patch cord required

d Includes material certification to meet EN 10204 3.1B & USP<88> ClassVI

e 4-electrode sensor, maximum patch cord length 15 m (50 ft)

S = Standard connector used with 58 080 25X patch cords only. See page 74.

VP = VarioPin sealed connector used with 58 080 20X patch cords only (58 080 101 3-ft adapter cable can connect an existing 1XXX-67 patch cord to a VP sensor).

Boiler Water Conductivity Sensors
Rugged and Reliable

Boiler and steam piping can be protected from upset conditions using a continuous conductivity measurement with readout in µS/cm, mS/cm or ppm TDS. The sensor can monitor systems to 14.5 bar (210 psig) saturated steam conditions without sample cooling. Accurate temperature compensation is provided. The transmitter readout can be located up to 61 m (200 ft) away from the sensor and retransmit alarm, control and/or analog signals even further. Automatic blowdown control allows close management of boiler water quality and usually reduces the amount of blowdown, saving a significant amount of energy.

Specifications

Process connection	1" NPT
Insertion length	28 mm (1.10")
Cable length	0.6 m (2 ft)
Cable jacket material; rating	PTFE; 200 °C (392 °F)
Wetted materials	316SS, PEEK, Viton®
Maximum pressure/temperature	35 bar (500 psig) at 25 °C (77 °F); 17 bar (250 psig) at 200 °C (392 °F)
Range	10 to 20,000 µS/cm uncompensated
Cell constant	0.4 cm^{-1}
Temperature sensor	Pt1000 RTD, IEC 60751 Class A
Temperature accuracy	0.1 °C at 25 °C (0.1 °F at 77 °F)
Certification	ASTM/NIST-traceable certificate of accuracy for conductivity and temperature

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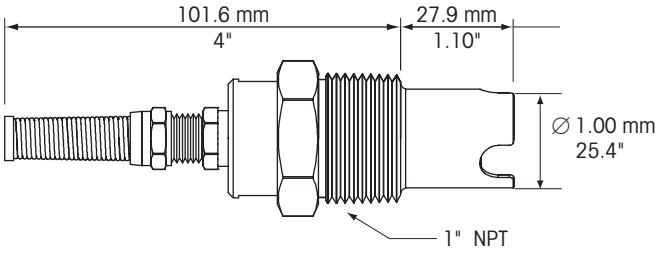
Features Overview

- Minimize corrosion and scaling with highest accuracy measurement and consistent blowdown control
- Reduce energy costs with continuous monitoring and automatic control rather than grab sampling with manual control
- Save operations costs by direct measurement without sample cooler and cooling water, for samples up to 14.5 bar (210 psig) saturated steam
- Install with flexibility of in-line mounting or side-stream flow housing
- Use with versatile Thornton M300 or 770MAX transmitters with choice of built-in control options

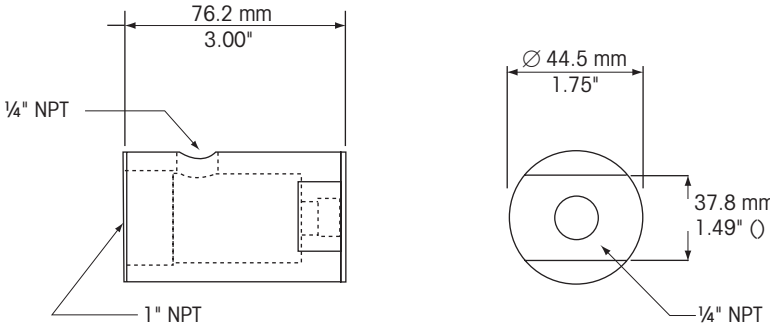
Ordering Information

Sensor	Order Number
Boiler water conductivity sensor with VP connector for M300	58 031 264

Housing	
Flow housing, 316SS, ¼" NPT inlet/outlet	58 084 016



Dimensions of the boiler water conductivity sensor



Dimensions of the flow housing 58 084 016

Flow housing 58 084 016

Pharma Water Verifiers

UniCond® ISM Verifier for M800 and M300 ISM

Pharma Waters Verifiers are modified calibrators used with the respective transmitter firmware features to easily demonstrate that the conductivity and temperature measurement circuitry complies with the electronics accuracy specification of USP <645> Water Conductivity as well as global Pharmacopeial requirements. These verifiers are available in both UniCond® and M300 analog versions.

Features Overview

- Easy-to-use confirmation of the Conductivity and Temperature accuracy requirements for the measurement electronics to meet USP <645> Water Conductivity
- Uses NIST traceable resistors for global acceptance
- Simple, menu driven transmitter interface guides the user through the verification process
- Compliant to EP, JP, ChP, IP, other International Pharmacopeias
- Available for use with the Thornton M800 and M300ISM for UniCond sensors & M300 analog transmitters for analog sensors.

Applications

- Required for compendial pharamaceutical water applications to demonstrate compliance with instrument requirements of USP <645> and global Water Conductivity regulations.
- Recommended for all low conductivity pharmaceutical water applications <5µS/cm.

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Ordering Information

Description	Order Number
Pharma Waters UniCond® ISM Verifier for Thornton M800 and M300 ISM transmitters	58 082 311
Pharma Waters Verifier for analog conductivity sensors and Thornton M300 transmitter	58 082 301

Nominal Simulated Values and Resistances

Pharma Waters UniCond ISM Verifier/M800, M300ISM

Resistance/Conductivity	Resistance/Temperature	Nominal Simulated Value
200KΩ		0.50µS/cm
75KΩ		1.3µS/cm
47KΩ		2.1µS/cm
33KΩ		3.0µS/cm
	1.10KΩ	25°C
	1.33KΩ	25°C

Pharma Waters Verifiers for analog conductivity sensors/M300

Resistance/Conductivity	Resistance/Temperature	Nominal Simulated Value
200KΩ		0.50µS/cm
100KΩ		1.0µS/cm
75KΩ		1.3µS/cm
47KΩ		2.1µS/cm
41KΩ		2.4µS/cm
33KΩ		3.0µS/cm
	1.05KΩ	13°C
	1.097KΩ	25°C
	1.33KΩ	85°C

Did You Know

The Pharma Waters Verifiers are designed to simulate specific conductivities and temperatures when used with either an M300 transmitter or a UniCond® conductivity sensor and M300 ISM or M800 transmitter. The simulated conductivity and temperature values represent values that are in the range of conductivity limits found in USP <645> Water Conductivity.

656 Pure Light™
Water Quality Indicator with Timer

The Pure Light™ is a go/no-go indicator for the quality of pure water from purification systems including service deionization, reverse osmosis, and distillation. Under normal conditions, the green light is illuminated, indicating that the water is in the acceptable purity range. When the purity falls below the user selected set point, the indicator light switches from green to red. The user can activate the time function to also alarm based on time and prevent organic or biological fouling of the system. This easy to interpret, go/no-go, signal alerts the user to take appropriate action.

Features/Benefits:

- Low voltage operation - the indicator operates on 6 VAC.

- Five ranges, user-selectable - jumper permits the user to select the acceptable purity level threshold to meet the application. Threshold limit can be re-set as needed to one of the following five settings.

Restivity	Conductivity
50 kΩ-cm	20 µS/cm
200 kΩ-cm	5 µS/cm
500 kΩ-cm	2 µS/cm
1 MΩ-cm	1 µS/cm
2 MΩ-cm	0.05 MΩ-cm

- BioFouling timer - includes selectable timer that indicates the elapse of 90 or 180 days since the last servicing.

- Dual mounting threads - supplied with two mounting threads 1/2" NPT and 9/16" - 12 for convenience and reduced inventory.

- Multiple lights, one transformer - up to three Pure Lights can be operated from one 120V transformer which has screw terminals. Only one electrical outlet is required to monitor multiple points. Each light for 120V is supplied with a 10 ft (3 m) connecting wire.

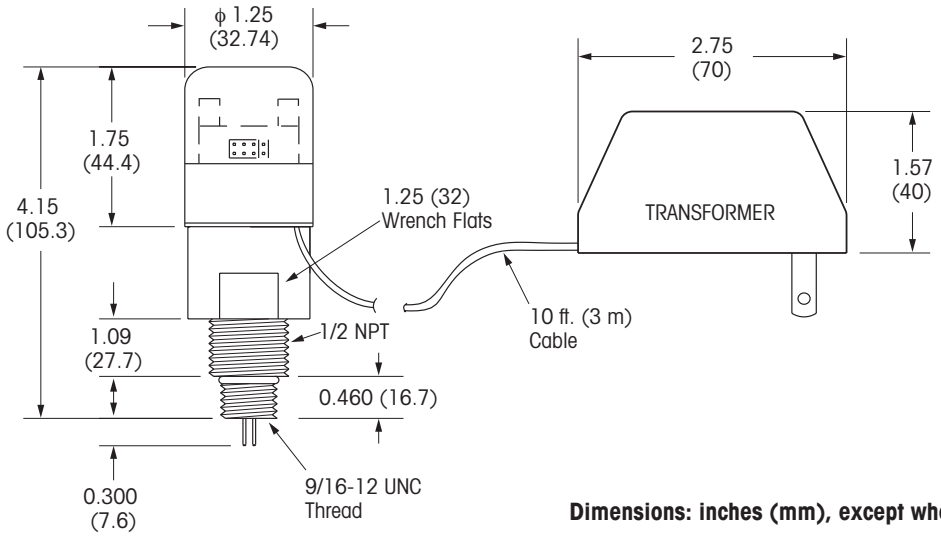
- Red & green LED's - for reliability, two bright Light Emitting Diodes (LED's) are used to indicate above or below threshold status, representing the need for regeneration or replacement of ion exchange resin.

www.mt.com/Thornton

Specifications	
Accuracy	± 10% at 25 °C, typical
Threshold settings	
Restivity	50 k, 200 k, 500 k, 1 M & 2 MΩ-cm
Conductivity	20, 5, 2, 1 & 0.5µS/cm
Visual Indication	continuous green = satisfactory water quality and operation within time limit continuous red = unacceptable water quality flashing red = time limit (90 or 180 days) exceeded, satisfactory water quality
Power requirement	115 VAC ± 10% 50/60 Hz, 230 VAC ± 10% 50/60 Hz, or 6 VAC 50/60 Hz Timer elapsed time is retained in memory on power loss
Installation fittings	1/2" NPT & 9/16" - 12
Operating pressure	0-150 psi (10 bar(g))
Operating temperature	+5°C to +45°C (Measurement is not temperature compensated)
Storage temperature	-40°C to +50°C
Materials	Noryl SE 100X body, gold-plated electrodes, Viton o-ring, Lexan 121 cover
Weight	Light and transformer - 0.9 lbs (0.4 kg)
Rating	120 VAC transformer cULus listed (Canadian and US standards) 230 VAC transformer, CE compliant, European round pin plug

Ordering Information

Description	Order Number
Pure Light with 120 VAC Transformer	58 001 031
Pure Light without Transformer	58 001 030
Pure Light with 230 VAC Transformer	58 001 032
Accessory	
120 V Transformer	36143



Dimensions: inches (mm), except where noted otherwise