

Analytical Sensors



THORNTON
Leading Pure Water Analytics

ISM® Sensors for M800 & M300 Transmitters

UniCond® Conductivity/Resistivity

pH/ORP

Dissolved Oxygen

Ozone



Digital Liquid Analysis Sensors Optimized for Pure Water Treatment

METTLER TOLEDO

ISM Digital Analytical Sensors

with Plug and Measure capability

METTLER TOLEDO Thornton M800 and M300 ISM process analytical instrumentation provides reliable, accurate measurements of conductivity/resistivity, pH/ORP, dissolved oxygen and dissolved ozone. On-board digital measurement and Intelligent Sensor Management (ISM) technology provide the utmost in convenience and control of sensor performance.

Quick and easy installation thanks to “Plug and Measure” capabilities

Operational errors at the transmitter are virtually eliminated since all relevant status and configuration information is automatically transferred from the sensor to the transmitter during startup. UniCond conductivity/resistivity sensors provide an exceptionally wide measurement range, reducing inventory and variety of spare sensors.

Sensor Features and Benefits

- ISM Sensors are immediately recognized at installation
- Measurements are available within seconds of connection
- ISM capabilities communicate type, model, serial number, full calibration data, plus historical data with the M800 transmitter
- Sensors can be pre-calibrated in the laboratory and then installed in situ
- On-line sensor diagnostics ensure continuous process surveillance
- Historical calibration and exposure information enables real-time predictive maintenance programs the M800 transmitter

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Applications

- Pure water treatment for ultrapure semiconductor rinsing, critical power/steam makeup and pharmaceutical waters
- Semiconductor processing in rinsers and wet benches with precise resistivity measurement and temperature compensation
- Power plant cycle chemistry and stator cooling monitoring with especially accurate temperature compensation for specific and cation conductivity and pH plus very low maintenance dissolved oxygen measurement
- Pharmaceutical water monitoring to meet USP, EP, JP and other pharmacopeias' conductivity requirements
- Reclaim, recycle and wastewater treatment for the above industry applications for contaminant detection, diversion and neutralization



The built-in measuring circuits, digital signal conversion and comprehensive memory give ISM sensors advanced performance, reliability and simplified startup. UniCond conductivity/resistivity sensors provide factory calibration accuracy and the widest measurement range in every installation, with Plug and Measure convenience. ISM Sensors for pH, ORP, dissolved oxygen and ozone store process exposure data to enable real-time predictive maintenance when used with M800 transmitters.

UniCond Conductivity/Resistivity Sensors with ISM

UniCond conductivity/resistivity sensors for the Thornton M800 and M300 ISM transmitters provide exceptionally wide measurement ranges due to their advanced built-in measuring circuit. The 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.

Sensor Selection Criteria

- Conductivity or resistivity range – resistivity (Mohm-cm) = 1/conductivity (µS/cm)
- Mounting type – Insertion or submersion
- Process connection type and size
- Chemical compatibility, including cleaning and disinfection processes. Rely on process experience or consult Thornton for unusual process composition. PEEK is compatible with ozone and other oxidizers. Monel is recommended for exposure to hydrofluoric acid.
- Temperature requirements, including steam and/or hot chemical cleaning



Two-Electrode UniCond Sensor Specifications

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
Repeatability	± 0.25%
Temperature Sensor	Pt1000 RTD, IEC 60751, Class A, with NIST-traceable calibration
Temperature Accuracy	± 0.1 °C at 25 °C
Maximum Sensor Distance	91m (300 ft)
Finish (Sanitary 0.1 cm ⁻¹ Sensors)	Ra 0.2 micrometers (8 microinches), 316L SS is electropolished
Insulator Material	PEEK
Connector	IP65, mates with 58 080 27X series cable

Fitting	Insertion Length "X" mm (in)	Fitting/Body Material	Range (µS/cm) ¹	Cell Const. (cm ⁻¹)	Electrode Material	Max Pressure/Temp bar (psig) at °C (°F)	Part No.
3/4" NPTM	34 (1.35)	PTFE/SS	0.02-50,000	0.1	Titanium	17 (250) / 93 (200)	58 031 404
3/4" NPTM	132 (5.19)	PTFE/SS	0.02-50,000	0.1	Titanium	17 (250) / 93 (200)	58 031 409
3/4" NPTM	34 (1.35)	PTFE/SS	0.02-50,000	0.1	Monel	17 (250) / 93 (200)	58 031 407
3/4" NPTM	132 (5.19)	PTFE/SS	0.02-50,000	0.1	Monel	17 (250) / 93 (200)	58 031 408
1/2" NPTM	29 (1.14)	PTFE/SS	0.02-50,000	0.1	Titanium	17 (250) / 93 (200)	58 031 406
3/4" NPT	60 (2.38)	PTFE/SS	0.002-500	0.01	Titanium	17 (250) / 93 (200)	58 031 410
DIN DN25 Bund ³	60 (2.38)	316L SS	0.02-3,000	0.1	316L SS		58 031 416²
ISO DN25 Bund ⁴	60 (2.38)	316L SS	0.02-3,000	0.1	316L SS		58 031 417²
1.5" Tri-Clamp [®]	55 (2.17)	316L SS	0.02-3,000	0.1	316L SS		58 031 412²
1.5" Tri-Clamp [®]	86 (3.38)	Titanium	0.02-50,000	0.1	Titanium	14 (203) / 130 (266) & 31 (450) / 25 (77)	58 031 413²
1.5" Tri-Clamp [®]	86 (3.38)	316L SS	0.02-3,000	0.1	316L SS		58 031 414²
2" Tri-Clamp [®]	105 (4.13)	316L SS	0.02-3,000	0.1	316L SS		58 031 415²

¹ Megohm-cm = 1/µS/cm

² FDA compliant materials with certification to meet EN10204 3.1. & USP <88> Class VI

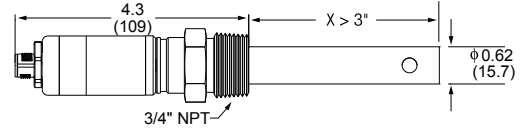
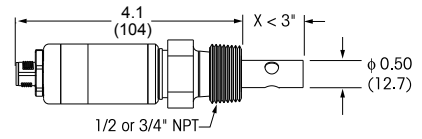
³ Aseptic DN25 per DIN11864-3, Form A and DIN11866, Series A

⁴ Aseptic DN/OD33.7 per DIN11864-3, Form A and DIN11866, Series B

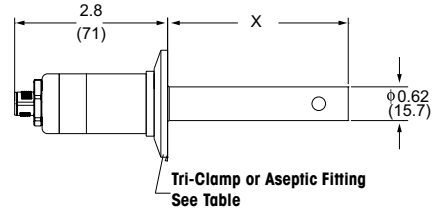
® Tri-Clamp is a registered trademark of Alpha Laval

Two-Electrode UniCond Conductivity/Resistivity Sensors

NPT 0.01 and 0.1 Constant

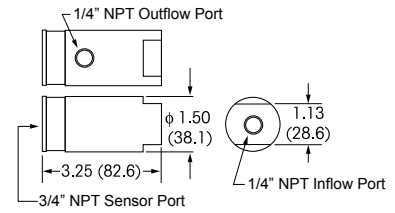


Sanitary 0.1 Constant



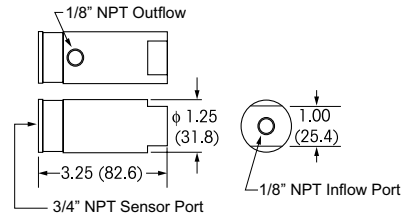
316SS Flow Housing, 1/4" NPT*

58 084 019



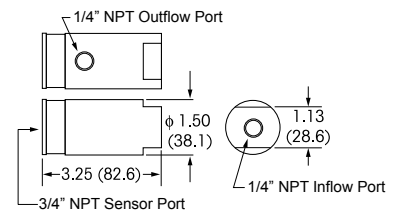
316SS Flow Housing, 1/8" NPT*

58 084 000
(1000-30)



PVDF Flow Housing, 1/4" NPT*

58 084 001
(1000-31)



*For 0.1 constant, 3/4" NPT short conductivity sensors only

Dimensions: inches (mm).

Four-Electrode UniCond Conductivity Sensors

Four-Electrode UniCond Sensor Specifications

Accuracy	4%
Repeatability	± 2%
Temperature Sensor	Pt1000 RTD, IEC 60751, Class A, with NIST-traceable calibration
Temperature Accuracy	± 0.5 °C
Maximum Sensor Distance	91m (300 ft)
Insulator Material	body material
Connector	IP65, mates with 58 080 27X series cable

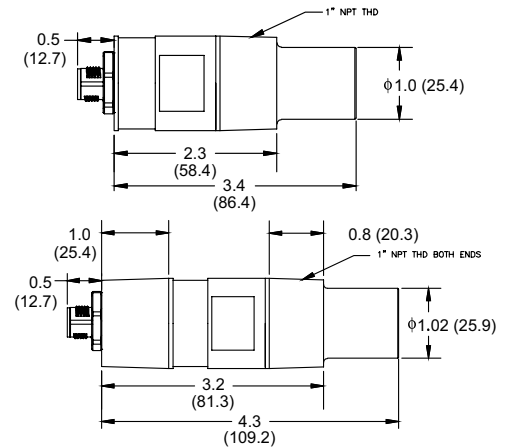
Fitting	Insertion Length "X" mm (in)	Fitting/Body Material	Range (µS/cm)*	Electrode Material	Max Pressure/Temp bar (psig) at °C (°F)	Part No.
1" NPTM	28 (1.1)	PEEK	10-1,000,000	Hastelloy	7 (100) / 93 (200) 14 (200) / 25 (77)	58 031 421
1" NPTM	28 (1.1)	CPVC	10-1,000,000	316L SS	3.5 (50) / 80 (176) &	58 031 422
1" NPTM	28 (1.1)	CPVC	10-1,000,000	Hastelloy	7 (100) / 25 (77)	58 031 423
1.5" Tri-Clamp®	25 (1.0)	PEEK	10-1,000,000	316L SS	14 (200) / 50 (122) &	58 031 424†
2" Tri-Clamp®	25 (1.0)	PEEK	10-1,000,000	316L SS	4.8 (70) / 140 (284)	58 031 425†
1.5" Tri-Clamp®	25 (1.0)	PEEK	10-1,000,000	Hastelloy		58 031 426†

* Megohm-cm = 1µS/cm

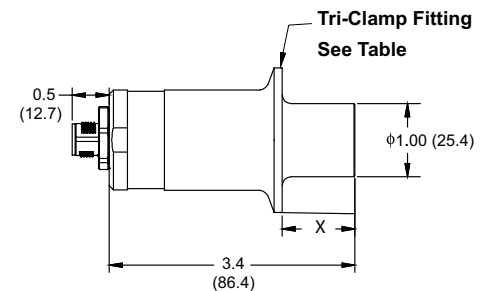
† FDA compliant materials with certification to meet EN10204 3.1. & USP <88> Class VI

® Tri-Clamp is a registered trademark of Alpha Laval

NPT 4-E



Sanitary 4-E



UniCond Conductivity/Resistivity Sensor Cables

For connections between Thornton ISM conductivity sensors and ISM instruments.

Length	Part No.
0.3 m (1 ft)	58 080 270
1.5 m (5 ft)	58 080 271
3 m (10 ft)	58 080 272
4.5 m (15 ft)	58 080 273
7.6 m (25 ft)	58 080 274
15.2 m (50 ft)	58 080 275
30.5 m (100 ft)	58 080 276
45.7 m (150 ft)	58 080 277
61 m (200 ft)	58 080 278
91 m (300 ft)	58 080 279



Conductivity Standard Solutions

Provided for sensor verification, recalibration or validation, conductivity standards are produced, analyzed, and documented in the METTLER TOLEDO Thornton ISO 9001 certified facility. Production is done with processes similar to those used to calibrate high-accuracy Thornton conductivity sensors. Standards 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 μ S/cm, 500 mL, HCl	\pm 3%	6 mo	58 078 001
100 μ S/cm, 500 mL, KCl	\pm 1%	12 mo	58 078 002
1000 μ S/cm, 500 mL, KCl	\pm 1%	12 mo	58 078 003
10,000 μ S/cm, 500 mL, KCl	\pm 1%	12 mo	58 078 004
100,000 μ S/cm, 500 mL, KCl	\pm 1%	12 mo	58 078 005



pH and ORP Sensors with ISM

METTLER TOLEDO Thornton offers pH and ORP sensors designed specifically for water treatment. The inclusion of ISM technology allows Plug and Measure capabilities, easier maintenance and convenient calibration. A variety of housings ensure a wide range of installation requirements can be met. The solution ground feature enables ORP measurement and ISM sensor diagnostics, and prevents measurement errors due to ground potentials.

Specifications

Measuring Electrode	Glass pH, platinum ORP/solution ground
Reference Electrode	Silver-silver chloride with double junction or equivalent
Temperature Compensator	NTC included in all sensors
pH Range	0-14
Maximum Flow	3 m/s (10 ft/s)
Maximum Cable Lengths	80 m (262.4 ft)

A complete pH or ORP installation requires **1** an electrode, **2** a housing and **3** an AK9 cable, from each of the tables below. Each installation requires an M300 Water or M800 Water transmitter. In the table below, a double line divides groups of compatible electrodes and housings.

Electrode (1)

Application	Rating	Fitting / Material	Part No.
pH & ORP, general purpose, high pressure	See housing limits	Pg 13.5 glass, platinum	52 005 381
			4260I-SG-120
pH & ORP, general purpose, & moderately pure water*	0-100 °C 4 bar (60 psi)	Pg 13.5 glass, platinum	52 005 373
			3250I-SG-120
pH & ORP, retractable	See housing limits	Pg 13.5 glass, platinum	52 005 382
			4260I-SG-225

Housing (2)

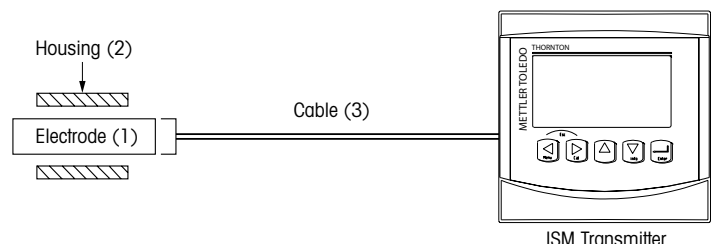
Connection / Material / Rating	Part No.
3/4" NPT(M) insertion or submersion** / CPVC 7 bar (100 psi) at 20 °C & 2 bar (30 psi) at 80 °C	53 300 021
3/4" NPT(M) insertion or submersion** / PVDF 6 bar (87 psi) at 20 °C & 1 bar (15 psi) at 100 °C	52 401 520
1" weld tee / PVC / 3.5 bar (50 psi) at 60 °C	58 084 014
Retractable 1-1/2" NPT(M) / CPVC / 5 bar (75 psi), 80 °C	58 084 002
Retractable 1-1/2" NPT(M) / PVDF / 5 bar (75 psi), 100 °C	58 084 003
Retractable 1" NPT(M) / 316 SS / 7 bar (100 psi), 100 °C	58 084 004

* For use with moderately pure waters (conductivity 5-50 µS/cm) use 53 300 021 housing in 3/4" NPT(F) earth-grounded metal pipe tee with flow <100 mL/min and discharge to open drain. For higher purity and/or higher accuracy in pure water see the pHure Sensors, pages 10-13.

** For insertion in plastic pipe, use 3/4 x 1" reducing bushing and 1" pipe tee. For submersion w/plastic pipe, use 3/4 x 1" reducing coupling and 1" pipe.

AK9 pH/ORP Cable (3)

Cable Length	Part No.
1 m (3.3 ft)	59 902 167
3 m (9.8 ft)	59 902 193
5 m (16.4 ft)	59 902 213
10 m (32.8 ft)	59 902 230
20 m (65.6 ft)	52 300 204
30 m (98.4 ft)	52 300 393
50 m (164.0 ft)	52 300 394
80 m (262.4 ft)	52 300 395



ISM pH and ORP Sensors

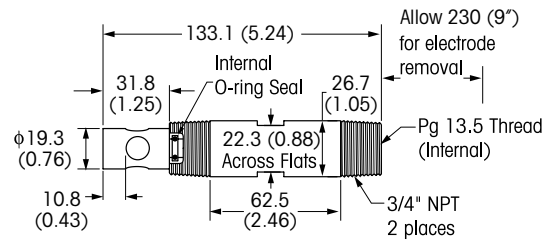
Electrodes



Housings



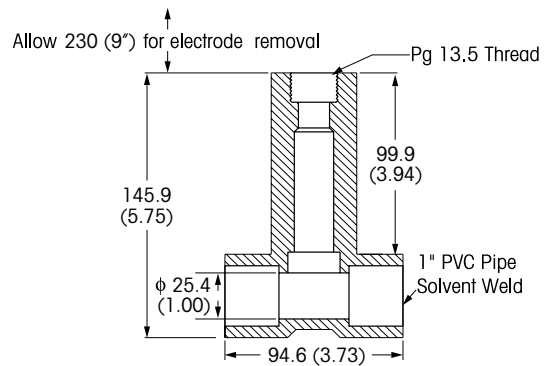
53 300 021



53 300 021 & 52 401 520



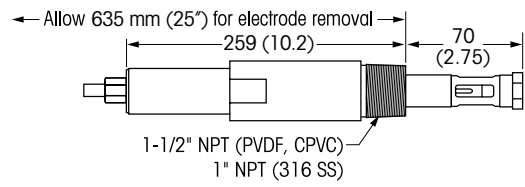
58 084 014



58 084 014



58 084 002



58 084 00X

Dimensions: mm (inches)

pHure Sensors with ISM

Applications for pure water pH measurement

Reverse osmosis – pH adjustment of clean recycle water or between membranes in two pass systems to optimize rejection rates

Power plant cycle chemistry – monitoring and controlling pH levels to comply with guidelines and minimize corrosion and scaling

pH measurement in low-conductivity waters requires special precautions. It must be made on a side-stream sample in a closed, metal, flow-through chamber with low flowrate and discharge to open drain. This ensures a sample uncontaminated by carbon dioxide from the air, low and constant sample pressure at the reference electrode, and electrical shielding to promote stability. The sample line should be short and small in diameter to minimize sample delays and to minimize waste of pure water.

Key to pure water pH measurements has been the use of a flowing-junction type of reference electrode which forces electrolyte through the reference junction to provide the same conditions in various samples. The flowing junction produces nearly the same potential in pure water as in the much more conductive calibrating buffer solutions. However, a flowing junction requires some form of electrolyte reservoir that can make installation, service and calibration more cumbersome and increases cost.

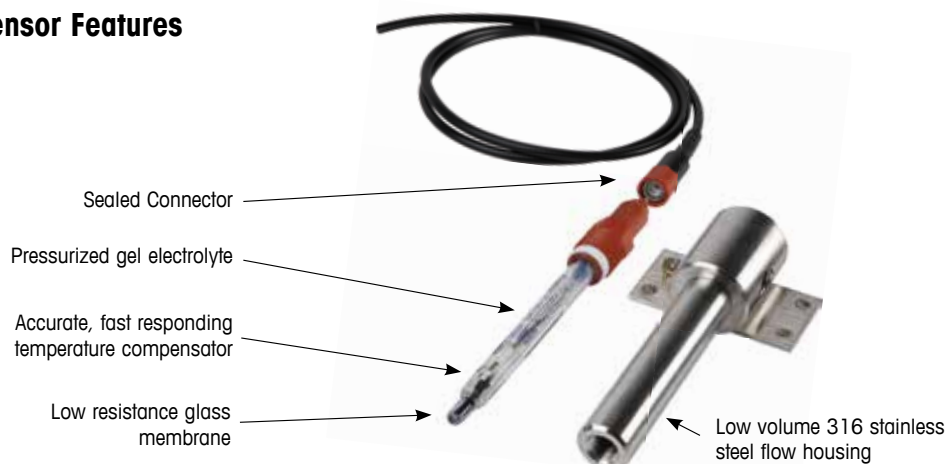
The METTLER TOLEDO Thornton pHure Sensor uses a special internally-pressurized gel electrolyte reference electrode to produce similar results to a flowing junction but with much more convenient installation and maintenance. The electrode also includes a low resistance pH glass membrane, an integral, fast-responding NTC, and an AK9 connection. The flow housing provides a controlled flow path with minimum volume to encourage power plant corrosion particles to flush through instead of accumulating as with a large flow bowl.

All components of the pHure Sensor have been optimized for performance and value and conform to ASTM Standard D5128. Various lengths of cable can be selected to provide flexibility in locating the sensor. No preamplifier is required.

Specifications

Wetted Materials	Glass, silicone rubber
Process Connections	1/4" NPT(F) in/out
Flow Housing Volume	5 mL with electrode in place
Maximum Pressure	Atmospheric pressure for optimum stability; operational 0-2.5 bar (0-35 psig); can safely withstand 7 bar (100 psig)
Sample Temperature	0-80 °C (32-176 °F), short term to 100 °C (212 °F)
Sample pH	1-11
Sample Flowrate	50-150 mL/min
Sample Conductivity	> 1.5 µS/cm for highest accuracy
Connection	AK9 or VP cable from sensor directly to instrument, included
Components Included	52 003 821 combination pH electrode, 58 084 010 flow housing and AK9 cable

pHure Sensor Features



pHure Sensors with ISM

Ordering Information

pHure Sensor		Order Number
pHure Sensor ISM combination electrode with temperature compensator		52 003 821
pHure Sensor combination electrode with RTD		52 002 447
* All new installations require a sensor, housing and cable.		
Spare Parts		Order Number
Replacement electrolyte 3M KCl 250 ml		51 340 049
Replacement syringe for electrolyte refill		58 079 520
Housing		Order Number
Flow housing		58 084 010

Cables (pHure Sensor ISM combination electrode with temperature compensator)

Cable length	AK9
1m (3.3 ft)	59 902 167
3m (9.8 ft)	59 902 193
5m (16.4 ft)	59 902 213
10m (32.8 ft)	59 902 230
20m (65.6 ft)	52 300 204
30m (98.4 ft)	52 300 393
50m (164.0 ft)	52 300 394
80m (262.4 ft)	52 300 395

Cables (pHure Sensor combination electrode with RTD)

Cable length	VP
1m (3.3 ft)	52 300 107
3m (9.8ft)	52 300 108
5m (16.4 ft)	52 300 109
10m (32.8 ft)	52 300 110

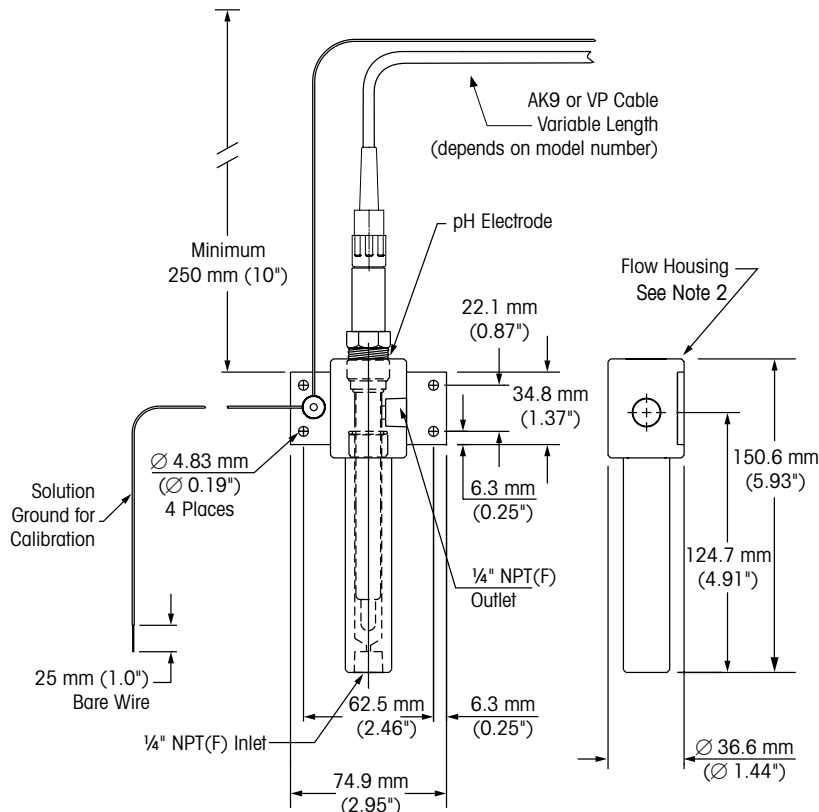
Accessories

Accessories	Order Number
iSense full version	30 130 614
iSense lite version	Available for free
iSense mobile version	Available for free
iLink cable for iSense	52 300 383

pH and ORP (Redox) Standard Buffer Solutions

pH and ORP (Redox) Standard Buffer Solutions	Order Number
pH Buffer, 4.01, 250 mL	51 340 057
pH Buffer, 7.00, 250 mL	51 340 059
pH Buffer, 9.21, 250 mL	51 300 193
pH Buffer, 10.00, 250 mL	51 340 056
ORP (Redox) Buffer, 220 mV, 6 x 250 mL	51 340 081

pHure Sensor Dimensions



Notes:

1. Dimensions: mm (inches)
2. Electrode/Flow housing assembly must be in upright position as shown.
3. Allow at least 250 mm (10 in.) clearance to remove sensor.

pHure Sensor LE with ISM

Reliable pH Measurement in Pure Waters

The METTLER TOLEDO Thornton pHure Sensor Liquid Electrolyte (LE) with ISM for M800 Water and M300 Water transmitters use free-flowing liquid electrolyte to provide the most accurate pH measurement available in pure waters. The electrode includes a special pH glass membrane, an integral, fast-responding temperature sensor, and AK9 cable connections. All components of the pHure Sensor LE have been optimized for low conductivity performance and value, and conform to ASTM Standard D5128. Various lengths of cable can be selected to provide flexibility in locating the sensor.

Features

- Free-flowing liquid electrolyte
- Accurate, fast responding temperature compensator
- Special glass membrane
- Solution ground connection
- Low volume 316 stainless steel flow housing
- Easily refillable electrolyte chamber
- Integral buffer containers

Applications

- Power plant cycle chemistry where pH measurement in very low conductivity water is critical
- Reverse osmosis – pH adjustment of clean recycle water or between membranes in two pass systems to optimize rejection rates
- Monitoring and controlling pH levels to comply with guidelines and minimize corrosion and scaling

Specifications

Wetted materials	Glass pH, platinum solution ground/ORP
Process connections	1/4" NPT(F) in /out
Flow housing volume	5 ml with electrode in place
Maximum pressure	Atmospheric pressure for measurement; can safely withstand 7 bar(g) (100 psig)
Sample temperature	0 to 100°C (32 to 212°F)
Sample pH	1–12 pH
Sample flowrate	50 to 150 ml/min
Sample conductivity	> 0.3 μ S/cm for highest accuracy
Connection	AK9 or VP cable from sensor to instrument
Reference electrode	3M KCl
Components included	Combination pH electrode, 3 molar KCl electrolyte

* All new installations require a sensor, housing and cable.



pHure LE Sensors with ISM

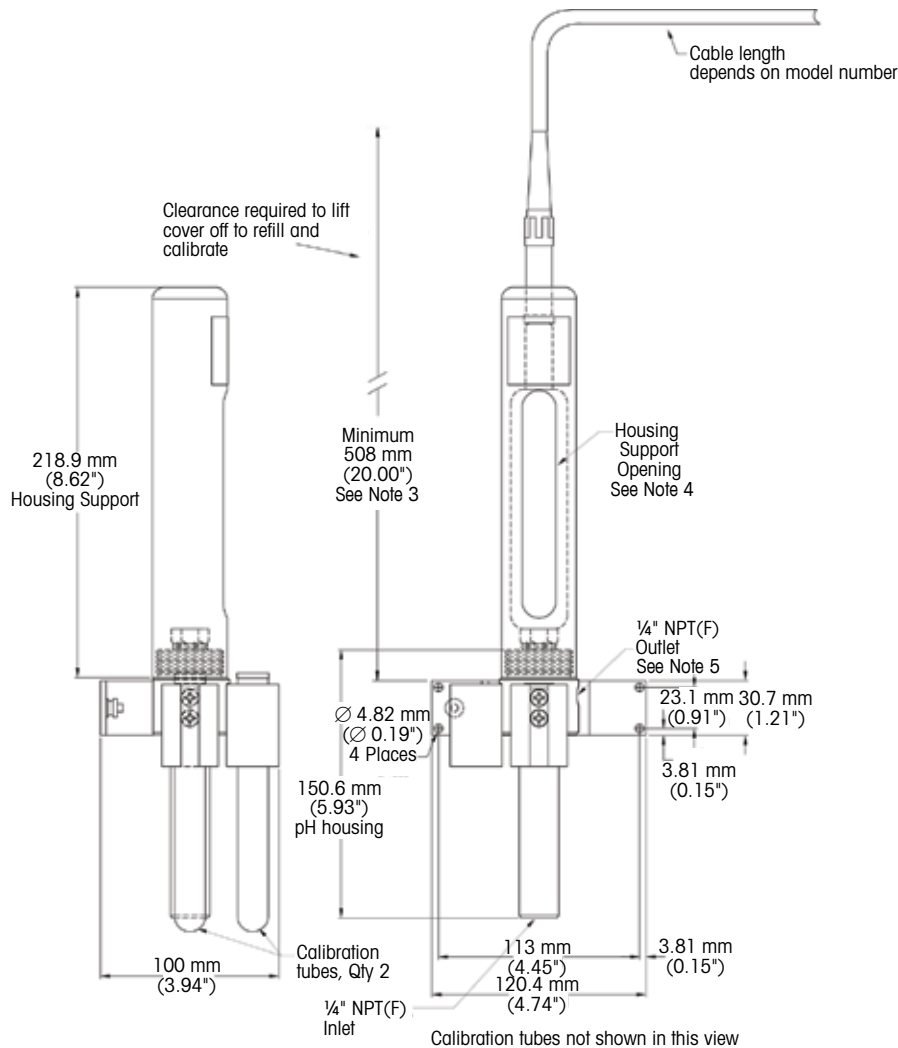
Ordering Information

pHure Sensor LE	Order Number
pHure Sensor LE ISM electrode	30 039 086
pHure Sensor LE analog electrode	30 039 085
* All new installations require a sensor, housings and cable. For housings refer to page 194.	
* For pH and ORP buffers, refer to page 195.	
Spare Parts	Order Number
Replacement electrolyte 3M KCl 250 ml	51 340 049
Replacement syringe for electrolyte refill	58 079 520

Cables (pHure Sensor LE ISM combination electrode with temperature compensator)	
Cable length	AK9
1m (3.3 ft)	59 902 167
3m (9.8 ft)	59 902 193
5m (16.4 ft)	59 902 213
10m (32.8 ft)	59 902 230
20m (65.6 ft)	52 300 204
30m (98.4 ft)	52 300 393
50m (164.0 ft)	52 300 394
80m (262.4 ft)	52 300 395

Cables (pHure Sensor LE combination electrode with RTD)	
Cable length	VP
1m (3.3 ft)	52 300 107
3m (9.8 ft)	52 300 108
5m (16.4 ft)	52 300 109
10m (32.8 ft)	52 300 110

pHure Sensor LE Dimensions



Notes:

1. Dimensions: mm (inches)
2. Electrode / pH housing assembly must be in upright position as shown.
3. Allow at least 508 mm (20 in.) clearance to remove sensor.
4. Housing support opening to face forward as shown when screwed onto housing.
5. Recommended tubing size 9.5 mm (3/8") or larger running downward to open drain.

Pure Water Optical DO Sensor

Fast Response, Reduced Maintenance

The Pure Water Optical Dissolved Oxygen Sensor with Intelligent Sensor Management (ISM) technology provides high accuracy, fast response, and increased stability in demanding low ppb-level applications.

Outstanding measurement performance with low detection limit, minimum drift, and short response time significantly improves oxygen monitoring. METTLER TOLEDO Thorntons's proprietary OptoCap™ sensing element provides very accurate oxygen determination and easy maintenance without electrolyte handling. Additionally, the OptoCap eliminates the need for polarization, making the measuring system readily available and reducing downtime.

Intelligent Sensor Management (ISM) simplifies sensor handling and provides diagnostic tools for predicting sensor maintenance before measurements are affected.

Features Overview

- Very high accuracy
- Fast response
- Enhanced stability and reliability
- Reduced maintenance and downtime
- No dissolved hydrogen interference
- No flow sensitivity

Typical Applications

- Power plant cycle chemistry monitoring
- Generator stator cooling
- Semiconductor ultrapure water
- Pure water treatment systems



Specifications

Operating range	0 – 5000 ppb
System accuracy	± 2% of reading or 2 ppb, whichever is greater
Response time at 25 °C (77 °F) (Air – N ₂)	98% of final value in < 20 s
Sampling rate	Adjustable between 1 and 60 seconds
Sample flow rate	50 – 800 ml / min
Temperature compensation	Automatic
Measuring temperature range	0 – 50 °C (32 – 122 °F) for DO measure
Environmental temperature range	0 – 121 °C (32 – 250 °F)
Operating pressure	0.2 – 12 bar (2.9 – 174 psi absolute)
Mechanical pressure resistance	Maximum 12 bar (174 psi absolute)
Sample connections	¼" NPT(F)
Wetted materials	Stainless steel, silicone, EPDM O-Ring
Cable length Probe to M800	1 – 10 m (3 – 33 ft)
Components needed	Optical DO probe, housing and cable
Sensor diameter	12 mm

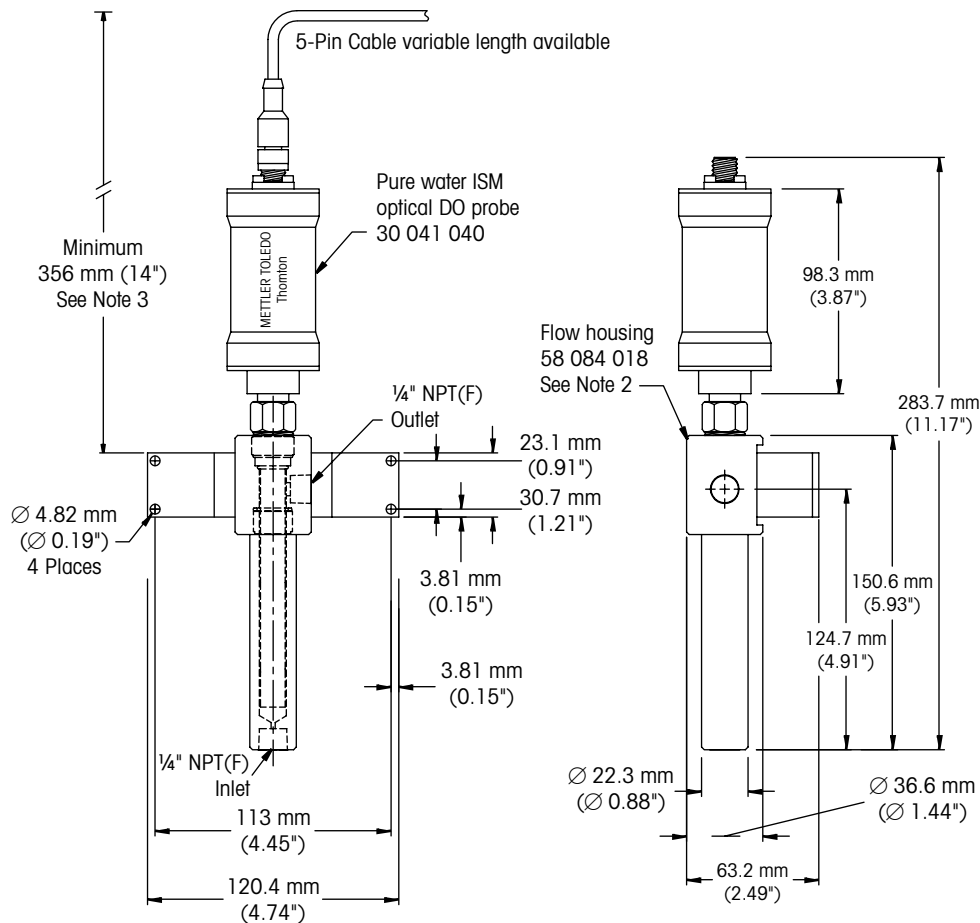
Pure Water Optical DO Sensor

Ordering Information

Optical DO Sensor	Order Number
Pure Water ISM Optical DO Probe	30 041 040
* All new installations require a sensor, housing and cable.	
Required Accessories	Order Number
Pure Water 316 Stainless Steel Housing	58 084 018
Sensor Cables	Order Number
2m (6.6ft)	52 300 379
5m (16.4ft)	52 300 380
10m (32.8ft)	52 300 381
15m (49.2ft)	52 206 422
25m (82.0ft)	52 206 529
50m (164.0ft)	52 206 530
Spare Parts	Order Number
OptoCap Replacement Kit	52 206 403
Accessories	Order Number
iSense full version	30 130 614
iSense lite version	Available for free
iSense mobile version	Available for free
iLink cable for iSense	52 300 383

* Power limitations allow only one optical DO sensor on a 2-channel M800 Water or two optical DO sensors on a 4-channel M800 Water. The other channels can be used for other parameters such as pH or conductivity.

Pure Water Optical DO Sensor Dimensions



Notes:

1. Dimensions: mm (inches)
2. Electrode / flow housing assembly must be in upright position as shown.
3. Allow at least 356 mm (14 in.) clearance to remove sensor.

High Performance DO Sensors with ISM

METTLER TOLEDO Thornton's High Performance ppb-level dissolved oxygen (DO) measurement capability excels in demanding low ppb-level applications. It provides a precise zero and a highly accurate response over the entire measurement range.

Features

- Plug and Measure capability
- Very fast response
- Intelligent Sensor Management
- Low maintenance with drop-in modular membrane
- Excellent long-term stability



The polarographic probe uses a gas-permeable membrane through which oxygen passes to produce an electrochemical reaction and current flow in direct proportion. The membrane is stainless steel mesh-reinforced PTFE for exceptional durability. Behind that membrane is the platinum cathode where oxygen reacts to produce the measurement signal. The cathode is surrounded by a guard electrode which prevents stray oxygen from the sides of the membrane or inside of the probe from adding to the signal. The guard ring is the key to the very rapid downscale response. The electrochemical reaction is completed at the silver anode. Full temperature compensation accounts for effects on both membrane permeability and solubility of oxygen in water.

Applications

Power plant cycle chemistry monitoring of DO enables control of oxygen scavenger with phosphate, caustic or all-volatile treatment. With oxygenated treatment it can be used to regulate oxygen feed. Compliance with cycle chemistry guidelines and specifications for DO can be ensured with this very accurate and responsive measuring system. Cycling plants can benefit from its rapid downscale response, assuring real-time reporting of even the fastest deoxygenation during startup.

Semiconductor ultrapure water for some processes requires low DO levels to prevent oxidation of wafer surfaces between stages. The ISM transmitter can provide a solid ppb-level DO measurement plus a simultaneous resistivity measurement in the same instrument.

Pure water treatment systems with deaerators to produce water for the above applications can be reliably monitored with the M300 Water system. The second measurement channel is available for conductivity, resistivity, pH or ORP monitoring.

Specifications

Sample Flowrate	50-1,000 mL/min
Sample Temperature	0-60 °C (32-140 °F) for temperature compensation; can tolerate 100 °C (212 °F)
Sample Pressure	0-5 bar (0-72 psig)
Sample Connections	1/4" NPT(M)
Wetted Materials	Polyacetal flow housing, polyphenylene sulfide probe body, PTFE membrane reinforced with stainless steel and silicone rubber, Viton® and silicone rubber o-rings
Cable Length	Probe to instrument, 1 to 10 m (3 to 33 ft)
Weight	1 kg (2 lb) with flow housing
Response Time	98% response in 90 seconds
Operating Range	0-10,000 ppb (µg/L)
System Accuracy	± 1% of reading or 1 ppb, whichever is greater; ± 0.5 °C

High Performance Dissolved Oxygen Sensors with ISM

Ordering Information

High Performance Dissolved Oxygen Sensor	Order Number
ISM High Performance DO probe	52 201 209
Analog High Performance DO probe	52 201 067
Spare parts and Accessories for All High Performance Sensors	Order Number
Maintenance kit (electrolyte and 4 membranes)	52 200 024
Analog Polarization module (for portable use with VP cable)	52 200 893
DO electrolyte pack (3 × 25 ml)	30 298 424
Single membrane body	52 200 071
Flow housing	58 084 009

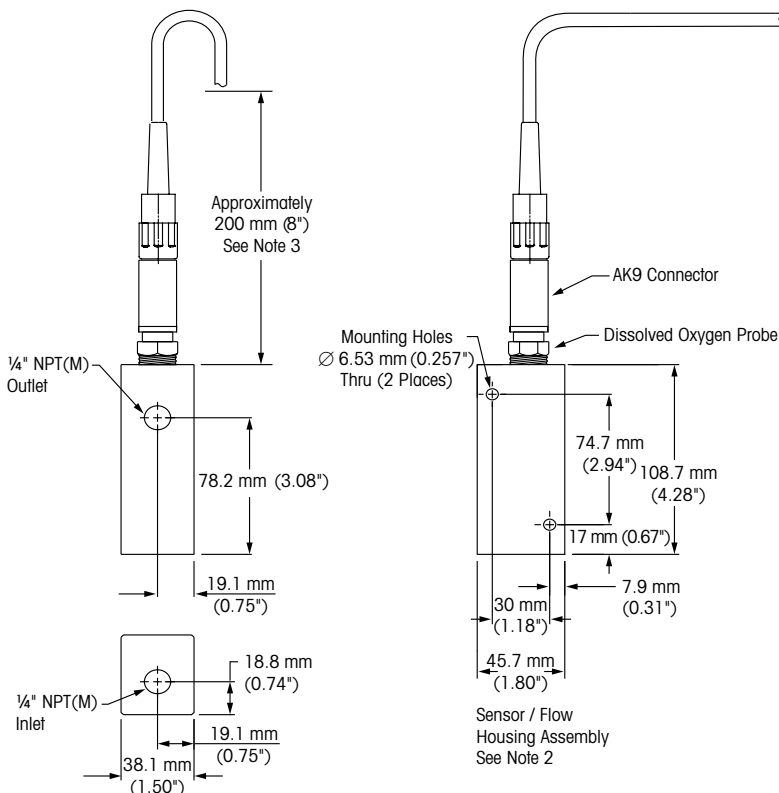
* All new installations require a sensor, housing and cable.

Cables (High Performance Dissolved Oxygen probe ISM)	
Cable length	AK9
1m (3.3 ft)	59 902 167
3m (9.8 ft)	59 902 193
5m (16.4 ft)	59 902 213
10m (32.8 ft)	59 902 230
20m (65.6 ft)	52 300 204
30m (98.4 ft)	52 300 393
50m (164.0 ft)	52 300 394
80m (262.4 ft)	52 300 395

Cables (High Performance Dissolved Oxygen probe analog)	
Cable length	VP
1m (3.3 ft)	52 300 107
3m (9.8 ft)	52 300 108
5m (16.4 ft)	52 300 109
10m (32.8 ft)	52 300 110

Accessories	Order Number
iSense full version	30 130 614
iSense lite version	Available for free
iSense mobile version	Available for free
iLink cable for iSense	52 300 383

High Performance Dissolved Oxygen Sensor Dimensions



Notes:

1. Dimensions: mm (inches)
2. Sensor/Flow housing assembly must be in upright position as shown
3. Allow approximately 8 in. (200 mm) clearance to remove sensor

pureO₃ Dissolved Ozone Sensor with ISM

METTLER TOLEDO Thornton's highly reliable dissolved ozone measurement capability uses a proven sensor design with rapid and accurate response to ozone concentrations. At the low end, its excellent sensitivity gives positive detection of zero ozone after destruction by UV light.

Features

- Rapid, accurate response
- Positive zero detection
- Low maintenance with drop-in modular membrane
- Plug and Measure operation



Robust sensor construction is coupled with a membrane cartridge which allows exceptionally fast and easy replacement of electrolyte and membrane when necessary.

Applications

Pharmaceutical water systems can assure complete sanitization by controlling ozonation based on an ozone measurement downstream of the storage tank. To guarantee removal of all ozone downstream of UV destruction (and satisfy the 'no added substances' requirement), a second ozone measurement can confirm a zero level. When the entire distribution system is ozonated with the UV lights off, a third measurement at the return of the distribution piping can show when an adequate ozone level has been achieved throughout the loop. Thornton M300 Water instrumentation can monitor two points for ozone and/or conductivity with the same instrument.

Semiconductor ultrapure water ozone sanitization can be controlled by monitoring the ozone concentration downstream of the ozonator and UPW storage tank. To be sure all ozone has been decomposed after UV lights, a second ozone measurement can confirm a zero level. Thornton multi-parameter capability can provide solid ppb-level ozone measurements plus simultaneous resistivity measurements in the same instrument.

Bottled water systems monitor ozonation levels to be sure of proper sanitization of the water, which in turn sanitizes the bottle and seal. Continuous measurement and control to proper ozone levels is a key quality practice that promotes consistent good taste and long shelf life. Thornton equipment can provide this measurement continuously at minimal cost.

Beverage systems frequently use ozonated water in place of chemicals for the clean-in-place (CIP) operations when changing between flavors. Instead of using acids, caustic or chlorine, ozone can provide the cleaning and disinfection without risk of objectionable residuals or byproducts. Ozone monitoring and control are essential to enable repeatable CIP operations. Thornton instrumentation meets these requirements cost effectively.

Specifications

Sample flow rate	200 to 500ml/min with housing; 0.15 to 1 m/s (0.5 to 3 ft/s) without housing
Sample temperature	5 to 50 °C (41 to 122 °F) for compensation; probe can withstand 100 °C (212 °F)
Sample pressure	Normal operation, atmospheric; can withstand 0.8 to 3 bar absolute (0 to 45 psig)
Sample connections	1/4" NPT(F)
Wetted materials	Polycarbonate or 316 stainless steel flow housing, 316L/1.4404 stainless steel probe, silicone rubber membrane, FKM O-rings
Cable lengths	1 to 80 m (3.3 to 262.5 ft)
Weight	227 g (0.5 lb)
Response time	90% response in 30s
Operating range	0–5,000 ppb (mg/L); 0–5.0 ppm (mg/L) short term; 0–500 ppb (mg/L); 0–0.5 ppm (mg/L) continuous
System accuracy	± 1% of reading or 0.4 ppb, whichever is greater

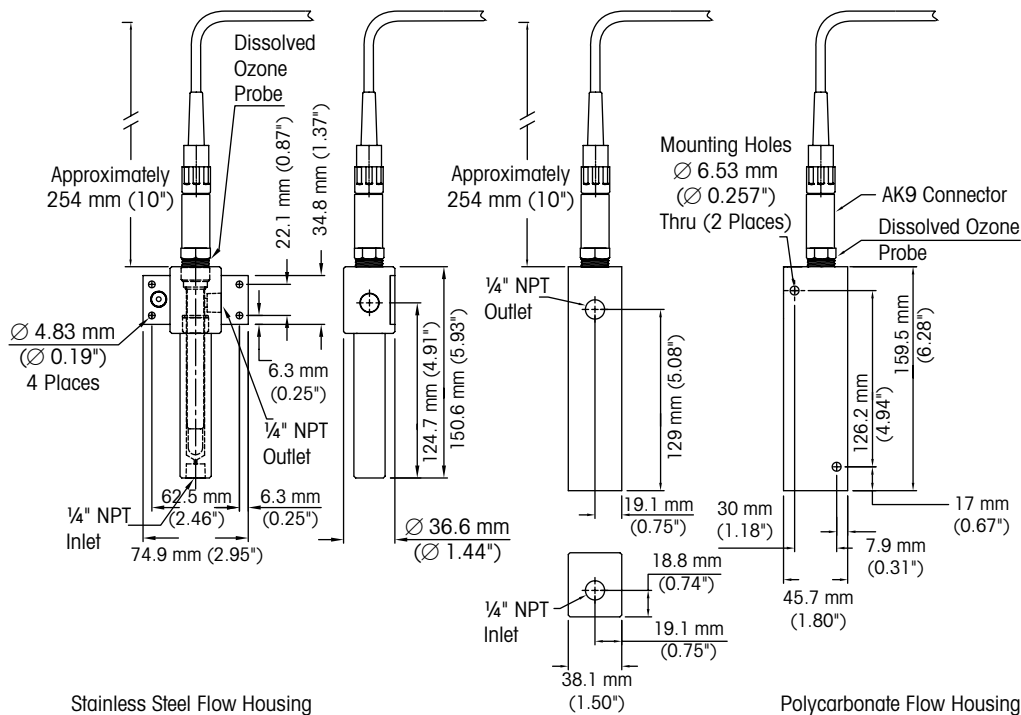
pureO₃ Dissolved Ozone Sensors with ISM

Ordering Information

Ozone Sensor	Order Number
pureO ₃ ™ Dissolved Ozone sensor	30 139 305
Required Accessories	Order Number
Polycarbonate Housing	58 084 012
Stainless Steel Housing	58 084 020
Spare Parts	Order Number
pureO ₃ membrane kit including electrolyte, 4 membranes and O-rings	30 235 170
Interior sensor body for pureO ₃	30 236 790
pureO ₃ electrolyte, 25 ml	30 135 837
ISM Sensor Cables	Order Number
1.0m (3.3 ft)	59 902 167
3.0m (9.8 ft)	59 902 193
5.0m (16.4 ft)	59 902 213
10.0m (32.8 ft)	59 902 230
20m (65.6 ft)	52 300 204
30m (98.4 ft)	52 300 393
50m (164.0 ft)	52 300 394
80m (262.4 ft)	52 300 395

* All new installations require a sensor, housing and cable.

pureO₃ Dissolved Ozone Sensor Dimensions



Notes:

1. Dimensions: mm (inches)
2. Sensor/Flow housing assembly must be in upright position as shown
3. Allow approximately 254 mm (10 in) clearance to remove sensor

M800 Water Transmitter

Features:

- 1/2" DIN wall/panel/pipe mount enclosure
- Color touchscreen display
- 2 and 4-channel models
- 2 additional pulse flow inputs
- Full predictive sensor diagnostics with iMonitor screens
- PROFIBUS DP compatible
- Menus available in English, Chinese, French, German, Italian, Japanese, Korean, Portuguese, Russian, Spanish



See M800 family flyer 52 121 836 for more details.

M300 Water Transmitter

Features:

- 1/4" DIN panel mount and 1/2" DIN wall/panel/pipe mount enclosure
- 1 and 2-channel models
- 4-line backlit display
- Menus available in English, French, German, Italian, Japanese, Portuguese, Russian, Spanish



See M300 Water product flyer 30 325 500 for more details.

www.mt.com/thornton

Visit for more information

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Process Analytics Division
Local contact: www.mt.com/contacts

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