

# Analytical Sensors



## THORNTON

Leading Pure Water Analytics

### Sensors for M300 Instruments

Conductivity / Resistivity

pH / ORP

Dissolved Oxygen

Dissolved Ozone



## Comprehensive Liquid Analysis Sensors Optimized for Pure Water Treatment

METTLER TOLEDO

# M300 Analytical Sensors

## provide reliable measurements

The **METTLER TOLEDO THORNTON M300 series of process analytical instrumentation provides reliable, accurate measurements of conductivity/resistivity, pH/ORP, dissolved oxygen, ozone and flowrate.**

### Sensor Features and Benefits

- Convenient electrical and process connections for easy maintenance and calibration
- Advanced METTLER TOLEDO sensor technology for high performance and long life
- Integral temperature sensing for accurate measurement and compensation
- On-line pH sensor diagnostics for assurance of process surveillance
- Direct sensor inputs for all parameters for simplified installation

### 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, and JP conductivity requirements

Reclaim, recycle and wastewater treatment for the above industry applications for contaminant detection, diversion and neutralization

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# Conductivity/Resistivity Sensors for M300

## 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

- Suspended solids – four-electrode sensors have flat surfaces which are less likely to accumulate solids
- Chemical compatibility, including cleaning and disinfection processes. Rely on process experience or consult Thornton for unusual process composition. Monel® is recommended for exposure to hydrofluoric acid.

## Specifications

Cell Constant Accuracy	± 1% except ± 5% system accuracy for 4-E and 240-401 sensors (sensor & transmitter calibrated as a matched-pair system at start up)
Cell Constant Repeatability	± 0.25% except ± 2% for 4-E sensors
Temperature Sensor	PT1000 RTD, IEC 60751, Class A
Temperature Accuracy	± 0.1 °C at 25 °C, except 4-E sensors
Cable Jacket Material/Temp. rating	PVC, 80 °C; except 0.1 constant sanitary & 0.4 constant-PTFE, 200 °C
Maximum Sensor Distance	200 ft (60 m) except 50 ft (15 m) for 244-series
Finish (Sanitary 0.1cm <sup>-1</sup> Sensors)	Ra 8 microinches (0.2 micrometers), 316L SS is electropolished
Insulator Material	PEEK (0.1, 0.4 and 0.01 constant sensors)

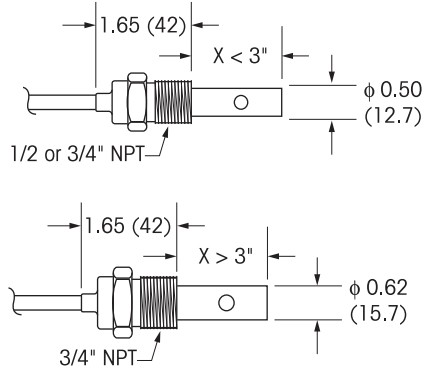
Fitting	Insertion Length "X" in (mm)	Cable Length ft (m)/ Connector	Fitting/Body Material	Range (µS/cm)*	Cell Const. (cm <sup>-1</sup> )	Electrode Material	Max Pressure/Temp Psig (bar) at °F (°C)	US & Canada Part No.	International Part No.
3/4" NPTM	1.35 (34)	1.5 (0.5)/S	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-201</b>	<b>58 031 201</b>
3/4" NPTM	5.19 (132)	1.5 (0.5)/S	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-202</b>	<b>58 031 202</b>
3/4" NPTM	1.35 (34)	1.5 (0.5)/S	PTFE/SS	0.02-2,000	0.1	Monel®	250 (17) at 200 (93)	<b>240-203</b>	<b>58 031 203</b>
3/4" NPTM	5.19 (132)	1.5 (0.5)/S	PTFE/SS	0.02-2,000	0.1	Monel®	250 (17) at 200 (93)	<b>240-204</b>	<b>58 031 204</b>
3/4" NPTM**	1.15 (29)	None/S	PVDF	0.02-2,000	0.1	Titanium	100 (7) at 203 (95) & 500 (34) at 77 (25)	<b>240-207</b>	<b>58 031 207</b>
Retractable for 1000-4X †††	2.75 (70)	None/VP	SS	0.02-2,000	0.1	316L SS	58 (4) at 268 (131) & 250 (17) at 77 (25)	<b>240-222</b>	<b>58 031 222</b>
1/2" NPTM	1.14 (29)	1.5 (0.5)/S	Noryl	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-213</b>	<b>58 031 213</b>
3/4" NPTM	1.14 (29)	1.5 (0.5)/S	Noryl	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-214</b>	<b>58 031 214</b>
3/4" NPTM	1.35 (34)	10 (3)/S	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-215</b>	<b>58 031 215</b>
1/2" NPTM	1.14 (29)	1.5 (0.5)/S	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-216</b>	<b>58 031 216</b>
3/4" NPTM	1.35 (34)	20 (6.1)***	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-217</b>	<b>58 031 217</b>
1/2" NPTM	1.14 (29)	10 (3)***	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-218</b>	<b>58 031 218</b>
3/4" NPTM	1.35 (34)	30 (9)***	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-220</b>	<b>58 031 220</b>
3/4" NPTM	2.38 (60)	1.5 (0.5)/S	PTFE/SS	0.002-200	0.01	Titanium	250 (17) at 200 (93)	<b>240-101</b>	<b>58 031 230</b>
1.5" Tri-Clamp	3.38 (86)	1.5 (0.5)/S	Titanium	0.02-2,000	0.1	Titanium	150 (10) at 311 (155) & 450 (31) at 77 (25)	<b>243E221†</b>	<b>58 031 221</b>
1.5" Tri-Clamp	3.38 (86)	1.5 (0.5)/S	316L SS	0.02-2,000	0.1	316L SS		<b>243E223†</b>	<b>58 031 223</b>
2" Tri-Clamp	4.13 (105)	1.5 (0.5)/S	316L SS	0.02-2,000	0.1	316L SS		<b>243E227†</b>	<b>58 031 227</b>
3/4" NPTM	3.38 (86)	1.5 (0.5)/S	PTFE/SS/Noryl	10-40,000	10	Graphite	250 (17) at 200 (93)	<b>240-401</b>	<b>58 031 241</b>
3/4" NPTM	1.35 (34)	1.5 (0.5)/VP	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-231</b>	<b>58 031 232</b>
3/4" NPTM	5.19 (132)	1.5 (0.5)/VP	PTFE/SS	0.02-2,000	0.1	Titanium	250 (17) at 200 (93)	<b>240-236</b>	<b>58 031 233</b>
1.5" Tri-Clamp	3.35 (85)	None/VP	316L SS	0.02-2,000	0.1	316L SS	150 (10) at 311 (155) & 450 (31) at 77 (25)	<b>243E233†</b>	<b>58 031 234</b>
2" Tri-Clamp	4.10 (104)	None/VP	316L SS	0.02-2,000	0.1	316L SS		<b>243E237†</b>	<b>58 031 235</b>
1.5" Tri-Clamp	1.00 (25)	None/VP	PEEK	10-650,000	4-E††	316L SS†	200 (14) at 122 (50) & 70 (5) at 302 (150)	<b>244-633</b>	<b>58 031 242</b>
2" Tri-Clamp	1.00 (25)	None/VP	PEEK	10-650,000	4-E††	316L SS†		<b>244-634</b>	<b>58 031 243</b>
1.5" Tri-Clamp	1.00 (25)	None/VP	PEEK	10-650,000	4-E††	Hastelloy® C†		<b>244-636</b>	<b>58 031 245</b>
1.5" Tri-Clamp	0.5 (12)	None/VP	PEEK	10-650,000	4-E††	316L SS†		<b>244-638</b>	<b>58 031 248</b>
1" NPTM	1.1 (28)	None/VP	PEEK	10-650,000	4-E††	Hastelloy® C	100 (7) at 200 (93) & 200 (14) at 77 (25)	<b>244-630</b>	<b>58 031 239</b>
1" NPTM**	1.1 (28)	None/VP	CPVC	10-650,000	4-E††	316L SS	50 (3.5) at 176 (80) & 100 (7) at 77 (25)	<b>244-631</b>	<b>58 031 240</b>
1" NPTM**	1.1 (28)	None/VP	CPVC	10-650,000	4-E††	Hastelloy® C	100 (7) at 77 (25)	<b>244-635</b>	<b>58 031 244</b>
1" NPTM	1.1 (28)	2 (0.6)VP	316 SS	10-20,000	0.4	316 SS	500 (34) at 77 (25) & 250 (17) at 392 (200)	<b>58 031 264</b>	<b>58 031 264</b>

\* Megohm-cm=1/(µS/cm)  
 \*\* 1" NPTM insertion and 1" NPTM submersion  
 \*\*\* finned leads-no patch cord required  
 S = Standard connector used with 1XXX-67 (58 080 25X) patch cords only.

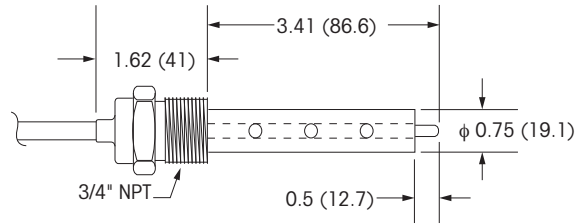
† FDA compliant materials with certification to meet EN10204 3.1B. & USP <88> Class VI  
 †† 4-Electrode Sensor, maximum patch cord length 50 ft (15 m).  
 ††† See pages 6-7 for retractable housings (also used for pH & ORP)  
 VP = Vario Pin sealed connector used with 58 080 20X patch cords only.  
 (58 080 101 3-ft adapter cable can connect an existing 1XXX-67 (58 080 25X) patch cord to a VP sensor.)

# Conductivity/Resistivity Sensors for M300

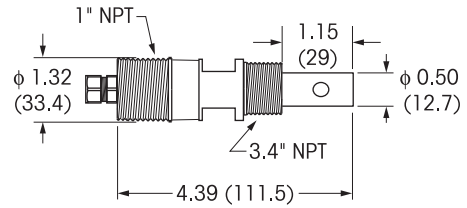
## NPT 0.01 and 0.1 Constant



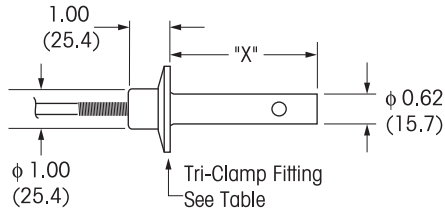
## 10 Constant



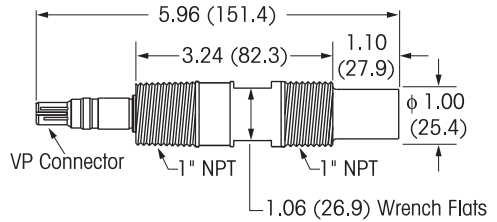
## Submersion 0.1 Constant



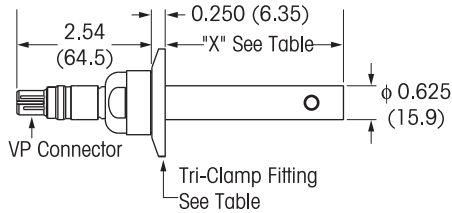
## Sanitary 0.1 Constant



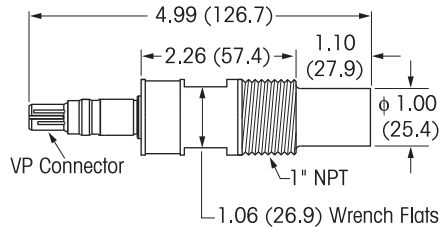
## NPT 4-Electrode, CPVC



## Sanitary 0.1 Constant, VP

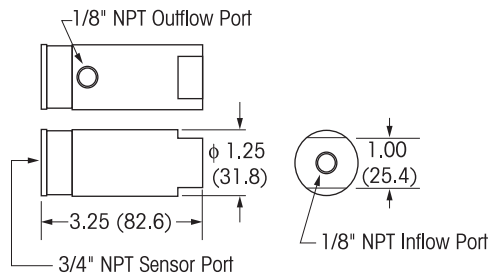


## NPT 4-Electrode, PEEK



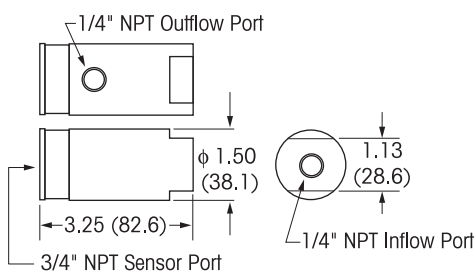
## 3/4" NPT 316SS Flow Housing \*

1000-30 (58 084 000)

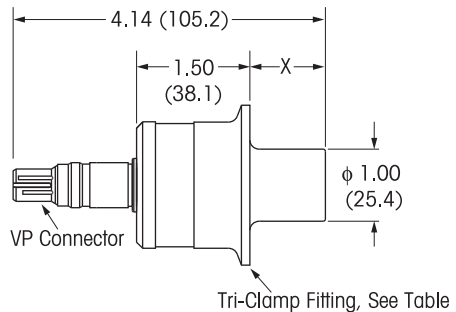


## PVDF Flow Housing \*

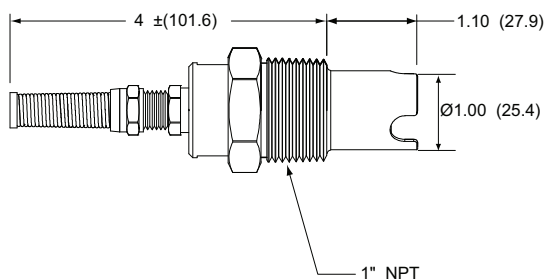
1000-31 (58 084 001)



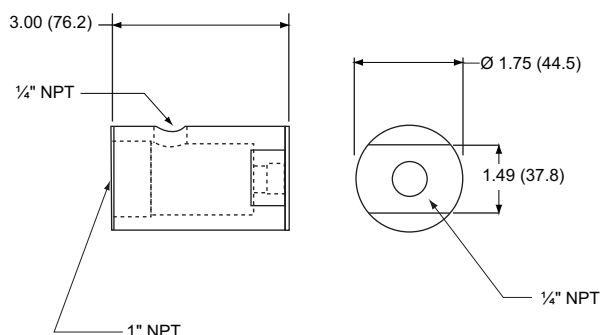
## Sanitary 4-Electrode



## Boiler Water Conductivity Sensor



## 58 084 016 Flow Housing (boiler sensor)



## Conductivity/Resistivity Sensor Patch Cords

For connections between sensors and instruments, use patch cord type (standard or VP) depending on sensor connector type. See sensor specification table, page 3, column 3.

Description	Standard		VP*
	US & Canada Part No.	International Part No.	Part No.
1 ft (0.3 m)	1001-67	58 080 250	-
5 ft (1.5 m)	1005-67	58 080 251	58 080 201
10 ft (3 m)	1010-67	58 080 252	58 080 202
15 ft (4.5 m)	1015-67	58 080 253	58 080 203
25 ft (7.6 m)	1025-67	58 080 254	58 080 204
50 ft (15.2 m)	1050-67	58 080 255	58 080 205
75 ft (23 m)	-	-	58 080 206
100 ft (30.5 m)	1110-67	58 080 256	58 080 207
150 ft (45.7 m)	1115-67	58 080 257	58 080 208
200 ft (61 m)	1120-67	58 080 258	58 080 209

One cord is required for each sensor except 240-217, -218, -220.  
4-electrode conductivity sensors are limited to 50 ft (15.2 m).

\* For VP Conductivity sensors only. NOT for pH, ORP or dissolved oxygen sensors.



58 080 20X\*  
VP Patch Cord



1XXX-67  
(58 080 25X)  
Std. Patch Cord

## 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 $\mu$ S/cm, 500 mL, HCl	$\pm$ 3%	6 mo	58 078 001
100 $\mu$ S/cm, 500 mL, KCl	$\pm$ 1%	12 mo	58 078 002
1000 $\mu$ S/cm, 500 mL, KCl	$\pm$ 1%	12 mo	58 078 003
10,000 $\mu$ S/cm, 500 mL, KCl	$\pm$ 1%	12 mo	58 078 004
100,000 $\mu$ S/cm, 500 mL, KCl	$\pm$ 1%	12 mo	58 078 005





# pH and ORP Sensors for M300

Thornton offers detachable pH and ORP sensors with an electrical connector directly on the electrode body to allow convenient maintenance and calibration. A variety of housings are available.

## Specifications

Measuring Electrode	Glass pH, platinum ORP
Reference Electrode	Silver-silver chloride with double junction or equivalent
Temperature Compensator	Pt1000, IEC60751, Class A in all pH sensors; not in ORP sensors
pH Range	0-14, except 52 000 512 which is 2-12
Maximum Flow	10 ft/s (3 m/s)
Maximum Cable Lengths	65 ft. (20 m)

A complete pH or ORP installation requires **1** an electrode, **2** a housing and **3** a VP or AS9 cable, from each of the tables below. No preamp is required. Each installation requires an M300 instrument. Heavy lines divide groups of compatible electrodes and housings.

Electrode (1)				Housing (2)	
	Rating	Fitting / Material / Connection	International Part No. US & Canada Part No.		International Part No. US & Canada Part No.
pH, general purpose, low cost	0-60 °C	Pg 13.5 / polysulfone & glass / VP	<b>52 000 512</b>	3/4" NPT insertion or submersion** / CPVC	<b>53 300 021</b>
	30 psi (2 bar) at 60 °C & 75 psi (5 bar) at 45 °C		4010-120-Pt1000		
pH, general purpose, high pressure	See housing limits	Pg 13.5 / glass / VP	<b>52 002 987</b> 4260-120-Pt1000	100 psi (7 bar) at 20 °C & 30 psi (2 bar) at 80 °C	
pH, general purpose, & moderately pure water*	0-100 °C	Pg 13.5 / glass / VP	<b>52 002 559</b>	3/4" NPT insertion or submersion** / PVDF	<b>52 401 520</b>
	60 psi (4 bar)		3250SG-120-Pt1000		
pH, HF-Resistant	See housing limits	Pg 13.5 / glass / VP	<b>52 003 550</b> 4262-120-Pt1000-VP	87 psi (6 bar) at 20 °C & 15 psi (1 bar) at 100 °C	
ORP, general purpose, & moderately pure water*	0-100 °C	Pg 13.5 / glass & Pt / S8	<b>59 904 203</b>	1" weld tee / PVC /	<b>58 084 014</b>
	36 psi (2.5 bar)		<b>10 505 3339</b> Pt4805-DPA-S8-120		
ORP, general purpose, high pressure	See housing limits	Pg 13.5 / glass & Pt / S8	<b>59 904 167</b>	50 psi (3.5 bar) at 60 °C	<b>41 722 3001</b>
			<b>10 505 3288</b> Pt4805-DXK-S8-120		
pH, general purpose, high chemical resistance	0-100 °C	1" NPT insertion or 1" NPT submersion / PVDF & glass / VP	<b>59 909 571</b>	User's 1-1/2" tee & reducing bushing for insertion, or 1" coupling & pipe for submersion	<b>none required</b>
	100 psi (7 bar) at 65 °C & 50 psi (3.5 bar) at 100 °C		<b>41 453 3102</b> 4501-VP-Pt1000-SG		
pH, Retractable	See housing limits	Pg 13.5 retractable / glass / VP	<b>52 002 989</b>	Retractable 1-1/2" NPT / CPVC / 75 psi (5 bar), 80 °C	<b>58 084 002</b> <b>1000-40</b>
			<b>52 002 989</b> 4260-225-Pt1000		
ORP, Retractable	See housing limits	Pg 13.5 retractable / glass & Pt / S8	<b>59 904 152</b>	Retractable 1-1/2" NPT / PVDF / 75 psi (5 bar), 100 °C	<b>58 084 003</b> <b>1000-41</b>
			<b>10 505 3255</b> Pt4805-DXK-S8-225	Retractable 1" NPT / 316 SS / 100 psi (7 bar), 100 °C	<b>58 084 004</b> <b>1000-42</b>

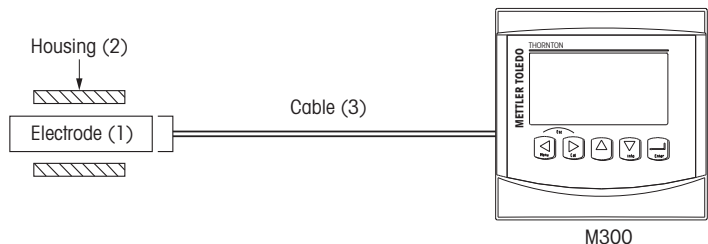
\* For use with moderately pure waters (conductivity 5-50 µS/cm) use 53 300 021 housing in 3/4" NPT earth-grounded metal pipe tee with flow <100 mL/min and discharge to open drain. For higher purity and/or higher accuracy in pure water see the pHure Sensor™, pages 8-9.

\*\* 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.

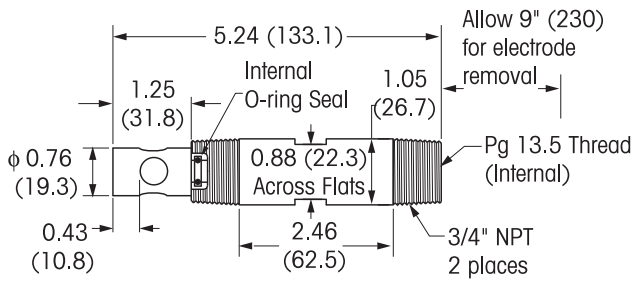
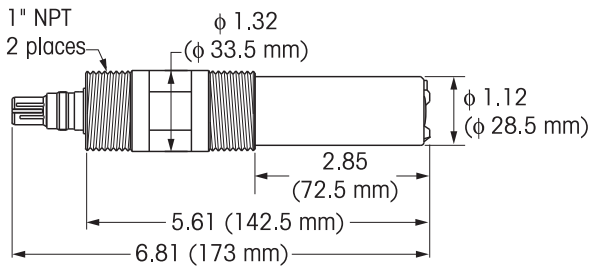
### pH/ORP Cable (3)

	Connector	Cable Length	International Part No.	US & Canada Part No.
pH	VP	3 ft (1 m)	<b>52 300 107</b>	<b>52 300 107</b>
	VP	10 ft (3 m)	<b>52 300 108</b>	<b>52 300 108</b>
	VP	16 ft (5 m)	<b>52 300 109</b>	<b>52 300 109</b>
	VP	33 ft (10 m)	<b>52 300 110</b>	<b>52 300 110</b>
	VP	49 ft (15 m)	<b>52 300 144</b>	<b>52 300 144</b>
	VP	65 ft (20 m)	<b>52 300 141</b>	<b>52 300 141</b>
ORP	AS9	3 ft (1 m)	<b>59 902 245</b>	<b>10 001 0102</b>
	AS9	10 ft (3 m)	<b>59 902 268</b>	<b>10 001 0302</b>
	AS9	16 ft (5 m)	<b>59 902 292</b>	<b>10 001 0502</b>
	AS9	33 ft (10 m)	<b>59 902 318</b>	<b>10 001 1002</b>

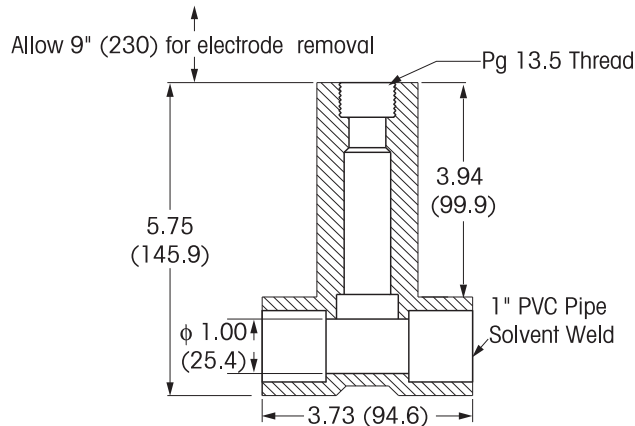
AS9 connector mates with S8 electrode connector.



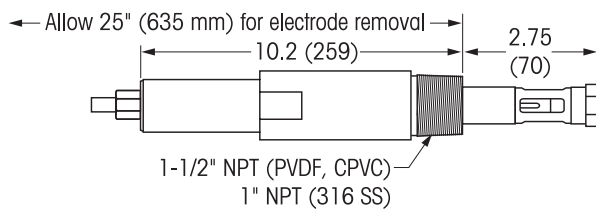
# pH and ORP Sensors for M300



**53 300 021 & 52 401 520**



**41 722 3001**



**1000-4X**

## Electrodes



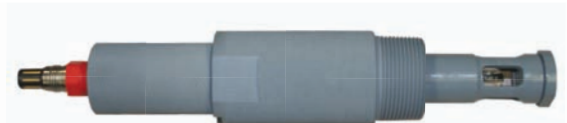
## Housings



**53 300 021**



**41 722 3001**



**1000-40**

# pHure Sensor™ for M300

## 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 assures 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. Additional stability is obtained with a dual high-impedance measuring circuit that includes a solution ground.

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 RTD, and VP connection. The mating M300 instrument provides a dual high-input impedance measuring circuit with solution ground to maximize stability. 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.

Description	Part No.
pHure Sensor™ with 3 ft (1 m) VP cable	<b>58 032 236</b>
pHure Sensor™ with 10 ft (3 m) VP cable	<b>58 032 237</b>
pHure Sensor™ with 16 ft (5 m) VP cable	<b>58 032 238</b>
pHure Sensor™ with 33 ft (10 m) VP cable	<b>58 032 239</b>
Replacement combination electrode with RTD	<b>52 002 447</b>

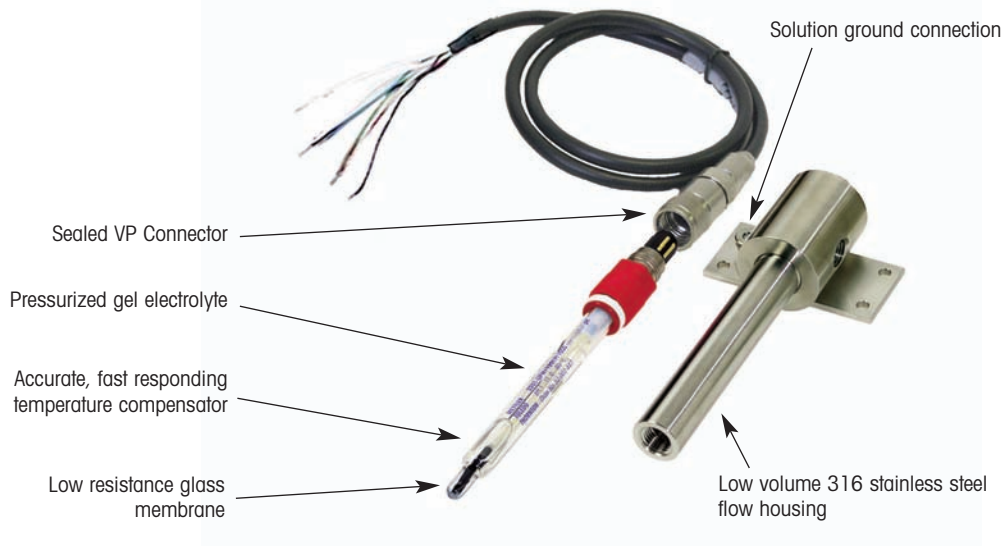
## Specifications

Wetted Materials	316 SS, glass, silicone rubber
Process Connections	1/4" NPTF in/out
Flow Housing Volume	5 mL with electrode in place
Maximum Pressure	Atmospheric pressure for optimum stability; operational 0-35 psig (0-2.5 bar); can safely withstand 100 psig (7 bar)
Sample Temperature	32-176 °F (0-80 °C), short term to 212 °F (100 °C)
Sample pH	1-11
Sample Flowrate	50-150 mL/min
Sample Conductivity	> 0.8 µS/cm for highest accuracy
Connection	VP cable from sensor directly to instrument, included
Components Included	52 002 447 combination pH electrode, 02385 flow housing and 52 300 1XX VP cable

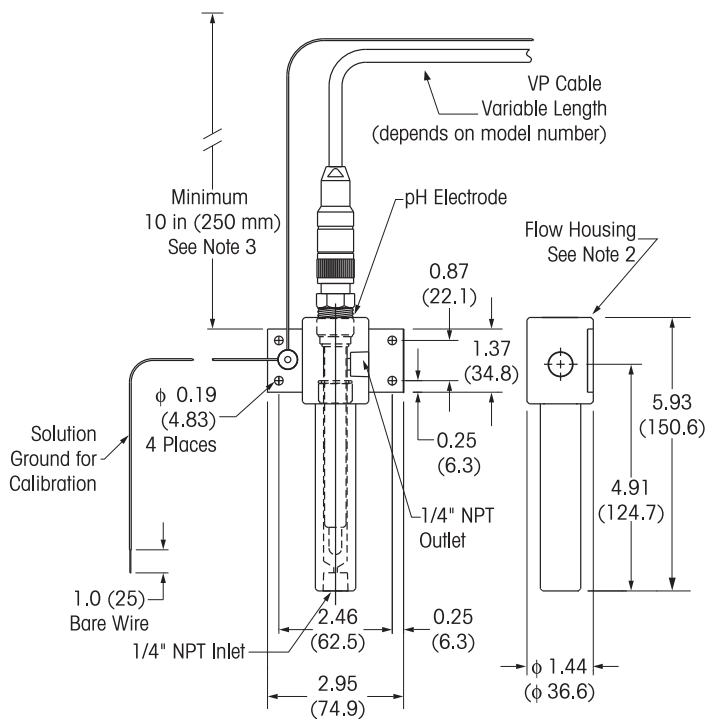


# pHure Sensor™ for M300

## pHure Sensor™ Features



## pHure Sensor™ Dimensions



### Notes:

1. Dimensions: inches (mm)
2. Electrode/Flow housing assembly must be in upright position as shown.
3. Allow at least 10 in. (250 mm) clearance to remove sensor.
4. Allow at least 4.5 in. (115 mm) clearance for patch cord connection.

## pH and ORP Accessories

pH and ORP (Redox) Standard Buffer Solutions	Part No.
pH Buffer, 4.01, 250 mL	<b>51 340 057</b>
pH Buffer, 7.00, 250 mL	<b>51 340 059</b>
pH Buffer, 9.21, 250 mL	<b>51 300 193</b>
pH Buffer, 10.00, 250 mL	<b>51 340 056</b>
ORP Buffer, 220 mV, 6 x 250 mL	<b>51 340 081</b>



# High Performance DO Sensor for M300

Thornton's High Performance ppb-level dissolved oxygen measurement capability excels in the demanding low ppb-level applications. It provides a precise zero and a highly accurate response over the entire range of measurement. This allows it to perform well at any level as well as providing very fast response to changes from one level to another.

## Features

- Very fast response
- High accuracy
- 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 assured 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 M300 can provide a solid ppb-level DO measurement plus a simultaneous resistivity measurement in the same instrument.

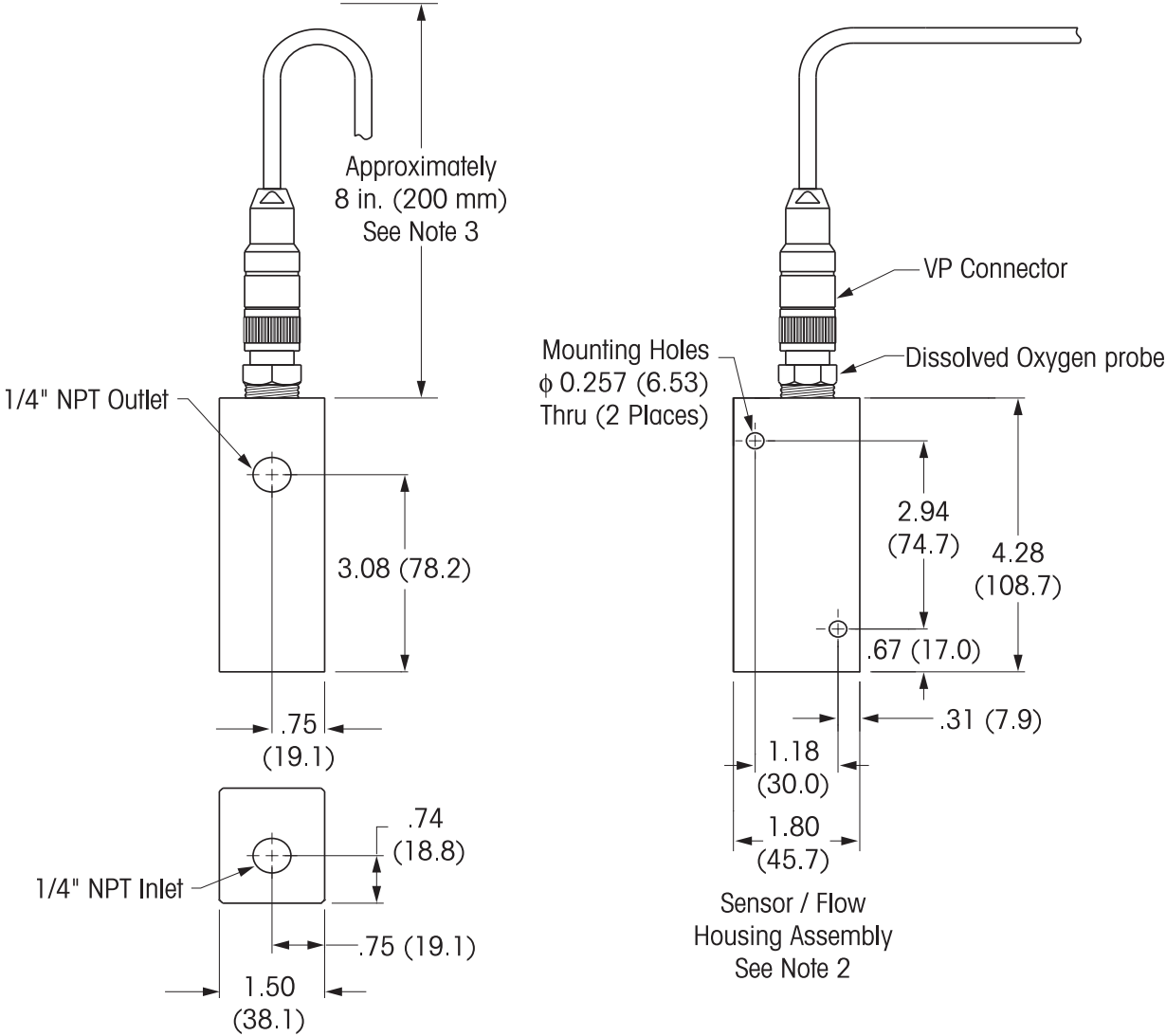
**Pure water treatment systems** with deaerators to produce water for the above applications can be reliably monitored with the M300 system. The second measurement channel is available for conductivity, resistivity, pH or ORP monitoring.

Description	Part No.
DO probe, flow housing & 3 ft (1 m) cable	<b>58 037 204</b>
DO probe, flow housing & 10 ft (3 m) cable	<b>58 037 205</b>
DO probe, flow housing & 16 ft (5 m) cable	<b>58 037 206</b>
DO probe, flow housing & 33 ft (10 m) cable	<b>58 037 207</b>
Replacement DO Probe	<b>52 201 067</b>
Maintenance kit (electrolyte & 4 membranes)	<b>52 200 024</b>
Polarization module (for portable use)	<b>52 200 893</b>

## Specifications

Sample Flowrate	50-1,000 mL/min
Sample Temperature	0-60 °C (32-140 °F) for temperature compensation; can tolerate 100 °C
Sample Pressure	0-5 bar (72 psig)
Sample Connections	1/4" NPT
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, 3 to 65 ft (1 to 20 m)
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
Components Included	52 201 067 DO Probe with spare electrolyte, 17490 (58 084 009) Housing, 52 300 1XX VP Cable

# High Performance Dissolved Oxygen Sensor for M300



**Notes:**

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

# Long-Life Dissolved Oxygen Sensor for M300

Thornton's long-life dissolved oxygen measurement capability uses an industry-proven sensor design with major improvements in longevity. An especially durable membrane and controlled internal electrochemistry allow many years of operation with no internal maintenance.

## Features

- Very low maintenance
- Excellent long-term stability
- Industry-proven sensor technology
- No interference from hydrogen in stator cooling applications



Self-polarized electrodes minimize upsets from power interruption. 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. Its immunity to interference from dissolved hydrogen and non-PTFE membrane, make it ideal for stator cooling and some nuclear plant applications.

**Semiconductor ultrapure water** for some processes requires low DO levels to prevent oxidation of wafer surfaces between stages. The M300 system 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 system. The second measurement channel is available for conductivity, resistivity, pH or ORP monitoring.

Description	US & Canada Part No.	International Part No.
ppb DO probe/preamp & flow chamber	58 037 221	58 037 221
Patch Cord, ordered separately (page 5)	1XXX-67	58 080 25X

## Specifications

Sample Flowrate:	50-2,000 mL/min
Sample Temperature:	5-50 °C (41-122 °F)
Sample Pressure:	Normal operation, atmospheric; can withstand 6 bar (87 psig)
Sample Connections:	1/8" NPT
Wetted Materials:	Polyacetal flow chamber, 316 stainless steel and polyacetal probe, HDPE membrane.
Cable Length:	Probe to preamp, 1.5 ft (0.5 m); preamp to instrument, 5 to 200 ft (1.6 to 61 m) with patch cord ordered separately
Weight:	1.5 kg (3 lb) with flow chamber
Response Time:	Within range, 20 seconds for 90% response; from air calibration, dependent on air exposure time
Operating Range:	0-10,000 ppb (µg/L) with auto-ranging
System Accuracy:	± 2% of reading or 1 ppb, whichever is greater; ± 0.5 °C
Spare Parts:	Maintenance kit of 7 membranes, and replacement electrolyte, Part No. 91008 (58 079 100) included.

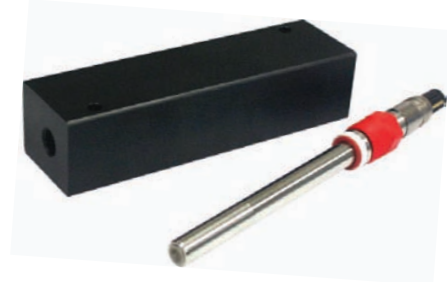


# Dissolved Ozone Sensor for M300

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
- Additional parameters available



The polarographic probe uses a gas-permeable membrane through which ozone passes to produce an electrochemical reaction and current flow in direct proportion. The membrane is reinforced silicone for durability. It is pre-mounted in a membrane cartridge which allows exceptionally easy replacement of electrolyte and membrane when necessary. Behind the membrane is the platinum cathode where ozone reacts to produce the measurement signal. The electrochemical reaction is completed at the silver anode. Full temperature compensation accounts for effects of both membrane permeability and solubility of ozone in water.

**Mettler-Toledo Thornton ozone sensors are available in two versions: 6500 and 6510.** The 6500 sensors provide high accuracy under typical operating conditions. The 6510 sensors offer faster response for detecting the deactivation or failure of a UV ozone destruct system. The difference between the sensors is in the membrane and the electrolyte. In most applications the 6510 sensor is preferred.

## 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 instrumentation can monitor two points for ozone and/or conductivity with the same instrument.

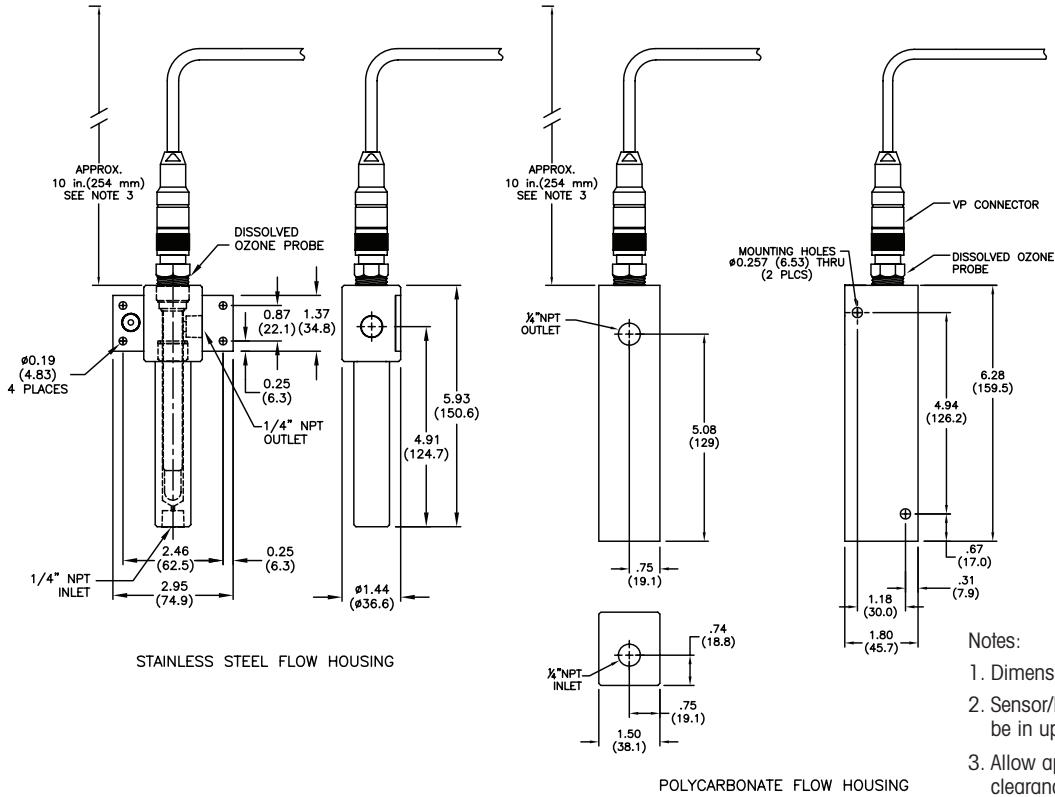
**Semiconductor ultrapure water** ozone sanitization can be controlled by monitoring the ozone concentration downstream of the ozonator and UPW storage tank. To be sure all ozone has been decomposed after UV lights, a second ozone measurement can confirm a zero level. Thornton multiparameter capability 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.



# Dissolved Ozone Sensor for M300



## Specifications

Sample Flowrate	200 - 500 mL/min with housing; 1-3 ft/s (0.3-1 m/s) without housing
Sample Temperature	5-50 °C (41-122 °F) for measurement, probe can withstand 100 °C (212 °F)
Sample Pressure	Normal operation, atmospheric; can withstand 3 bar (45 psig)
Sample Connections	1/4" NPT
Wetted Materials	Polycarbonate or 316 SS flow housing, 316 SS probe, silicone rubber membrane
Cable Lengths	3 ft (1 m) to 65 ft (20 m) with VP cable
Weight	0.5 kg (1 lb) with flow chamber
Response Time, T90*	Model 6510: 30 s; Model 6500: 3 min
Operating Range	0-5,000 ppb (µg/L); 0-5.00 ppm (mg/L) short term; 0-500 ppb (µg/L); 0-0.5 ppm (mg/L) continuous
Relative System Accuracy	Model 6500: ± 2% reading or 3 ppb, whichever is greater; Model 6510: ± 4% of reading or 3 ppb, which ever is greater; 0.5 °C
Included Parts	Probe with spare electrolyte, 17743 (58 084 012) Polycarbonate or 02385 (58 084 010) SS flow housing and 52 300 1XX cable as specified

\* Upscale response may be slower if sensor has recently been exposed to high ozone concentration.

Description	Model 6510 Part Number	Model 6500 Part Number
Ozone sensor with PC housing, 1 m cable	<b>58 041 236</b>	<b>58 041 231</b>
Ozone sensor with PC housing, 3 m cable	<b>58 041 237</b>	<b>58 041 232</b>
Ozone sensor with PC housing, 5 m cable	<b>58 041 238</b>	<b>58 041 233</b>
Ozone sensor with PC housing, 10 m cable	<b>58 041 239</b>	<b>58 041 234</b>
Ozone sensor with SS housing, 1 m cable	<b>58 041 246</b>	<b>58 041 241</b>
Ozone sensor with SS housing, 3 m cable	<b>58 041 247</b>	<b>58 041 242</b>
Ozone sensor with SS housing, 5 m cable	<b>58 041 248</b>	<b>58 041 243</b>
Ozone sensor with SS housing, 10 m cable	<b>58 041 249</b>	<b>58 041 244</b>
Maintenance Kit (4 membranes & electrolyte)	<b>52 201 218</b>	<b>52 201 179</b>
Replacement Probe	<b>52 201 225</b>	<b>52 201 178</b>
Ozone Sensor Simulator	<b>52 201 197</b>	<b>52 201 197</b>

# M300 Transmitters



Sensors described in this data sheet are used with the comprehensive series of M300 Transmitters which are available in both ¼ DIN panel mount and ½ DIN wall/panel/pipe mount configurations. Single-channel, multichannel and multi-parameter models meet the requirements of diverse monitoring applications.

## Features:

- Four-line back-lit display
- Direct sensor input for all parameters
- On-line pH sensor diagnostics
- Universal AC/DC power supplies
- Menus available in English, French, German, Italian & Spanish
- Internal PID control
- Plug-in terminals for easy wiring

[www.mt.com/thornton](http://www.mt.com/thornton)

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