

# Dissolved Oxygen Sensor

- INSTALLS in aeration basins or pipes.
- RUGGED CONSTRUCTION.
- EASILY REPLACEABLE MEMBRANE; no special tools required.
- AUTOMATIC COMPENSATION for changes in membrane permeability with temperature.
- AUTOMATIC PRESSURE EQUALIZATION maintains correct membrane tension.
- COMPATIBLE with most Delta and Rosemount Analytical analyzers.
- VARIOPOL CONNECTOR OPTION allows the sensor to be replaced without running new cable.



## FEATURES AND APPLICATIONS

The Model 499ADO sensor is intended for the continuous determination of dissolved oxygen between 0-20 ppm. The primary application is aeration basins in municipal and industrial wastewater treatment plants.

The Model 499ADO is a membrane-covered amperometric sensor. The sensor consists of a gas-permeable membrane stretched tightly over a gold cathode. A silver anode and an electrolyte solution complete the internal circuit. During operation, oxygen diffuses from the sample through the membrane to the cathode. A polarizing voltage applied to the cathode reduces the oxygen to hydroxide. The reaction produces a current, which the analyzer measures. The current is directly proportional to the rate at which oxygen reaches the cathode, which is ultimately proportional to the concentration of oxygen in the sample.

Because the rate of diffusion of oxygen through the membrane depends on temperature, sensor response must be corrected for changes in membrane permeability caused by temperature. A Pt 100 RTD in the sensor (Delta-compatible sensors use a thermistor) measures the temperature, and the analyzer automatically performs the correction.

Calibration is easy. Simply expose the sensor to water-saturated air and press a button on the analyzer. The analyzer measures the barometric pressure

and calculates the equilibrium solubility of atmospheric oxygen at the prevailing temperature and pressure. (Delta analyzers and the Model 1054ADO and 1054BDO, 5081-A, and Xmt-A analyzers require the user to manually enter the barometric pressure.)

Maintenance is fast and easy. Replacing the membrane requires no special tools or fixtures. Simply place a few drops of electrolyte solution in the membrane assembly, place it on the cathode, and screw the retainer in place. To replenish the electrolyte solution, unscrew the fill plug, add the reagent from a squeeze bottle, and replace the plug.

Pressure changes have little influence on sensor response. A flexible bladder in the sensor prevents distortion of the membrane by keeping the pressure inside the sensor equal to the sample pressure.

Several mounting configurations are possible. For aeration basins and tanks, use the handrail mounting. For measuring oxygen in pipes, use either the flow tee or the low flow cell.

The Model 499ADO sensor is available with a Variopol (VP) watertight connector. Wire the interconnecting cable to the analyzer and run the cable to the sensor. The sensor plugs into the cable receptacle. To replace the sensor, simply disconnect the Variopol fitting and plug in a new sensor.

## SENSOR SPECIFICATIONS

**Range:** 0 to 20 ppm (mg/L) as O<sub>2</sub>. For measurements at the ppb level choose Model 499A TrDO.

**Wetted Parts:** Noryl<sup>1</sup>, Viton<sup>2</sup>, EPDM, Teflon<sup>3</sup>, silicone

**Cathode:** gold (not normally wetted)

**Accuracy:** ±0.2 ppm at 25°C

**Repeatability:** ±0.05 ppm at 25°C

**Response time:** 25 sec to 63% of final reading at 25°C

**Pressure:** 0 to 65 psig (0 to 549 kPa abs)

**Temperature:** 32 to 122°F (0 to 50°C)

**Process Connection:** 1 inch MNPT

**Electrolyte Volume:** 25 mL (approx.)

**Electrolyte Life:** 4 to 6 months (approx.)

**Cable Length (standard integral cable):** 25 ft (7.6 m)

**Cable Length (maximum):** 300 ft (91 m)

**Sample Flow:**

Flow through	1-5 gpm (3.8 to 19 L/min)
Open channel	1 ft/sec (0.3 m/sec)
Low flow cell	2 to 5 gph (7.6 to 19 L/hr)

Agitation produced by bubbles in aeration basins usually provides adequate flow.

**Weight/Shipping Weight:** 1 lb/3 lb (0.5 kg/1.5 kg)

<sup>1</sup> Noryl is a registered trademark of General Electric.

<sup>2</sup> Viton is a registered trademark of E.I. duPont de Nemours & Co.

<sup>3</sup> Teflon is a registered trademark of E.I. duPont de Nemours & Co.

## FLOW CELL SPECIFICATIONS

**LOW FLOW CELL** PN 24091-00

**Wetted Parts:** polycarbonate, 316 stainless steel, Buna N

**Process Connection:** 1/4-inch OD tubing compression fitting or 1/4-inch FNPT

**Maximum Pressure:** 65 psig (549 kPa abs)

**Maximum Temperature:** 122°F ( 50°C)

**FLOW-THROUGH TEE** (1-1/2 inch body) PN 23567-00

**Wetted Parts:** CPVC and Buna N; body is schedule 80 CPVC

**Process Connection:** 1-1/2 inch socket

**Maximum Pressure:** 65 psig (549 kPa abs)

**Maximum Temperature:** 122°F ( 50°C)

**FLOW-THROUGH TEE** (2 inch body) PN 915240-03, 04, 05

**Wetted Parts:** PVC and Buna N; body is schedule 80 PVC

**Process Connection:** 3/4-inch NFPT, 1 inch NFPT, or 1-1/2 inch NFPT

**Maximum Pressure:** 60 psig (515 kPa abs)

**Maximum Temperature:** 120°F (49°C)

**SPRAY CLEANER** PN 12707-00

**Wetted Parts:** PVC, polypropylene, 316 stainless steel

**Connection for Cleaning Fluid:** compression fitting for 1/4-inch tubing

**VALVED ROTAMETER** PN 9390004  
for use with Low Flow Cell

**Flow:** 0.4 to 5 gph (1.5 to 19 L/hr)

**Wetted Parts:** acrylic, 316 stainless steel, Viton

**Process Connection:** 1/4-inch NFPT (316 SS)

**Maximum Pressure:** 100 psig (858 kPa abs)

**Maximum Temperature:** 150°F (65°C)

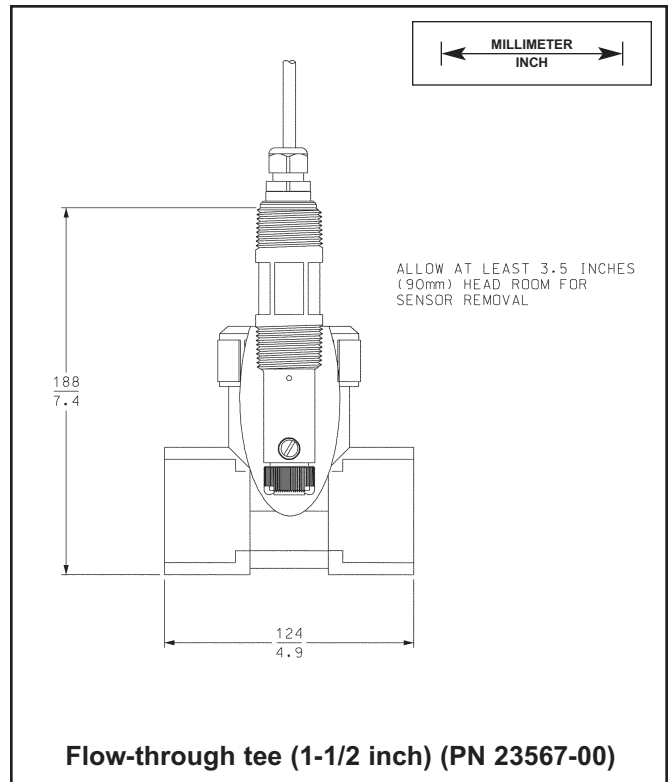
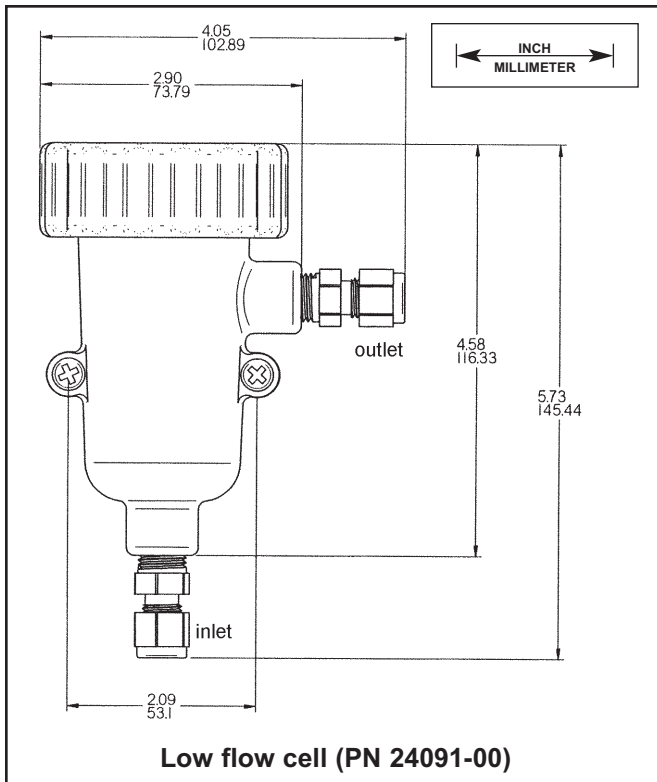
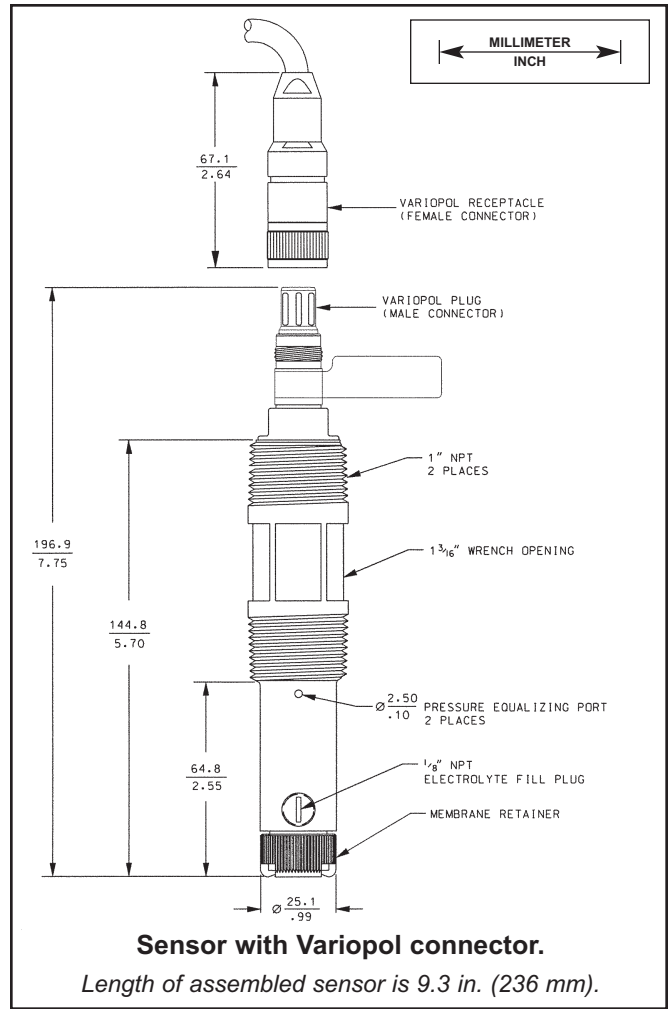
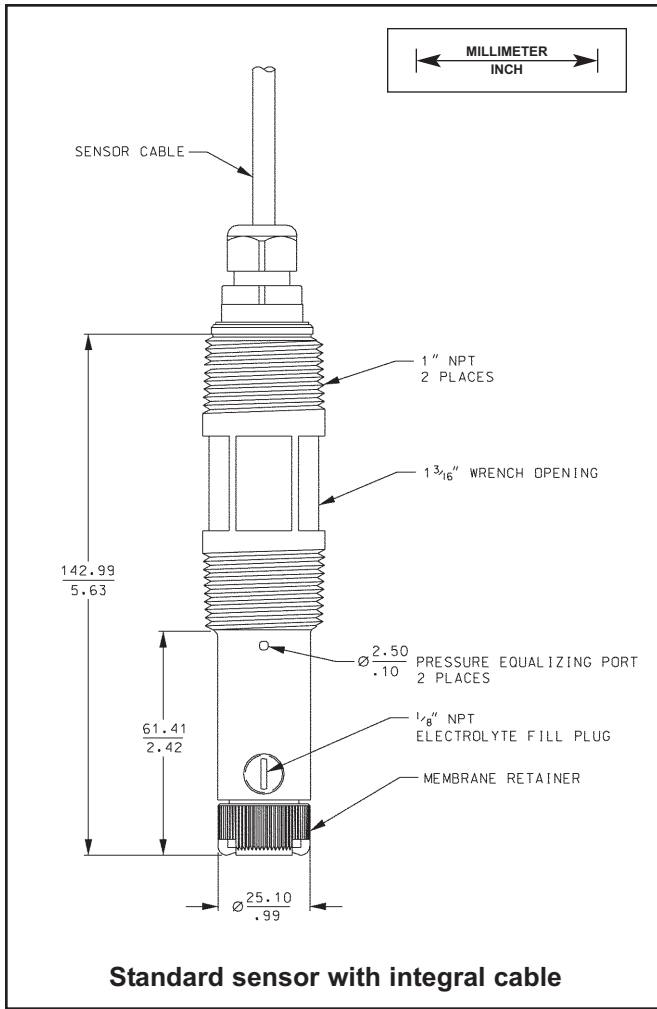
## RECOMMENDED ANALYZERS

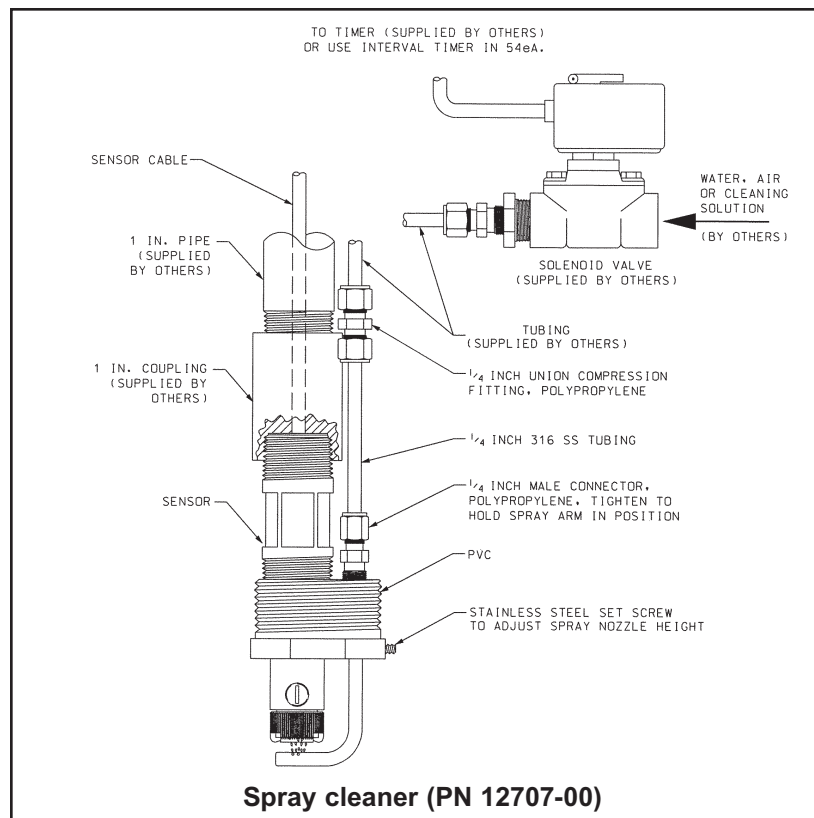
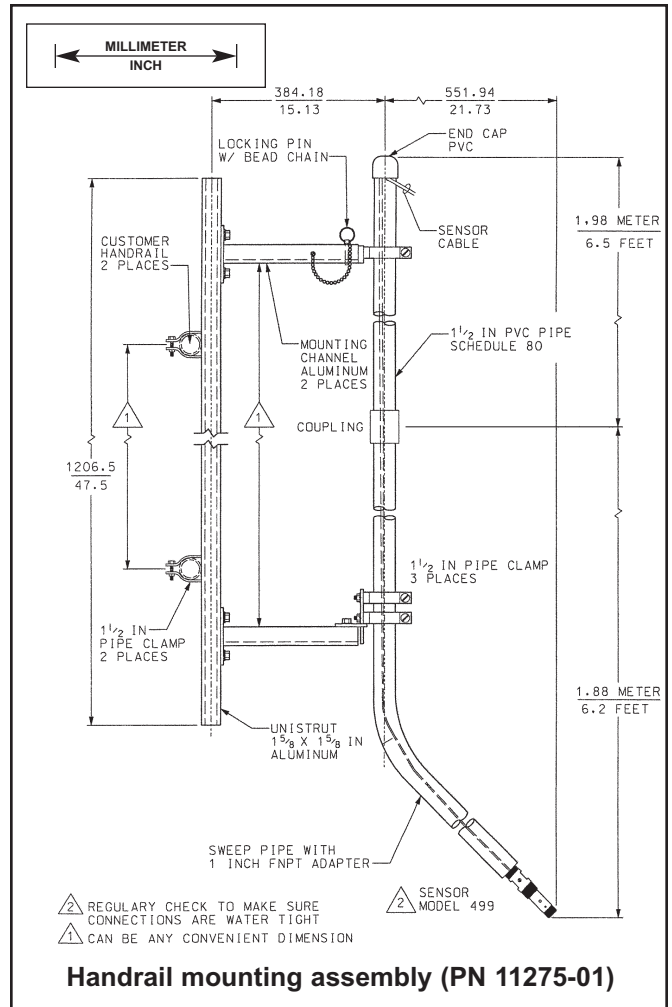
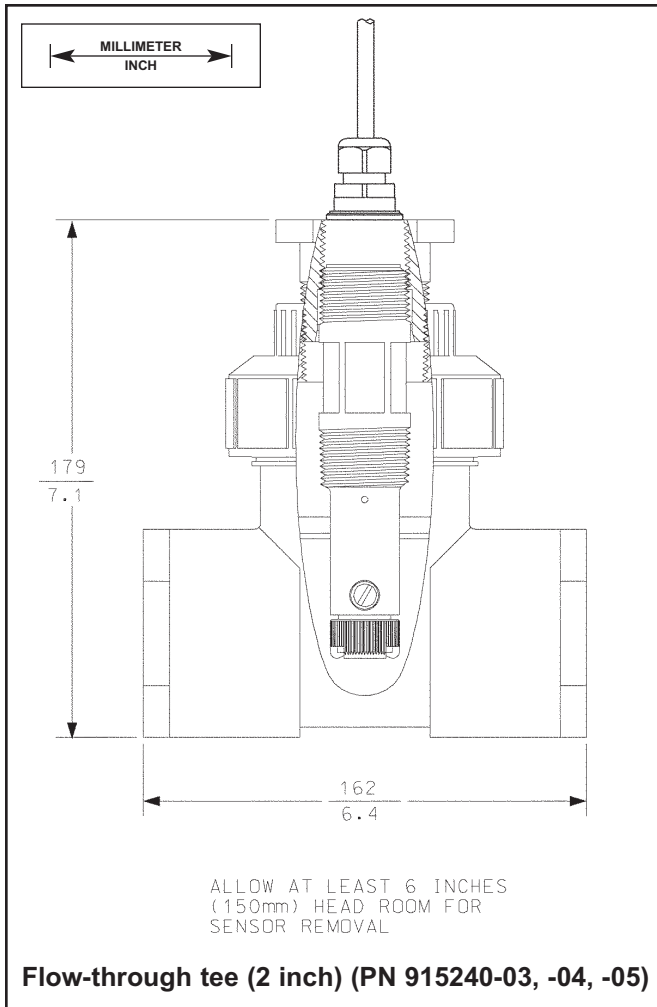
**Rosemount Analytical:** 1054ADO, 1054BDO, 1055-25, 54eA, 5081-A, and Xmt-A.

**Delta:** 910, 5310, 8210, and 8310. (Note: Delta analyzers are obsolete; information is provided for customers using Delta equipment.)

## OBSOLETE SENSORS

The 499ADO sensor replaces Rosemount Analytical Model 499DO and Delta Model 921103. Both sensors are obsolete.





## ORDERING INFORMATION

The **Model 499ADO sensor** is intended for the determination of dissolved oxygen at the ppm level. The sensor can be immersed directly in aeration basins using the handrail mounting assembly, or the sensor can be mounted in a variety of flow cells. The sensor is available with either an integral cable or a VP6.0 quick disconnect fitting. Three replacement membrane assemblies, three o-rings and a 4-oz (125 mL) bottle of electrolyte solution are provided with each sensor.

MODEL 499ADO DISSOLVED OXYGEN SENSOR	
CODE	Required selection
54	For use with Model 1054ADO, 1054BDO, 1055-25, 54eA, 5081-A, and Xmt-A analyzers
56	For use with Delta analyzers*
CODE	Optional selection
60	Optimum EMI/RFI cable (not available with -VP and -56 options)
VP	Sensor with Variopol 6.0 fitting (interconnecting cable must be ordered separately, not available with option -56)
<b>499ADO</b>	<b>-54 -VP EXAMPLE</b>

\* **For first time replacement of Delta sensors:** If a Delta oxygen sensor (Model 921103) is being replaced for the first time, a retrofit adapter must be ordered. Use PN 33211-00 to adapt the 499ADO 1-in. MNPT to the Delta 1-1/2 in. FNPT flow-through tee. Use PN 33530-00 to adapt to the Delta handrail mounting.

## FOR FIRST TIME VARIOPOL INSTALLATIONS

PART #	DESCRIPTION
23747-02	VP 6.0 interconnecting cable, 10 ft (3 m)
23747-03	VP 6.0 interconnecting cable, 50 ft (15 m)

For junction box and connecting cable between junction box and analyzer, see **ACCESSORIES**. The cable in PN 9200275 (unterminated) and PN 23747-00 (terminated) is the same cable used in the VP interconnecting cable.

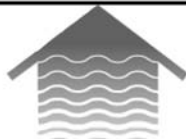
## ACCESSORIES

PART #	DESCRIPTION
23567-00	1-1/2 in. flow through tee with 1-1/2 socket connections
914240-03	2-in. flow through tee with 3/4-in FNPT connections
915240-04	2-in. flow through tee with 1-in FNPT connections
915240-05	2-in. flow through tee with 1-1/2-in FNPT connections
24091-00	Low flow cell
9390004	Rotameter: 0.5 - 5.0 gph
11275-01	Sensor handrail mounting assembly: includes 10 ft (3.0 m) Schedule 80 1-1/2 in PVC pipe with sweep ell and all mounting hardware
12707-00	Spray cleaner
22719-02	Junction box, 8 terminals
9200266	Extension cable for option -54, unterminated (specify length)
ED0011	Extension cable for option -56, unterminated (specify length)
9200275	Extension cable for optimum EMI/RFI cable, unterminated (specify length)
23747-00	Extension cable for optimum EMI/RFI cable, terminated (specify length)
2001492	Stainless steel tag
23501-00	Dissolved oxygen membrane assembly: includes one membrane assembly and O-ring.
23502-00	Dissolved oxygen membrane assembly: includes three membrane assemblies and three O-rings.
9210264	#1 Dissolved oxygen sensor fill solution, 4 oz (125 mL)



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