

Trace Dissolved Oxygen Sensor

For additional information, please visit our website
at www.emersonprocess.com/rainhome/liquid/.

⚠ CAUTION

SENSOR/PROCESS APPLICATION COMPATIBILITY
The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

SPECIFICATIONS - SENSOR

- Pressure:** 0 to 65 psig (103 to 549 kPa abs)
- Temperature:** 32 to 122°F (0 to 50°C);
Membrane permeability correction defined between 41 and 113°F (5 and 45°C)
- Process Connection:** 1 inch MNPT
- Wetted Parts:** Noryl¹, Viton², EPDM, Teflon³, silicone
- Cathode:** gold

¹ Noryl is a registered trademark of General Electric.
² Viton is a registered trademark of DuPont Performance Elastomers.
³ Teflon is a registered trademark of E.I. duPont de Nemours & Co.

INSTALLATION

The gray PVC cap contains a solution of sodium sulfite. Remove the cap before installing the sensor.

⚠ CAUTION

The cap contains sodium sulfite solution. Avoid contact with skin or eyes. Do not swallow!

The sensor must be used with flow cell (PN 24091-00). See Figure 2. Keep the flow between 1.6 and 6.3 gph (100 and 400 mL/min).

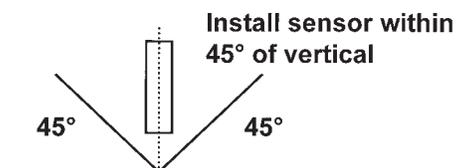


FIGURE 1. Sensor Orientation

⚠ CAUTION

Do not exceed pressure and temperature specifications.
Pressure: 65 psig max (549 kPa abs max)
Temperature: 32 to 122°F (0 to 50°C)

SPECIFICATIONS - FLOW CELL (PN 24091-00)

- Pressure:** 90 psig (722 kPa abs)
(exceeds sensor specification)
- Temperature:** 70°C (158°F) maximum
(exceeds sensor specification)
- Process Connection:** compression fittings for 1/4 inch OD tubing
- Wetted Parts:** polyester, polycarbonate, 316 SS, silicone

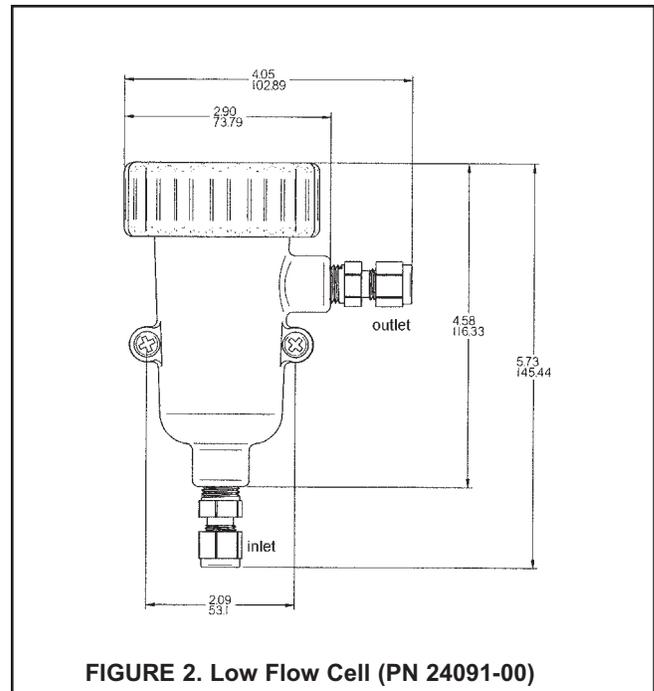


FIGURE 2. Low Flow Cell (PN 24091-00)

WIRING

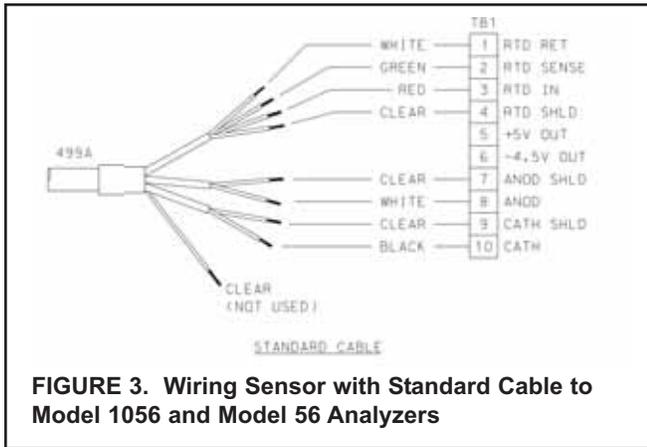


FIGURE 3. Wiring Sensor with Standard Cable to Model 1056 and Model 56 Analyzers

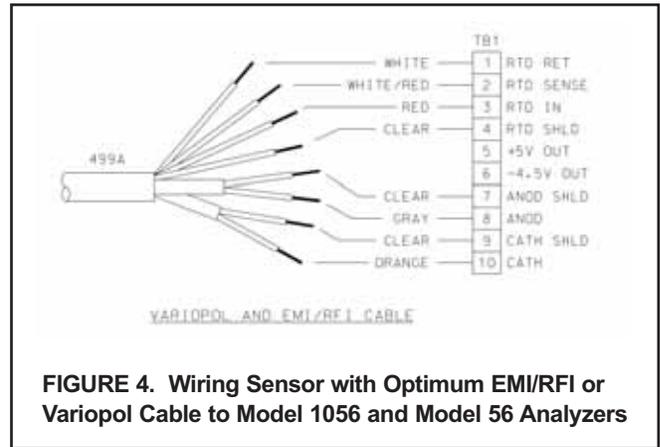


FIGURE 4. Wiring Sensor with Optimum EMI/RFI or Variopool Cable to Model 1056 and Model 56 Analyzers

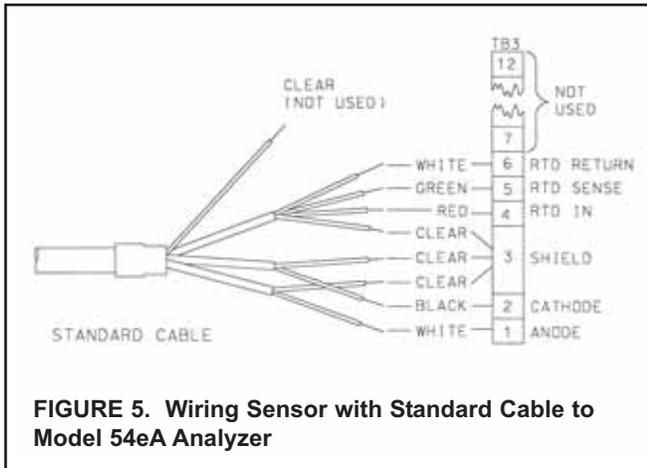


FIGURE 5. Wiring Sensor with Standard Cable to Model 54eA Analyzer

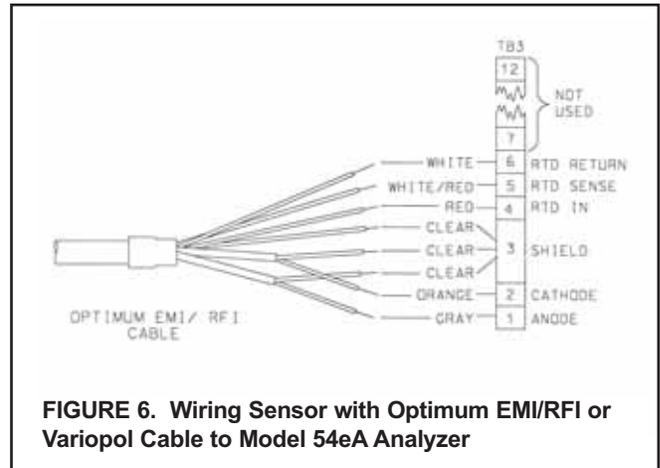
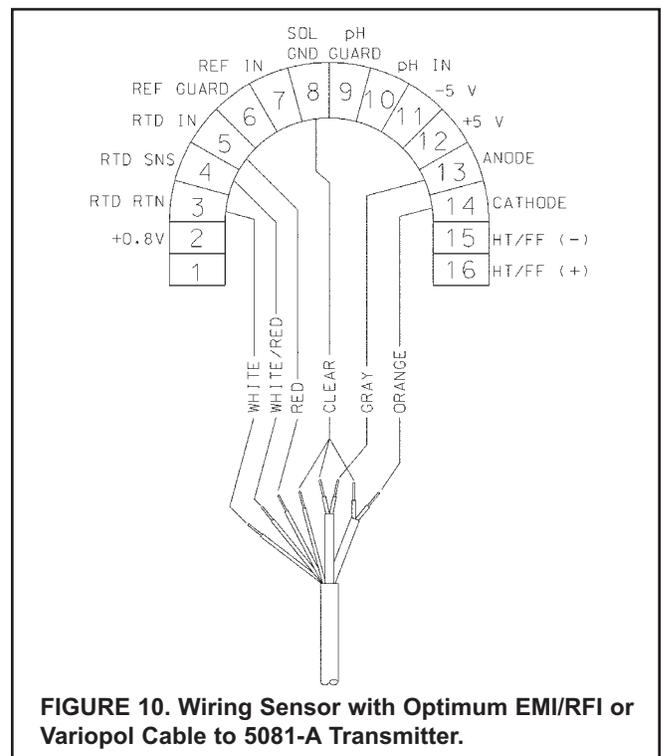
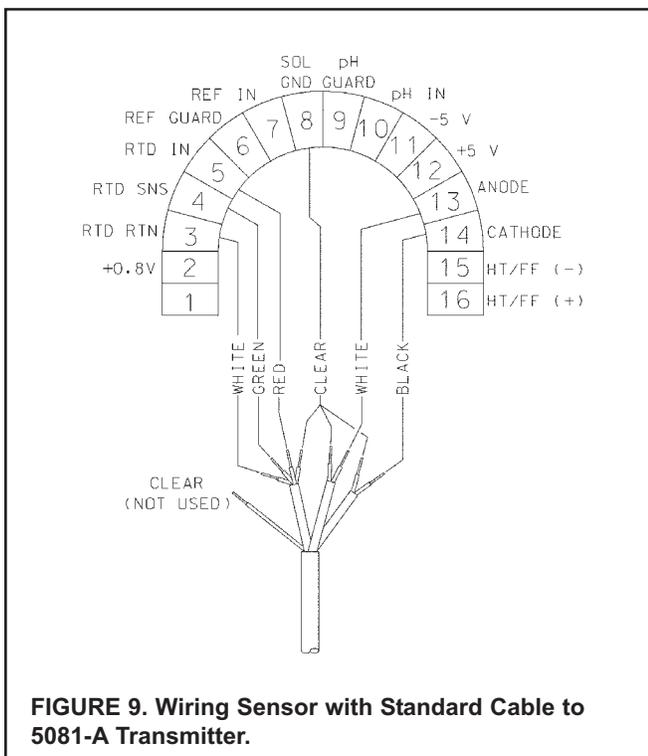
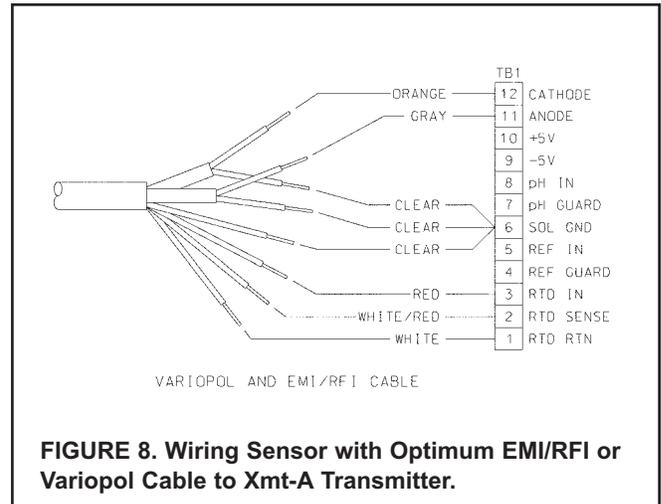
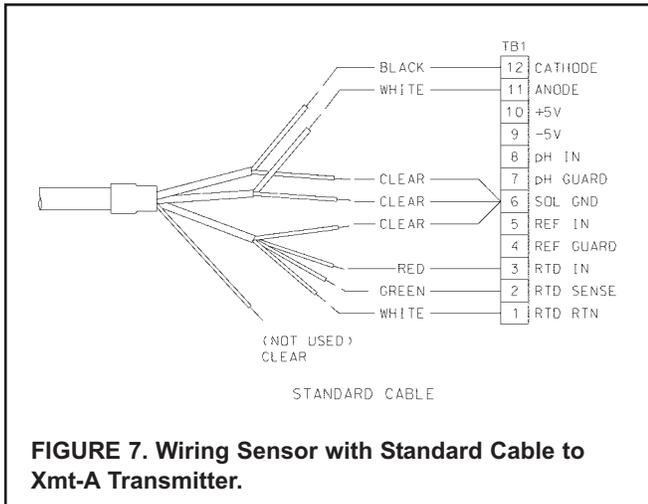
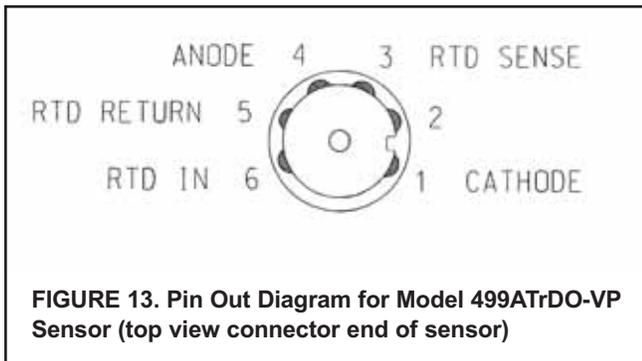
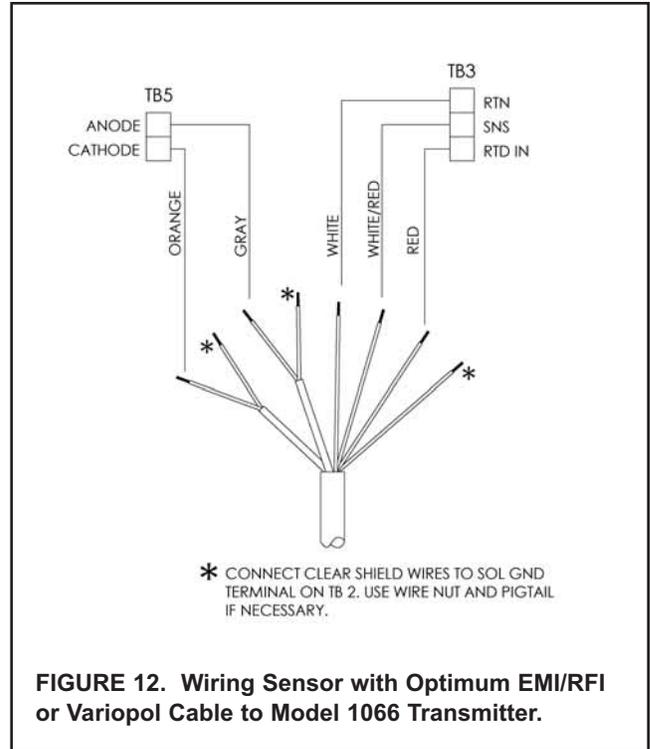
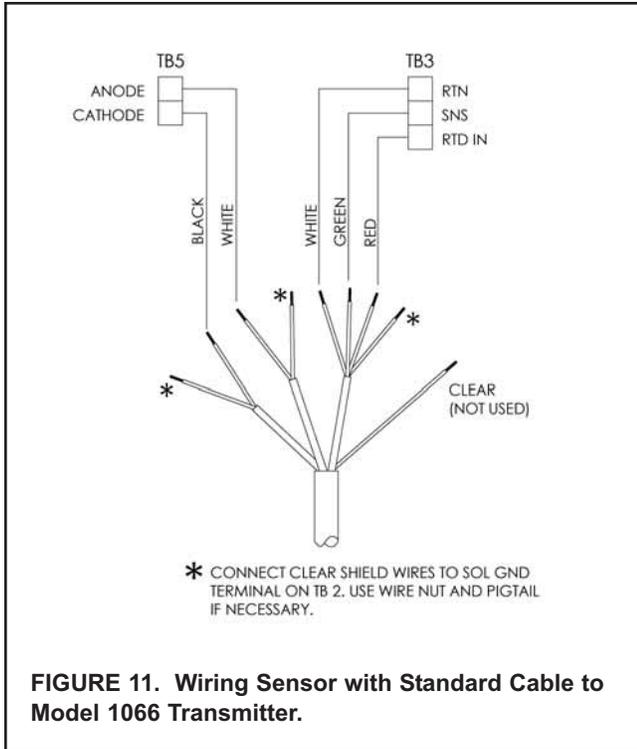


FIGURE 6. Wiring Sensor with Optimum EMI/RFI or Variopool Cable to Model 54eA Analyzer





When making connections through a junction box (PN 23550-00), wire point-to-point.

NOTE:

Use wire nut and pigtail (included) when connecting several wires to the same terminal.

CALIBRATION

Zero point: Even in the absence of oxygen, the 499ATrDO sensor generates a small signal called the zero current. Normally, the zero current is less than 5 nA, which introduces no more than a 0.5 ppb error in the measurement. Check the zero current when the sensor is first placed in service and every time the fill solution is changed. To check the zero current, place the sensor in a cup of water to which a teaspoonful of sodium sulfite has been added to scavenge the dissolved oxygen. Wait at least two hours before measuring the current. If it is less than 5 nA, do not zero the sensor. If it is between 5 and 10 nA, allow the sensor to run overnight. Zero the sensor if the reading is still between 5 and 10 nA and is stable. If the zero current is greater than 10 nA, call the factory. For more information refer to the analyzer manual.

Full Scale: The 499ATrDO sensor is best calibrated by exposing the sensor to water-saturated air. Pour a small amount of water into a cup and suspend the sensor,

keeping the membrane dry, about ¼ inch (6 mm) above the surface of the water. Once readings are stable, which should take no longer than 20 min., follow the analyzer prompts to complete the calibration. The analyzer will automatically calculate the equilibrium solubility of atmospheric oxygen in water under the prevailing temperature and pressure. After calibration, go to the diagnostics menu and check the sensitivity. It should be between 3600 and 6100 nA/ppm. For more information, refer to the analyzer manual.

Prolonged exposure to air may affect the linearity of the sensor. If the cumulative exposure to air is less than about five hours per year, sensor linearity should be within specification. If cumulative exposure exceeds five hours per year, restore linear response of the sensor by draining the electrolyte solution and replacing it with fresh.

MAINTENANCE

Periodic maintenance and cleaning is required for best performance of the sensor. Generally, the membrane and fill solution should be replaced every four to six months, but the optimum maintenance frequency can be determined only by experience. Periodically check the zero current and sensitivity. If the zero current is less than about 5 nA and the current in air is between 30 and 45 uA with a variability less than 2%, the sensor does not need maintenance.

WARNING

Before removing the sensor from the process stream for maintenance, be sure the process pressure is reduced to 0 psig and the process temperature is at a safe level.

CLEANING THE MEMBRANE.

Keep the membrane clean and free from solid corrosion products. Clean the membrane with water sprayed from a wash bottle or gently wipe the sensor with a soft, clean tissue.

REPLACING THE ELECTROLYTE SOLUTION AND MEMBRANE.

CAUTION

Fill solution may cause irritation. May be harmful if swallowed. Read and follow manual.

1. Unscrew the membrane retainer and remove the membrane assembly and O-ring. See Figure 14.
2. Hold the sensor over a container with the cathode pointing down.
3. Remove the fill plug and allow the electrolyte solution to drain out.
4. Inspect the cathode. If it is tarnished, clean it by gently rubbing in the direction of the existing scratches (do not use a circular motion) with 400-600 grit silicon carbide finishing paper. Rinse the cathode thoroughly with water.
5. Wrap the plug with one or two turns of pipe tape and set aside. Remove old tape first.
6. Prepare a new membrane. Hold the membrane assembly with the cup formed by the membrane and membrane holder pointing up. Place a drop of isopropyl alcohol in the cup. Slowly add about twenty (20) drops of electrolyte solution to the cup. This step is important because the alcohol wets the inside surface of the membrane and ensures that no air bubbles will be trapped when the membrane assembly is placed over the cathode. Leave the membrane assembly filled with electrolyte solution and set it aside.

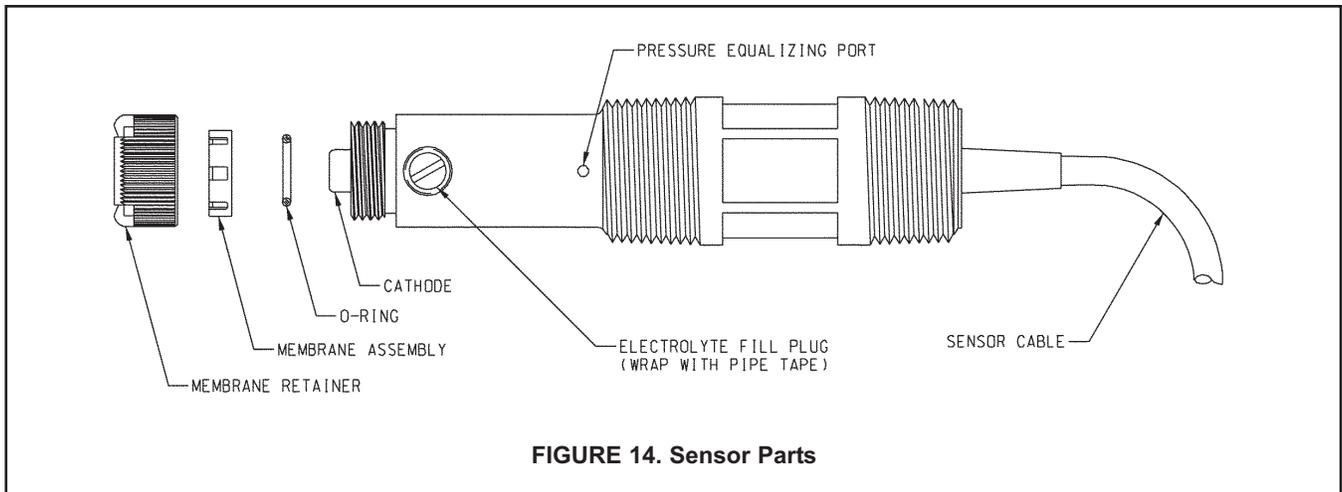
7. Hold the sensor at about a 45-degree angle with the cathode end pointing up. Add electrolyte solution through the fill hole until the liquid overflows. Tap the sensor near the threads to release trapped air bubbles. Add more electrolyte solution if necessary.
8. Place the fill plug in the electrolyte port and begin screwing it in. After several threads have engaged, rotate the sensor so that the cathode is pointing up and continue tightening the fill plug. Do not over-tighten.
9. Place a new O-ring in the groove around the cathode post. Cover the holes at the base of the cathode stem with several drops of electrolyte solution.
10. Insert a small **blunt** probe, like a toothpick with the end cut off, through the pressure equalizing port. See Figure 14.

NOTE

Do not use a sharp probe. It will puncture the bladder and destroy the sensor.

Gently press the probe against the bladder several times to force liquid through the holes at the base of the cathode stem. Keep pressing the bladder until no air bubbles can be seen leaving the holes. Be sure the holes remain covered with electrolyte solution.

11. Place a drop of electrolyte solution on the cathode, then place the membrane assembly over the cathode. Screw the membrane retainer in place.
12. The sensor may require several hours operating at the polarizing voltage to equilibrate after the electrolyte solution has been replenished.



STORAGE

Store the sensor with the membrane immersed in a fresh solution of saturated sodium sulfite. The PVC cap shipped with the sensor is ideal for the purpose. Leave the power to the analyzer turned on.

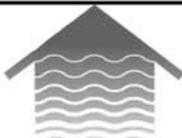
SPARE PARTS

33523-00	Electrolyte Fill Plug
9550094	O-Ring, Viton 2-014
33521-00	Membrane Retainer
23501-04	Dissolved Oxygen Membrane Assembly: includes one membrane assembly and one O-ring
23502-04	Dissolved Oxygen Membrane Kit: includes 3 membrane assemblies and 3 O-rings
9210264	#1 Dissolved Oxygen Sensor Fill Solution, 4 oz (120 mL)



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