Quick Start Guide
00825-0100-3493, Rev AB
November 2019

Rosemount™ 499ATrDO

Trace Dissolved Oxygen Sensor

ROSEMOUNT™

EMERSON.

Safety information

⚠ CAUTION

Sensor/process application compatibility

The wetted sensor materials may not be compatible with process composition and operating conditions.

Application compatibility is entirely the operator's responsibility.

⚠ CAUTION

Equipment damage

Do not exceed pressure and temperature specifications

Pressure: 65 psig (549 kPa abs) max.
Temperature: 32 to 122 °F (0 to 50 °C)

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

Contents

1 First steps

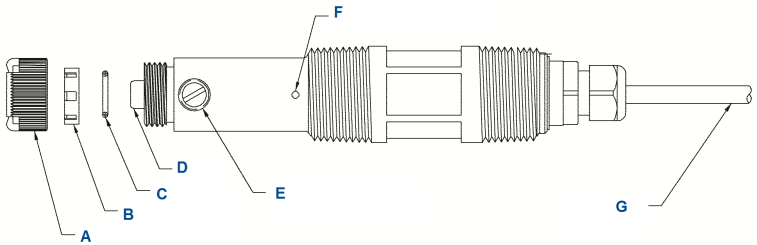
1.1 Unpack and inspect

Procedure

1. Inspect the shipping container. If it is damaged, contact the shipper immediately for instructions.
2. If there is no apparent damage, unpack the container. Be sure all items shown on the packing list are present. If items are missing, notify Emerson immediately.

1.2 Product description

Figure 1-1: Rosemount 499ATrDO Sensor Parts



A. Membrane retainer
B. Membrane assembly
C. O-ring
D. Cathode
E. Electrolyte fill plug (wrap with pipe tape)
F. Pressure equalizing port
G. Sensor cable (integral cable shown)

1.3 Specifications

Table 1-1: Sensor Specifications

Physical characteristics	Specifications
Range	0.1 ppb to 20 ppm
Pressure	0 to 65 psig (101 to 549 kPa abs)
Temperature (operating)	32 to 122 °F (0 to 50 °C)
Process connection	1-in. male national pipe thread (MNPT)

Table 1-1: Sensor Specifications *(continued)*

Physical characteristics	Specifications
Wetted parts	Noryl®, Viton®, EPDM, Teflon® , and silicone
Cathode	Gold (not normally wetted)
Accuracy	Accuracy depends on the accuracy of the chemical test used to calibrate the sensor.
Linearity	±5% of reading or ±3 ppb (whichever is greater) at 77 °F (25 °C)
Repeatability	±2% of reading at constant temperature
Response time	< 20 sec to 90% of final reading at 77 °F (25 °C) (0 to 200 ppb oxygen)
Membrane permeability connection	Defined between 32 and 122 °F (0 and 50 °C)
Electrolyte volume	0.8 oz. (25 mL), approximately
Electrolyte life	4 to 6 months (approximately)
Sensor life	2 years (approximately)
Accuracy at 77 °F (25 °C) following air calibration	<20 ppb: ±1 ppb >20 ppb: ±5% of reading
Cable length	See *Ordering information* table in the Product Data Sheet for cable length options.
Cable length (maximum)	300 ft. (91 m), up to 100 ft. (30.5 m) is standard.
Drift	<4% over 60 days
Sample flow	1.6-6.3 gph (100-400 mL/min) recommended. Response changes less than 2% when flow is maintained at recommended range. At 0.8 gph (50 mL/min), sensor response is about 90% of value at 100 mL/min.
Comedown time to 1 ppb	New sensor: < 5 hours Following membrane change: < 1 hour Following air calibration: < 1 hour
Shelf life	3 months. If the shelf life has been exceeded, the sensor can still be used. The comedown time will be longer.
Weight/shipping weight	1 lb./3 lb. (0.5 kg/1.5 kg)

Table 1-2: Other Specifications

Type	PN	Wetted materials	Process connection	Maximum temperature	Maximum pressure
Low flow cell (1)	24091-00 and 24091-01	Polycarbonate/ polyester, 316 stainless steel, and silicone	Compression fitting for ¼-in. O.D. tubing or ¼-in. female national pipe thread (FNPT)	158 °F (70 °C)	90 psig (722 kPa abs)

(1) Temperature and pressure specifications for the low flow cell exceed the temperature and pressure specifications for the sensor.

2 Install

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

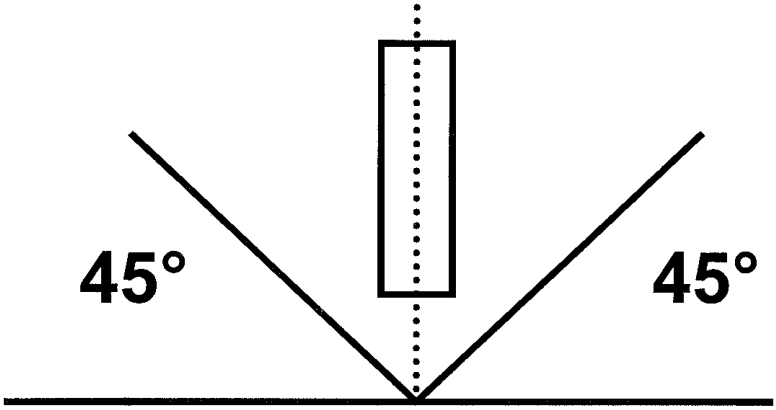
⚠ WARNING

Poisonous substance

The cap contains sodium sulfite solution.

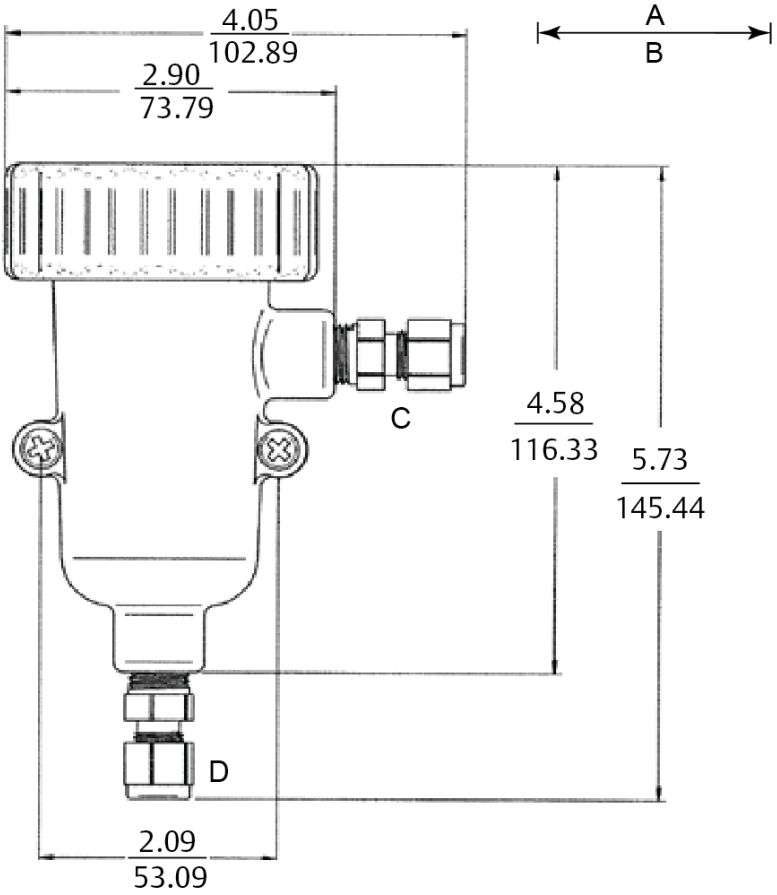
Avoid contact with skin or eyes.
Do not swallow!

Figure 2-1: Sensor Orientation



Install sensor within 45 degrees of vertical.

Figure 2-2: Low Flow Cell (PN 24091-00)



A. Inches
B. Millimeters
C. Outlet
D. Inlet

3 Wire

NOTICE

For additional wiring information on this product, including sensor combinations not shown here, please refer to the Liquid Transmitter Wiring Diagrams.

Figure 3-1: Rosemount 499ATrDO Sensor Wiring to Rosemount 1056 and 56 Transmitters

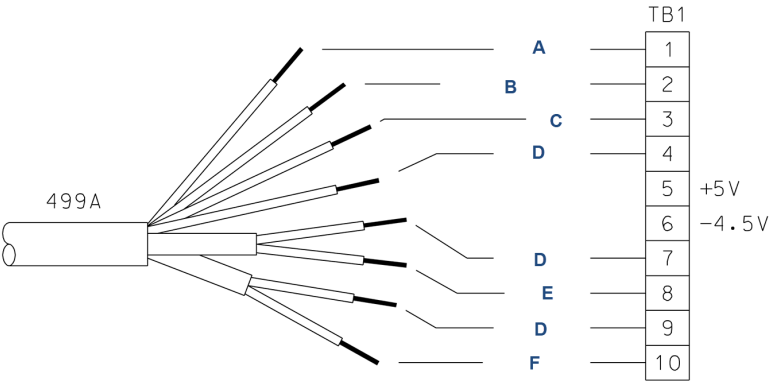


Table 3-1: Rosemount 499ATrDO Sensor Wiring to Rosemount 1056 and 56 Transmitters

Terminal number	Letter	Wire color	Description
1	A	White	Resistance temperature device (RTD) return
2	B	White/red	RTD sense
3	C	Red	RTD in
4	D	Clear	RTD shield
5	N/A	N/A	+5 V out
6	N/A	N/A	-4.5 V out
7	D	Clear	Anode shield
8	E	Gray	Anode
9	D	Clear	Cathode shield

Table 3-1: Rosemount 499ATrDO Sensor Wiring to Rosemount 1056 and 56 Transmitters *(continued)*

Terminal number	Letter	Wire color	Description
10	F	Orange	Cathode

Figure 3-2: Rosemount 499ATrDO Sensor Wiring to Rosemount 5081 Transmitter

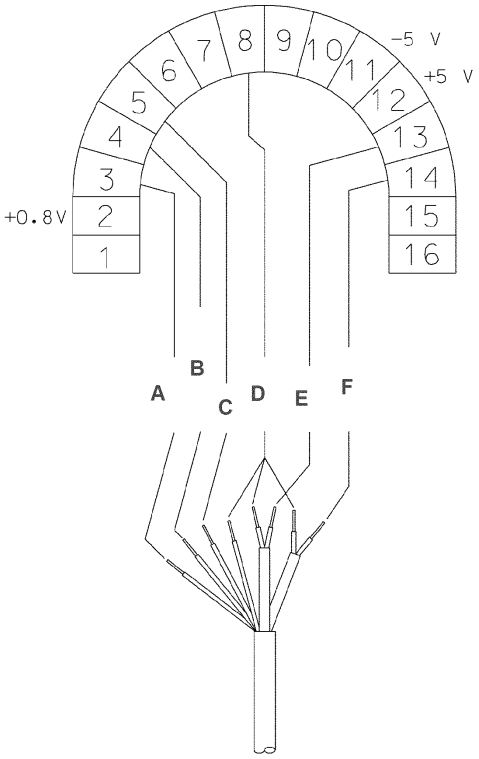


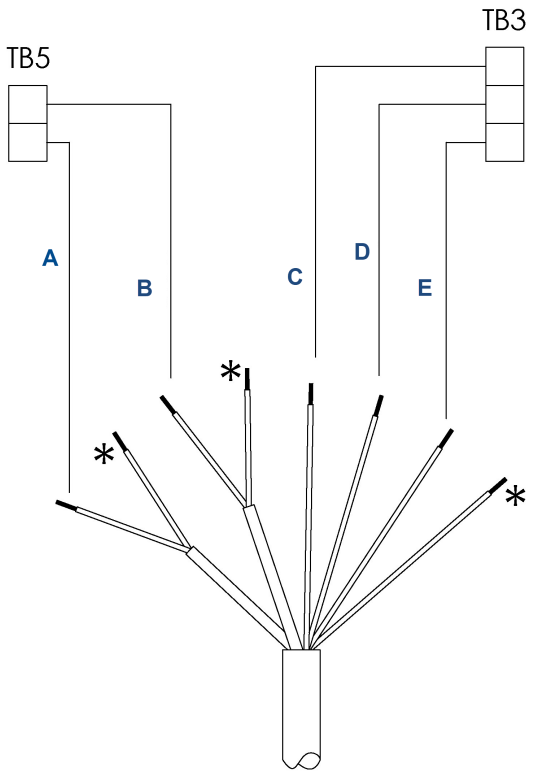
Table 3-2: Rosemount 499ATrDO Sensor Wiring to Rosemount 5081 Transmitter

Terminal number	Letter	Wire color	Description
1	N/A	N/A	N/A
2	N/A	N/A	+0.8 V
3	A	White	RTD return

Table 3-2: Rosemount 499ATrDO Sensor Wiring to Rosemount 5081 Transmitter *(continued)*

Terminal number	Letter	Wire color	Description
4	B	White/red	RTD sense
5	C	Red	RTD in
6	N/A	N/A	Reference guard
7	N/A	N/A	Reference in
8	D	Clear	Solution ground
9	N/A	N/A	pH guard
10	N/A	N/A	pH in
11	N/A	N/A	-5 V
12	N/A	N/A	+5 V
13	E	Gray	Anode
14	F	Orange	Cathode
15	N/A	N/A	HART®/FOUNDATION™ Fieldbus (-)
16	N/A	N/A	HART/FOUNDATION Fieldbus (+)

Figure 3-3: Rosemount 499ATrDO Sensor Wiring to Rosemount 1066 Transmitter



Note

Connect clear shield wires to solution ground terminal on TB 2. Use wire nut and pigtail if necessary.

Table 3-3: Rosemount 499ATrDO Wiring to Rosemount 1066 Transmitter

Letter	Color	Terminal description
A	Orange	Cathode
B	Gray	Anode
C	White	Return
D	White/red	Sense
E	Red	RTD in

Figure 3-4: Rosemount 499ATrDO Sensor Pin-out Diagram

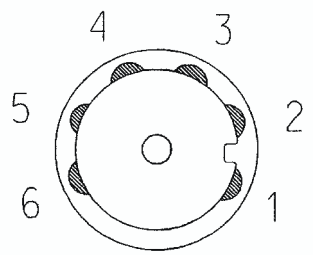


Table 3-4: Pin-out Diagram

Terminal number	Description
1	Cathode
2	N/A
3	RTD sense
4	Anode
5	RTD return
6	RTD in

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

NOTICE

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

4 Calibrate

4.1 Zero point calibration

Even in the absence of oxygen, the sensor generates a small signal called the zero current. Normally, the zero current is less than 5 nA, which introduces nor more than a 0.5 ppb error in measurement. Zero the sensor when it is first placed in service and every time the fill solution is changed.

To zero the sensor:

Procedure

1. Pour a cup of deionized or bottled water.
2. Add a teaspoon of sodium sulfite to the water.
3. Place the sensor in the water.
4. Wait until the sensor current has reached a stable low value (at least two hours).
5. Measure the current.
    a) If it is less than 5 nA, do not zero the sensor.
    b) 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.
    c) If it is greater than 10 nA, call the factory.

4.2 Full scale

The best way to calibrate the sensor is to expose it to to water-saturated air.

Procedure

1. Pour a small amount of water into a cup.
2. Suspend the sensor, keeping the membrane dry, about ¼-in. (6 mm) above the surface of the water.
3. Once readings are stable, which should take no longer than 20 minutes, follow the transmitter prompts to complete the calibration.

   The transmitter automatically calculates the equilibrium solubility of atmospheric oxygen in water under the prevailing temperature and barometric pressure.
4. After calibration, go to the ***Diagnostics*** menu and check the sensitivity.

   The sensitivity should be between 3,600 and 6,100 nA/ppm.

   For more information, refer to the transmitter 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 solution.

5 Maintenance

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

⚠ WARNING

Pressurized spray injury

Before removing the sensor, be absolutely certain that the process pressure is reduced to 0 psig and the process temperature is lowered to a safe level!

5.1 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.

5.2 Replacing the electrolyte solution and membrane

⚠ WARNING

Harmful substance

Fill solution may cause irritation. May be harmful if swallowed.

Read and follow the instructions.

Procedure

1. Unscrew the membrane retainer.
2. Remove the membrane assembly and O-ring.
   See Figure 1-1.
3. Hold the sensor over a container with the cathode pointing down.
4. Remove the fill plug.
5. Allow the electrolyte solution to drain out.
6. Inspect the cathode.
   a) 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.

7. Remove the old pipe tape from the plug.
8. Wrap the plug with one or two turns of pipe tape..
9. Prepare a new membrane.
    a) Hold the membrane assembly with the cup formed by the membrane and membrane holder pointing up.
    b) Place a drop of isopropyl alcohol in the cup.
    c) Slowly add about 20 drops of electrolyte solution to the cup.

       This step is important, because 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.
    d) Fill the cup with electrolyte solution.
    e) Leave the membrane assembly filled with electrolyte solution and set it aside.
10. Hold the sensor at about a 45 degree angle with the cathode end pointing up.
11. Add electrolyte solution through the fill hole until the liquid overflows.
12. Tap the sensor near the threads to release trapped air bubbles.
13. Add more electrolyte solution if necessary.
14. Place the fill plug in the electrolyte port and begin screwing it in.
15. After several threads have engaged, rotate the sensor so that the cathode is pointing up and continue tightening the fill plug.

    Do not overtighten.
16. Place a new O-ring in the groove around the cathode post.
17. Cover the holes at the base of the cathode stem with several drops of electrolyte solution.
18. Insert a small blunt probe, like a toothpick with the end cut off, through the pressure equalizing port.

    See Figure 1-1.

⚠ CAUTION

Equipment damage

A sharp probe may puncture the bladder and destroy the sensor.

Do not use a sharp probe.

19. 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.

20. Place a drop of electrolyte solution on the cathode; then place the membrane assembly over the cathode.
21. Screw the membrane retainer in place.

    The sensor may require several hours operating at the polarizing voltage to equilibrate after the electrolyte solution has been replenished.

5.3 Storage

Store the sensor with the membrane immersed in a fresh solution of saturated sodium sulfite. You can use the PVC cap shipped with the sensor. Leave the power to the transmitter turned on.

6 Accessories

Part number	Description
23747-06	Interconnecting cable, Variopol (VP) 6, 2.5 ft. (0.8 m)
23747-04	Interconnecting cable, VP 6, 4 ft. (1.2 m)
23747-02	Interconnecting cable, VP 6, 10 ft. (3.0 m)
23747-07	Interconnecting cable, VP 6, 15 ft. (4.6 m)
23747-08	Interconnecting cable, VP 6, 20 ft. (6.1 m)
23747-09	Interconnecting cable, VP 6, 25 ft. (7.6 m)
23747-10	Interconnecting cable, VP 6, 30 ft. (9.1 m)
23747-03	Interconnecting cable, VP 6, 50 ft. (15.2 m)
23747-11	Interconnecting cable, VP 6, 100 ft. (30.5 m)
24091-00	Low flow cell with ¼-in. OD tubing compression fittings
9390004	Rotameter: 0.5 - 5.0 gph
22550-00	Junction box, 12 terminals
9200266	Extension cable, standard, unprepped
9200275	Extension cable for optimum EMI/RFI cable, unprepped
23747-00	Extension cable for optimum EMI/RFI cable, prepped
23501-04	Trace dissolved oxygen membrane kit: includes 1 membrane assembly and 1 O-ring
25302-04	Trace dissolved oxygen membrane kit: includes 3 membrane assemblies and 3 O-rings
9210264	Dissolved oxygen sensor fill solution, 4 oz. (125 mL)
33521-02	Membrane retainer
33523-03	Electrolyte fill plug
9390094	O-ring, Viton® 2-014

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