Rosemount™ 499AOZ

Dissolved Ozone Sensor
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.

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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™ 499AOZSensor 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

<table>
<thead>
<tr>
<th>Physical characteristics</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0 to 3 ppm (mg/L) as O₃</td>
</tr>
<tr>
<td>Pressure</td>
<td>0 to 65 psig (101 to 549 kPa abs)</td>
</tr>
<tr>
<td>Temperature (operating)</td>
<td>0 to 50 °C (32 to 122 °F)</td>
</tr>
<tr>
<td>Process connection</td>
<td>1 in. MNPT</td>
</tr>
</tbody>
</table>
### Table 1-1: Sensor Specifications (continued)

<table>
<thead>
<tr>
<th>Physical characteristics</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetted parts</td>
<td>Polysulfone, Viton®, Teflon®, and silicone</td>
</tr>
<tr>
<td>Cathode</td>
<td>Gold (not normally wetted)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Accuracy depends on the accuracy of the chemical test used to calibrate the sensor.</td>
</tr>
<tr>
<td>Linearity</td>
<td>±5% of reading or ±3 ppb (whichever is greater) at 25 °C (77 °F)</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±2% of reading at constant temperature</td>
</tr>
<tr>
<td>Response time</td>
<td>30&lt; 20 sec to 90% of final reading at 25 °C (77 °F)</td>
</tr>
<tr>
<td>Membrane permeability connection</td>
<td>Defined between 0 and 50 °C (32 and 122 °F)</td>
</tr>
<tr>
<td>Electrolyte volume</td>
<td>25 mL (approx.)</td>
</tr>
<tr>
<td>Electrolyte life</td>
<td>3 months (approx.); for best results, replace electrolyte monthly.</td>
</tr>
<tr>
<td>Cable length (standard integral cable)</td>
<td>25 ft (7.6 m)</td>
</tr>
<tr>
<td>Cable length (maximum)</td>
<td>300 ft (91 m)</td>
</tr>
</tbody>
</table>
| Sample flow              | Flow through: 1 to 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) |
| Weight/shipping weight(1) | 0.5 kg / 1.5 kg (1 lb / 3 lb) |

(1) Weights and shipping weights are rounded up to the nearest whole pound or 0.5 kg.

### Table 1-2: Other Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>PN</th>
<th>Wetted materials</th>
<th>Process connection</th>
<th>Maximum temperature</th>
<th>Maximum pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in. tee</td>
<td>915240-03</td>
<td>PVC and Buna N; body is schedule 80 PVC</td>
<td>3/4 in. NFPT</td>
<td>49 °C (120 °F)</td>
<td>60 psig (515 kPa abs)</td>
</tr>
<tr>
<td></td>
<td>915240-04</td>
<td></td>
<td>1 in. NFPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>915240-05</td>
<td></td>
<td>1-1/2 in. NFPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low flow cell(1)</td>
<td>24091-00 and 24091-01</td>
<td>Polycarbonate/polyester, 316 stainless steel, and silicone</td>
<td>Compression fitting for 1/4 in. O.D. tubing or 1/4 in. FNPT</td>
<td>70 °C (158 °F)</td>
<td>90 psig (722 kPa abs)</td>
</tr>
</tbody>
</table>
Table 1-2: Other Specifications (continued)

<table>
<thead>
<tr>
<th>Type</th>
<th>PN</th>
<th>Wetted materials</th>
<th>Process connection</th>
<th>Maximum temperature</th>
<th>Maximum pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valved rotameter</td>
<td>9390004 for use with low flow cell</td>
<td>Acrylic, 316 stainless steel, and Viton</td>
<td>1/4 in. NFPT (316 stainless steel)</td>
<td>65 °C (150 °F)</td>
<td>100 psig (858 kPa abs)</td>
</tr>
</tbody>
</table>

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

Install the sensor in a flowing sample. Keep the sample flow as constant as possible at a value within the following limits:

<table>
<thead>
<tr>
<th>Sample flow unit</th>
<th>Flow limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow through</td>
<td>1 to 5 gpm (3.8 to 19 L/min)</td>
</tr>
<tr>
<td>Open channel</td>
<td>1 ft/sec (0.3 m/sec)</td>
</tr>
<tr>
<td>Low flow cell</td>
<td>2 to 5 gph (7.6 to 19 L/hr)</td>
</tr>
</tbody>
</table>

Figure 2-1: Sensor Orientation

Install sensor within 45° of vertical
Figure 2-2: Flow Through 1-1/2 in. Tee

A. Union coupler
B. 1 in. NPT (2 places)
C. Sensor body: Rosemount 499A
D. 1 in. NPT flow cell adapter
E. O-ring 2-222
F. 1 1/2 in. sched 80 CPVC tee body
Figure 2-3: Flow Through 2 in. Tee

A. Union coupler
B. Adapter
C. 1 in. NPT (2 places)
D. Sensor body: Rosemount 499A
E. O-ring 2-222
F. 2 in. sched 80 PVC tee body
Figure 2-4: Low Flow Cell (PN 24091-00)
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™ 499AOZ-54 Sensor Wiring to Rosemount 1056 and 56 Transmitters**

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**TB1**

1. RTD RET
2. RTD SENSE
3. RTD IN
4. RTD SHLD
5. +5V OUT
6. −4.5V OUT
7. ANOD SHLD
8. ANOD
9. CATH SHLD
10. CATH

**STANDARD CABLE**
Figure 3-2: Rosemount 499AOZ-54-60 and Rosemount 499AOZ-54-VP Sensor Wiring to Rosemount 1056 and 56 Transmitters

```
499A

TB1

1  RTD RET
2  RTD SENSE
3  RTD IN
4  RTD SHLD
5  +5V OUT
6  -4.5V OUT
7  ANOD SHLD
8  ANOD
9  CATH SHLD
10 CATH

VARIOPOL AND EMI/RFI CABLE
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Figure 3-3: Rosemount 499AOZ-54 Sensor Wiring to Rosemount 5081 Transmitter
Figure 3-4: Rosemount 499AOZ-60 and 499AOZ-VP Sensor Wiring to Rosemount 5081 Transmitter
Figure 3-5: Rosemount 499AOZ-54 Sensor Wiring to Rosemount 1066 Transmitter

Note
Connect clear shield wires to sol gnd terminal on TB 2. Use wire nut and pigtail if necessary.
Figure 3-6: Rosemount 499AOZ-60 and 499AOZ-54-VP 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.

Figure 3-7: Rosemount 499AOZ Sensor Pin-out Diagram
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 ozone, the Rosemount 499AOZ sensor generates a small signal called the zero current. Failing to correct for the zero current can introduce a bias, particularly if the ozone concentration is small (<0.4 ppm). 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. Place the sensor in the water.
3. Wait until the sensor current has reached a stable low value (at least two hours).
4. Follow the transmitter prompts for zeroing the sensor.

**Note**

Refer to the manual for the transmitter you are using (Rosemount 56, 1056, 5081, or 1066).

The zero current should be between -10 and +10 nA.

4.2 Full scale calibration

Because stable dilute ozone standards are not available, the sensor must be calibrated against the results of a laboratory test run on a grab sample of the process liquid.

**Procedure**

1. Place the sensor in the flow cell.
2. Start the sample and reagent flow.
3. Adjust the sample flow to the correct range.
4. Adjust the concentration so that it is near the upper end of the operating range.
5. Wait for the readings to stabilize.
6. Follow the transmitter prompts to complete the calibration.

**Note**

Refer to the manual for the transmitter you are using (Rosemount 56, 1056, 5081, or 1066).
7. After calibration, go to the **Diagnostics** menu and check the sensitivity.

The sensitivity should be between 250 and 450 nA/ppm. For more information, refer to the transmitter manual.
# 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. Sensors installed in harsh or dirty environments require more frequent maintenance. The optimum maintenance frequency is best determined by experience.

**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 and sensor tip clean and free from dirt. Clean the membrane with water sprayed from a wash bottle. Use a soft tissue to gently wipe the membrane.

## 5.2 Replacing the electrolyte solution and membrane

**WARNING**

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

### 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.
   b) Rinse thoroughly with water.
7. Remove the old pipe tape from the plug.
8. Wrap the plug with one or two turns of pipe tape.

   a) Hold the membrane assembly with the cup formed by the membrane and membrane holder pointing up.
   b) Fill the cup with electrolyte solution.
   c) Leave the membrane assembly filled with electrolyte solution and set it aside.

10. Hold the sensor at about a 45° 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**
   Do not use a sharp probe. It will puncture the bladder and destroy the sensor.

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.
## 6 Accessories

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>23747-06</td>
<td>Interconnecting cable, VP 6, 2.5 ft (0.8 m)</td>
</tr>
<tr>
<td>23747-04</td>
<td>Interconnecting cable, VP 6, 4 ft (1.2 m)</td>
</tr>
<tr>
<td>23747-02</td>
<td>Interconnecting cable, VP 6, 10 ft (3.0 m)</td>
</tr>
<tr>
<td>23747-07</td>
<td>Interconnecting cable, VP 6, 15 ft (4.6 m)</td>
</tr>
<tr>
<td>23747-08</td>
<td>Interconnecting cable, VP 6, 20 ft (6.1 m)</td>
</tr>
<tr>
<td>23747-09</td>
<td>Interconnecting cable, VP 6, 25 ft (7.6 m)</td>
</tr>
<tr>
<td>23747-10</td>
<td>Interconnecting cable, VP 6, 30 ft (9.1 m)</td>
</tr>
<tr>
<td>23747-03</td>
<td>Interconnecting cable, VP 6, 50 ft (15.2 m)</td>
</tr>
<tr>
<td>23747-11</td>
<td>Interconnecting cable, VP 6, 100 ft (30.5 m)</td>
</tr>
<tr>
<td>23567-00</td>
<td>1-1/2 in. flow through tee with 1-1/2 in. socket connections</td>
</tr>
<tr>
<td>915240-03</td>
<td>2 in. flow through tee with 3/4 in. FNPT connections</td>
</tr>
<tr>
<td>915240-04</td>
<td>2 in. flow through tee with 1 in. FNPT connections</td>
</tr>
<tr>
<td>915240-05</td>
<td>2 in. flow through tee with 1-1/2 in. FNPT connections</td>
</tr>
<tr>
<td>24091-00</td>
<td>Low flow cell with 1/4 in. OD tubing compression fittings</td>
</tr>
<tr>
<td>9390004</td>
<td>Rotameter: 0.5 - 5.0 gph</td>
</tr>
<tr>
<td>22550-00</td>
<td>Junction box, 12 terminals</td>
</tr>
<tr>
<td>9200266</td>
<td>Extension cable for option -54, unterminated (specify length)</td>
</tr>
<tr>
<td>9200275</td>
<td>Extension cable for optimum EMI/RFI cable, unterminated (specify length)</td>
</tr>
<tr>
<td>23747-00</td>
<td>Extension cable for optimum EMI/RFI cable, terminated (specify length)</td>
</tr>
<tr>
<td>2001492</td>
<td>Stainless steel tag</td>
</tr>
<tr>
<td>23501-11</td>
<td>Dissolved ozone membrane assembly; includes 1 membrane assembly and 1 O-ring</td>
</tr>
<tr>
<td>23502-11</td>
<td>Dissolved ozone membrane assembly; includes 3 membrane assemblies and 3 O-rings</td>
</tr>
<tr>
<td>9210299</td>
<td>#3 Dissolved ozone sensor fill solution, 4 oz (125 ml)</td>
</tr>
<tr>
<td>33521-02</td>
<td>Membrane retainer</td>
</tr>
<tr>
<td>33523-03</td>
<td>Fill plug</td>
</tr>
</tbody>
</table>