

Rosemount™ 490A

Optical Dissolved Oxygen Sensor



Safety messages

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 in 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 Device overview

The Rosemount 490A is ideal for use in wastewater aeration basins and ponds.

The sensor has a low maintenance sensing cap that measures dissolved oxygen using the Environmental Protection Agency (EPA)-approved luminescence-quenching method.

Figure 1-1: 490A Sensor Parts



2 Installation

2.1 Unpack

Procedure

Remove the probe and sensing cap from the box.

The sensing cap is shipped in a small plastic cylinder inserted in a hole in the internal cardboard packaging.

2.2 Assemble the probe

Procedure

1. Unscrew the guard from the probe and remove the red protective dust cap.
Save the dust cap for later use. Make sure the O-ring grooves are dry and the O-rings are not rolled or pinched.
2. Remove the sensor cap from its shipping/storage sleeve.
The expected operating lifetime of the cap is two years after the first reading has been taken.

NOTICE

Keep the cap in its sealed packaging until you are ready to install it.

Install promptly.

Avoid allowing moisture, including humidity, inside the cap.

3. Align the arrow on the cap with the sensor tip and firmly press the cap onto the probe, without twisting, until it seals.
4. Reattach the nose cone.

NOTICE

Make sure the nose cone is in place whenever the probe is submerged in water.

5. Connect the cable to the transmitter.

2.3 Install the probe

You can install the Rosemount 490A dissolved oxygen probe in basins or ponds.

Procedure

Use the fitting at the rear of the probe to attach it to a pipe.

Make sure the connection is water-tight and the upper end of the pipe is closed to keep out water. The nose cone must be completely submerged.

NOTICE

Equipment damage

Do not allow the back end of the sensor to get wet without the cable attached. Condensation buildup can occur in the installed pipe. Be sure the back end of the sensor is not submerged.

2.4

Wiring the probe

The Rosemount 490A dissolved oxygen probe comes with an integral cable that connects to the M12 connector on the transmitter.

3 Calibration

3.1 Calibration options

There are three ways to calibrate the Rosemount 490A probe:

Saturation

Both a two-point (100 percent and 0 percent saturation) and one-point (100 percent saturation) calibration are available. 100 percent saturation refers to water completely saturated with atmospheric oxygen. 0 percent refers to water containing no dissolved oxygen.

The solubility of atmospheric oxygen in water depends on the barometric pressure, temperature, and humidity. If these are known, the concentration of oxygen in air-saturated water can be readily calculated, making it a useful calibration standard. In practice, however, air-saturated water is almost never used. Air is used instead. Air works because, according to Henry's Law, the concentration of oxygen in air-saturated water (expressed in mg/L) is in equilibrium with the partial pressure of oxygen in the air used to saturate the water. Therefore, whether the probe is in air or in air-saturated water, the fluorescence quenching will be exactly the same.

During calibration at 100 percent saturation, the micro-processor uses the temperature measured by the probe and the barometric pressure measured by the transmitter to calculate the equilibrium solubility of oxygen in water. Because the calibration assumes the air is completely saturated with water, the calibration must be done with the probe in air having 100 percent humidity.

Calibrating at 0 percent saturation requires water containing no dissolved oxygen. A good 0 percent saturation standard is water containing about 5 percent sodium sulfite (Na_2SO_3). Add about one teaspoonful of sodium sulfite crystals to a cup of water.

Concentration

If the probe is installed in a waste-water aeration basin, it is often inconvenient to remove it for saturation calibration. In this case, concentration calibration, in which the probe is calibrated against a reference instrument, is more suitable.

Default

Default restores the default calibration.

Although you can use a new probe as received from the factory, Emerson recommends that you do a one-point calibration, unless accuracy between 0-2 mg/L is the target measurement range, when first placing the probe in service.

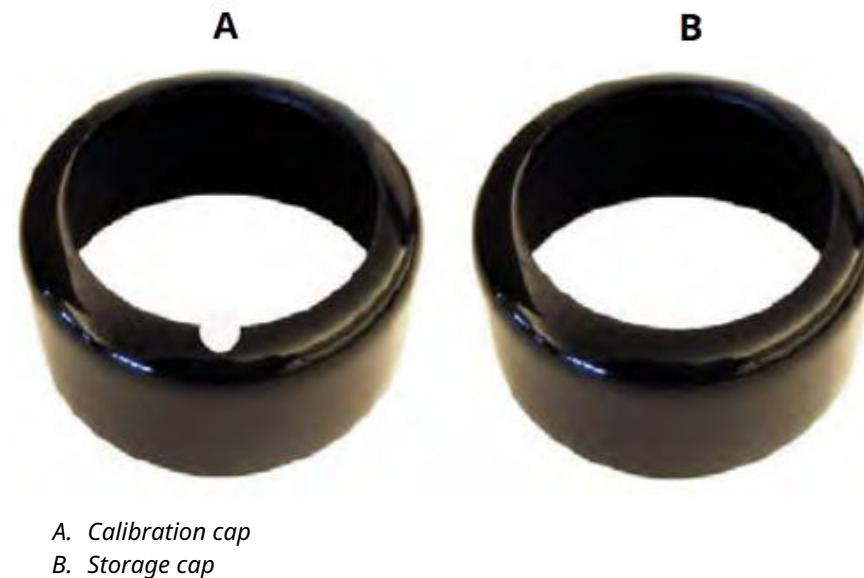
3.2

Perform one-point calibration (100 percent saturation)

Procedure

1. Remove storage cap on top of the calibration chamber and replace it with the calibration cap (cap with vent hole).

Figure 3-1: Calibration and storage caps



2. Place the sponge wafer in the bottom of the calibration chamber and saturate with approximately 0.3 oz. (10 ml) of water.
Make sure the water temperature is as close to the sample temperature as possible.

Figure 3-2: Fill the calibration chamber to the lower line with water



3. Remove the sensor from the process liquid. If the sensor is fouled or dirty, clean it. Gently dry the probe and sensor with a soft cloth, making sure there is no water on the body of the sensor or the sensing foil.

NOTICE

The sensing foil must remain dry during 100 percent saturation calibration.

4. Place the probe in the calibration chamber, keeping the sensing foil about 1 in. (25 mm) above the surface of the water.
5. Allow at least five minutes for the temperature to stabilize before starting calibration.

Keeping the sensor in the shade will help reduce drift caused by the sun's heat.

NOTICE

Do not leave the calibration chamber for more than 30 minutes to avoid condensation forming on the surface of the foil, which could lead to false low readings after calibration. If condensation does occur, remove the probe and dry the foil. Return the sensor to the calibration chamber and continue.

6. Once readings are stable, start the calibration from the transmitter menu.
 - a) Select **Menu → Calibrate → S1 (or S2) Measurement → 1 Point Saturation**.
 - b) Follow the prompts on the display to complete the calibration.

The sensor accepts slope values between -0.2 and 0.2. A slope or offset value outside these ranges indicates that an error was made in the calibration procedure or the

sensor cap has reached the end of its useful life. If the sensor does not accept the slope value, retry the calibration procedure. If this does not work, replace the sensor cap with a new cap.

3.3 Perform two-point calibration (100 percent and 0 percent saturation)

Procedure

1. Set up the calibration chamber and sensor as described in [Perform one-point calibration \(100 percent saturation\), Step 1](#) through [Step 5](#).

NOTICE

Perform the 100 percent calibration first.

2. Once readings are stable, start the calibration from the transmitter menu.
 - a) Select **Menu** → **Calibrate** → **S1 (or S2) Measurement** → **2 Point Saturation**.
 - b) Follow the prompts to complete the calibration.
3. Remove the probe and fill the calibration chamber to the upper fill line with approximately 1.4 oz. (40 ml) of fresh sodium sulfite solution.
See [Figure 3-3](#).

Figure 3-3: Fill the calibration chamber to the upper line with fresh sodium sulfite solution



A teaspoonful of sodium sulfite in a cup of water is adequate.

4. Place the probe in the sodium sulfite solution.
Leave at least $\frac{1}{2}$ in. (12 mm) between the surface of the foil and the bottom of the chamber. Do not allow the sensing foil to rest on the bottom of the calibration chamber. Allow at least five minutes for readings to stabilize.
5. Remove the probe from the calibration chamber. Rinse it and return it to the process liquid.

3.4

Perform a concentration calibration

Procedure

1. Calibrate the referee sensor following the manufacturer's instructions.
2. Immerse the referee sensor in the process liquid as close to the sensor as possible.
3. Allow adequate time for the referee sensor to come to equilibrium with the process liquid.
4. Once readings are stable, start the calibration.
 - a) Select **Menu** → **Calibrate** → **S1 (or S2) Measurement** → **Concentration**.
 - b) Follow the prompts on the display to complete the calibration.

The sensor accepts slope values between 0.8 and 1.2 and offset values between -0.2 and 0.2. A slope or offset value outside these ranges indicates that an error was made in the calibration procedure or that the sensor has reached the end of its useful life.

5. Enter the value from the referee sensor as the **Standard Value** in the transmitter.
6. Press **Enter**.

4 Maintenance

4.1 Clean the sensing cap

NOTICE

Leave the sensing cap and guard attached to the probe body.
Do not remove the sensing cap to clean it.

Procedure

1. Rinse the cap with clean water from a squirt bottle.
2. If biological fouling is present, gently wipe the cap with a soft bristled brush or soft cloth.
3. If oil or grease is present, wash with a gentle detergent.
4. If extensive fouling or mineral build-up is present, soak the cap of the sensor (without removing it from the sensor body) in vinegar for 15 minutes. Then soak it in deionized water for 15 minutes.

NOTICE

Equipment damage

Do not use organic solvents.

Postrequisites

After cleaning the sensor, check the calibration in the air. Perform a one or two-point saturation calibration if necessary.

4.2 Clean the probe body

NOTICE

Leave the sensing cap and nose cone attached to the probe body while cleaning the sensor.
Do not remove the sensing cap.

Procedure

1. Gently scrub the probe body with a soft-bristled brush or a nylon dish scrubber. Use a mild detergent to remove oil or grease.
2. Soak in vinegar followed by deionized water to remove mineral deposits or extensive fouling.

Postrequisites

After cleaning the sensor, check the calibration in the air. Perform a one or two-point sensor calibration if necessary.

Related information

[Clean the sensing cap](#)

4.3

Clean the optical window

Procedure

Clean the optical window only when replacing the sensing cap.

Related information

[Replace the sensing cap](#)

4.4

Replace the sensing cap

The replacement sensing cap kit (PN R0084230X) contains a sensing cap, two O-rings, O-ring lubricant, and a lens wipe.

NOTICE

Keep the cap in its sealed packaging until you are ready to install it.

Install the cap promptly.

Avoid allowing moisture, including humidity, inside the cap.

Procedure

1. Remove the sensor from the process liquid.
2. Rinse with water and dry the probe body and nose cone.
3. Unscrew the nose cone.
4. Pull the sensing cap straight off the probe body.

NOTICE

Do not twist.

5. Remove and discard the existing O-rings.
6. Remove any moisture in the O-ring grooves.

NOTICE

Be careful not to touch the lens.

7. Use your finger to apply a thin layer of lubricant around the O-ring grooves.

NOTICE

Equipment damage

Be careful not to get grease on the lens or on the sensor pins.

8. Slide the two O-rings into grooves. Check that the O-rings are not twisted or pinched. Apply a thin layer of lubricant over the O-rings and grooves.

NOTICE

Equipment damage

Be careful not to get grease on the lens or on the sensor pins.

9. Clean the lens with the wipe provided in the kit and allow it to dry thoroughly. Inspect the lens for scratches or dirt.
10. Remove the sensing cap from its sealed packaging.
11. Align the arrow on the cap with the index mark on the probe and firmly press the cap onto the probe, without twisting, until it seals.
12. Replace the nose cone.
13. Perform a one or two-point saturation calibration.

4.5 Store the sensor probe

You can store the sensors dry.

The caps will rehydrate within 90 seconds when placed in water or water-saturated air.

5 Replacement parts

Part number	Description
00490-1002-0001	Antifouling guard
00490-1003-0001	Air-blast guard
00490-1004-0001	Weighted guard
R008430X	Sensor cap replacement kit

For more information: Emerson.com/global

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