TPS EDSEN-123204

Dissolved Oxygen Sensor

Care and Operating Guide

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READ BEFORE FIRST USE:

This sensor ships **dry**.

You must fill it with electrolyte before you use it.

Running it dry will damage it - and that damage is not covered by warranty.

The filling process involves installing a fresh membrane - please take care in following these steps, as an incorrectly installed membrane can damage the sensor.

About this sensor

The EDSEN-123204 is a membrane-covered electrochemical dissolved oxygen sensor.
This serves as a replacement for the EDYSI-123204 Dissolved Oxygen Sensor and uses the same cables.

A gold cathode and a silver anode sit in potassium chloride (KCl) electrolyte behind a thin membrane. Oxygen diffuses through the membrane and produces a small current in proportion to how much oxygen is present. The membrane and the electrolyte are what make the reading possible, so most of this guide is about looking after them.

Compatible TPS instruments

The EDSEN-123204 is compatible with the following instruments:

WP-82Y · WP-91 · WP Plus · SmartChem Lab
90-FLT · 90-FLMV · AQUA-DY

About the sensor membrane, and why it matters

A correctly fitted membrane does two jobs:

1. It keeps the electrolyte in. A loose membrane lets fluid leak out and air bubbles form behind it, which gives you incorrect readings.
2. More importantly, it keeps contaminants out. Substances like sulphides poison the silver anode - the triangular piece sitting behind the membrane. A poisoned anode usually means the whole sensor is finished.

The membrane is the seal that protects the sensor. Fitting it correctly is very important – please take care when following the installation instructions below.

Fitting the membrane

Do this every time you change the membrane.

TPS-branded KCl comes as a liquid, ready to use. This will be your electrolyte for filling.

How to fit the membrane

1. Unscrew the sensor guard. If present, remove the old O-ring and membrane. Rinse the sensor with distilled water.
2. Check the cathode. If it looks dull, polish it before refilling (see polishing steps on Page 4).
3. Slowly fill the body with electrolyte, until a rounded bead sits over the gold cathode and covers it completely.
4. Hold a fresh membrane against the sensor body with your left thumb. Handle membranes by the ends only.
5. With the thumb and forefinger of your other hand, take the free end of the membrane. In one continuous motion, stretch it up, over and down the other side. This is the step that matters most - stretching is what forms the membrane into the shape that seals the sensor.

Aim for a cup shape

A good fit forms a clear cup shape over the tip. The membrane will stretch to about twice its length before it breaks, so if you are unsure, stretch it more rather than less. A slightly over-stretched membrane seals. A slack one does not.

6. Hold the end of the membrane under your left forefinger.
7. Roll the O-ring over the end of the sensor without touching the membrane surface. There should be no wrinkles and no trapped air. You can ease out small wrinkles by lightly tugging the membrane edges below the O-ring.
8. Trim the excess membrane cleanly with scissors or a sharp blade. Leave no loose scraps - a stray flap can catch in the sensor guard thread as you screw it back on, drag on the membrane and break the seal. Make sure the temperature sensor is not covered.
9. Shake off the excess KCl and screw the sensor guard back on. Store the sensor in the provided humidity bottle between measurements.

Checking the seal

It's good practice to check the seal when you fit a new membrane.

1. Rinse the sensor tip in distilled water and wipe it dry.
2. Hang the sensor up overnight somewhere dry.
3. Check the edge of the membrane near the O-ring. If you see white potassium chloride crystals, electrolyte has leaked and the seal is no good. Fit a fresh membrane and test again.

Using the sensor in the field

Connecting and disconnecting the field probe

To remove the cable: unscrew the retainer and slide it down the cable to expose the connector. Pull gently on the connector until it comes free of the probe body. If the O-ring on the connector is frayed or damaged, replace it with the spare supplied with each cable.

To reconnect: push the connector into the probe body and rotate. A light smear of silicone grease on the O-ring makes this easier. Make sure the connector is dry first, or you may get erratic readings. Screw the retainer back on finger-tight only.

Calibration

Please take care to calibrate the sensor, following the calibration steps provided in your instrument's product manual. It is recommended to perform an air calibration at least weekly, and a zero calibration at least monthly. In applications where there is a low level of dissolved oxygen, a zero calibration may have to be done weekly. It is recommended that this sensor be calibrated at the same atmospheric pressure that it will be used in.

Looking after the sensor

Membrane life

How long a membrane lasts depends on use. Replace the membrane and electrolyte if you get erratic readings or see signs of damage. As a rough guide, plan on replacing every two to four weeks. Under constant or heavy use, the electrolyte is usually spent in about two weeks.

Storage

Store the sensor in the humidity bottle provided. Put a small piece of damp sponge or towel in the bottle and sit the sensor in the open end. This stops the electrolyte drying out.

Keeping the gold cathode bright

The gold cathode must stay bright for the sensor to read correctly. It can tarnish from contact with hydrogen sulphide or sulphur dioxide or get plated with silver if you run it with a loose or wrinkled membrane. If it the cathode surface appears dull or tarnished, please following the polishing steps below.

Cathode polishing steps

Important: The cathode surface is naturally domed. Do not sand it completely flat.
Follow these steps to polish a dull cathode.

- Use 800-grit wet/dry sandpaper.
- Wet the sandpaper with clean water.
- Place the paper against the gold cathode and lightly rub in a gentle, twisting, circular motion for about 60 counts.
- Periodically shift the paper while rubbing to expose fresh abrasive material.
- Continue until the gold appears as a uniform, matte, bright finish.

A note on the anode colour

The silver anode can be anywhere from pearly white to medium grey. That is normal and does not affect performance. If it is not white and the sensor will not calibrate, soak it overnight in a 3% ammonia solution, rinse with deionised water, recharge with electrolyte and fit a new membrane. If it still will not calibrate after a few hours, contact TPS or your supplier.

A **black** anode is different. Black usually means the anode has been poisoned, generally through a poorly sealed membrane, and at that point the sensor is usually unrepairable. Poisoning is not covered by warranty.

Troubleshooting readings

Coated membrane

Bacteria, algae or heavy residue on the membrane will throw readings off by coating it. Regular cleaning usually sorts this out.

Interfering gases

Chlorine, sulphur dioxide, nitric oxide and nitrous oxide can react at the sensor like oxygen and skew your readings. If readings look wrong and you cannot explain them, consider whether these gases are present. Long-term monitoring makes these effects more pronounced.

Keep sensor away from harsh chemicals

Some environments attack the sensor materials. Avoid concentrated acids, caustics and strong solvents. The parts that contact the sample are FEP Teflon, acrylic, ABS, EPR rubber, stainless steel, epoxy, polyetherimide and the polyurethane cable cover.

Returning the sensor for service

Clean the sensor before you send it. It reduces the hazard for whoever handles it next. We treat any sensor used in wastewater as biologically contaminated.

To clean:

1. Empty the chambers and clean all matter off the probe.
2. Decontaminate the exposed surfaces with one of: 70% isopropyl alcohol; a fresh mix of a quarter cup of bleach to 5 litres of water; or 5% ammonia solution.

Send to

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Specifications

Cathode	Gold
Anode	Silver
Membrane	FEP Teflon
Electrolyte	Half-saturated KCl
Temperature range	-5 to 45°C
Thermistor accuracy	±0.2°C
Temperature compensation	See instrument specifications
Polarising voltage	0.8 volts (nominal)
Probe current in air at 30°C	19 microamps (nominal)
Probe current in nitrogen at 30°C	0.15 microamps or less
Measurement Response Time	Typical DO response is 90% in 15 seconds at constant temperature of 25°C. Response at low dissolved oxygen is typically 90% in 45 seconds.
Temperature Response Time	Typical Temperature response is 95% in 45 seconds at a constant temperature of 50°C.
High Temperature Performance	Sensor has been tested at and above 65°C and found to perform within ±5% of nominal under operating conditions.

Warranty

This sensor carries a one-year warranty, limited to repair or replacement at no charge. Cleaning and routine servicing are not covered. Damage caused by a poorly fitted membrane, including a poisoned anode, is not covered.