Assembly and operating instructions

DULCOTEST® Sensor for Ozone, Type: OZR 1-mA-2 ppm

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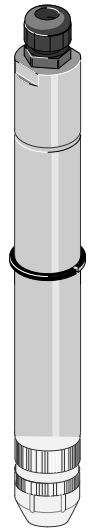

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Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

Part number 983638

BA DT 049 04/16 EN

General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. It is aimed equally at both men and women. We kindly ask female readers for their understanding in this simplification of the text.

Supplementary information

Please read the supplementary information in its entirety.

Information

This provides important information relating to the correct operation of the unit or is intended to make your work easier.

Warning information

Warning information includes detailed descriptions of the hazardous situation, see *Chapter 1.1 'Labelling of Warning Information' on page 5*.

The following symbols are used to highlight instructions, links, lists, results and other elements in this document:

More symbols

Symbol	Description
1.	Action, step by step.
⇨	Outcome of an action.
	Links to elements or sections of these instructions or other applicable documents.
■	List without set order.
[Button]	Display element (e.g. indicators). Operating element (e.g. button, switch).

Symbol	Description
'Display /GUI'	Screen elements (e.g. buttons, assignment of function keys).
CODE	Presentation of software elements and/or texts.

Table of contents

1 Introduction

These operating instructions provide information on the technical data and functions of the DULCOTEST® sensor for ozone,
OZR 1-mA-2ppm

1.1 Labelling of Warning Information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed warning information and are provided as clear step-by-step instructions.

The warning information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.

DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

Description of hazard

– Denotes an immediate threatening danger. If the situation is disregarded, it will result in fatal or very serious injuries.

WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in fatal or very serious injuries.

CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries. Material damage.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.

NOTICE!

Nature and source of the danger

Damage to the product or its surroundings.

Measure to be taken to avoid this danger.

– Denotes a possibly damaging situation. If the situation is disregarded, the product or an object in its vicinity could be damaged.

Type of information

Hints on use and additional information.

Source of the information. Additional measures.

– *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

1.2 Users' qualifications

WARNING!

Danger of injury with inadequately qualified personnel!

The operator of the plant / device is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

– All work on the unit should therefore only be conducted by qualified personnel.
– Unqualified personnel should be kept away from the hazard zone

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified personnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.

Training	Definition
Electrician	Electricians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations. Electricians should be specifically trained for the working environment in which the are employed and know the relevant standards and regulations. Electricians must comply with the provisions of the applicable statutory directives on accident prevention.
Customer Service department	Customer Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.

Note for the system operator

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to!

1.3 General safety information

WARNING!

Unauthorised access!

Possible consequence: Fatal or very serious injuries.

- Measure: Ensure that there can be no unauthorised access to the unit.
- Only allow trained personnel to fit, install, service and operate the sensor.
- Observe the applicable national installation and operating guidelines.

CAUTION!

Functional limitations

Possible consequence: Slight or minor injuries. Material damage.

- Check the sensor regularly for dirt and contamination.
- Check the diaphragm cap regularly for air bubbles adhering to it.
- Observe the applicable national guidelines relating to maintenance, service and calibration intervals.

CAUTION!

Prerequisites for operation

Possible consequence: Slight or minor injuries. Material damage.

- Only use the sensor in bypass fittings that ensure the correct flow parameters.
- Ensure that there is a free outlet or at most a back pressure of 1 bar at the outlet of the bypass fitting.
- Do not interrupt the power supply to the sensor.
- Following longer interruptions to the power supply (> 24 h), allow the sensor to run-in again and calibrate it.

1.4 Intended use

NOTICE!

Intended use

- Only use the sensor to measure and regulate concentrations of ozone (O_3).
- Connecting the sensor to external devices requires the approval of ProMinent.
- All other uses or modifications are prohibited.
- The sensor is not a safety component.

1.5 Information in the event of an emergency

- Switch off the measuring /control device in the event of an emergency.
- If liquid escapes from the bypass fitting, close the stopcocks on the inlet and outlet of the bypass fitting installed by the customer.
- Observe the plant operator's safety information before opening the bypass fitting.

2 Functional description

Brief description of the function

Sensor OZR 1-mA-2 ppm	Order number: 1051647

The DULCOTEST® OZR sensor for ozone is a diaphragm-covered amperometric two-electrode sensor. The sensor can be used to determine the concentration of ozone in water.

Use the sensor to measure and regulate ozone in process, service and cooling water. The sensor shows tolerance in contaminated water. However, it is essential to regularly check the sensitivity when using it in contaminated water. For example, a weekly check of the sensor's sensitivity must be carried out in heavily contaminated water.

The sensor is also suitable for monitoring the breach of ozone into water where no ozone is present.

A longer sensor response time must be taken into consideration after a longer absence of ozone. For example, the response time in clean water is approx. 5 minutes if the sensor has been operated for 4 weeks in water not containing ozone.

2.1 Function of the sensor

The sensor OZR is a diaphragm-covered, amperometric two-electrode sensor. A gold cathode acts as a working electrode and a silver chloride anode acts as a counter electrode.

The ozone in the sample water diffuses through the diaphragm. The constant polarisation voltage between the two measuring electrodes produces the electrochemical ozone reaction on the working electrode. The resulting current is measured as a primary signal (amperometric measuring principle). The primary signal is proportional to the ozone concentration in the operating range of the sensor. The primary signal is converted into a temperature-corrected 4 ... 20 mA output signal by the amplifier electronics of the sensor and displayed and processed in the measuring /control device.

2.2 Construction

The sensor OZR consists of 3 main parts, the top part, the sensor shaft and the diaphragm cap. The electrolyte-filled diaphragm cap constitutes the measuring chamber. The measuring electrodes are immersed in the measuring chamber. The measuring chamber is sealed from the measuring medium by a diaphragm. The amplifier electronics, embedded into a plastic mass, are located in the top part of the shaft. The sensor OZR has a passive 4 ... 20 mA two-wire interface. The power supply is external from a measuring / control device.

2.2.1 Construction of the sensor

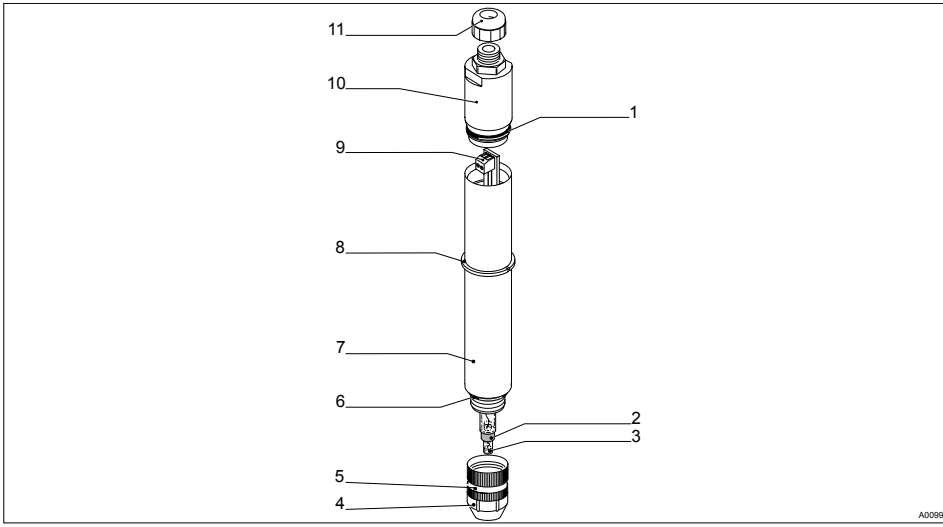

Fig. 1: Construction of the sensor

1 O-ring
2 Counter and reference electrodes
3 Working electrode
4 Diaphragm cap
5 Hose seal
6 O-ring
7 Sensor shaft
8 Clamp disc
9 2-wire connector
10 Upper part
11 Cable feed-through for M12 threaded connector

2.3 Measuring station of the sensor OZR

The measuring /control device, e.g. a DULCOMETER® DACa connected to the supply voltage, is connected electrically to the sensor via a two-wire measuring line in a complete measuring station. The sensor is installed, for example, in a bypass fitting DLG III or a modular bypass fitting DGM. A sampling tap can be screwed to the underside of the DGM module. The bypass fitting is connected hydraulically to the sample water flow.

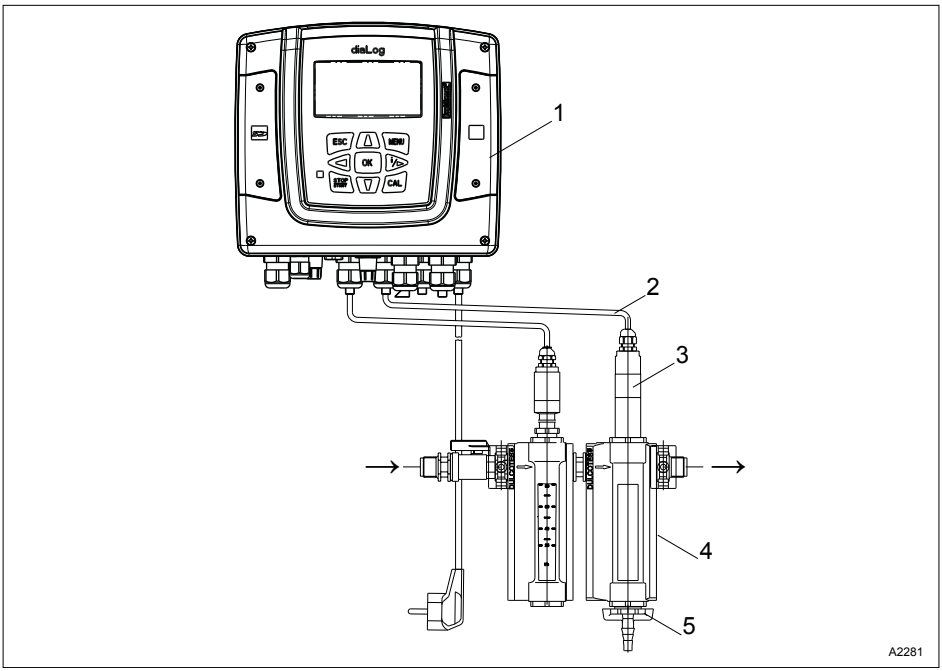

Fig. 2: Measuring station

1 Measruing /control device e.g. a DULCOMETER® DACa
2 2-wire measuring line
3 Sensor
4 Bypass fitting (e.g. a DGM here)
5 Sampling tap

3 How to store and transport the sensor

User qualification: trained user, see *Chapter 1.2 'Users' qualifications' on page 7*

NOTICE!

Original packaging

Damage to the product

- Only transport, ship and store the sensor in its original packaging
- Retain the packaging in its entirety including the polystyrene inserts

NOTICE!

Maximum storage period

Damage to the product

If the sensor is stored for a long period of time, return it to ProMinent for checking or servicing. Otherwise the safe operation and measuring accuracy of the sensor can no longer be guaranteed

3.1 Storage

Permissible ambient temperature: +5 °C to +50 °C

Humidity: maximum 90 % relative air humidity, non-condensing

Other: no dust, no direct sunlight

Maximum storage period of the electrolytes in their original packaging: see label on the bottle

Maximum storage period of the sensor in its original packaging and normal atmosphere: 2 years

3.2 Transport

The sensor should be transported in its original packaging and in compliance with the permissible environmental conditions. No further special conditions have to be observed in relation to transport.

4 Assembly

- User qualification: trained user, see *Chapter 1.2 'Users' qualifications' on page 7*

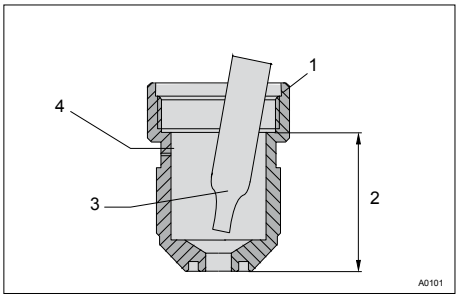

Fig. 3: Electrolyte in the diaphragm cap

1 Diaphragm cap
2 Electrolyte filling level
3 Pipette
4 Vent hole

4.1 Assembling the sensor

Assembly

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

WARNING!

Electrolyte material safety data sheet

Observe the current electrolyte material safety data sheet.

NOTICE!

- Do not touch or damage the diaphragm and the electrodes.
- Always keep the electrolyte bottle sealed after use! Do not decant electrolytes into other containers.
- The electrolyte should not be kept for longer than 2 years. See the label on the electrolyte bottle for the use-by-date.

Filling electrolyte

1. Remove the diaphragm protective cap and unscrew the diaphragm cap from the electrode shaft.
2. Fill the diaphragm cap up to the bottom thread.

If you wish to significantly reduce the run in period, then expel the air between the gauze and the diaphragm. Together with this air, the diaphragm reflects seen through the electrolyte filling.

There are two methods for doing this:

1

1. Gently tap the diaphragm cap with the side of the sensor shaft until no more air bubbles rise. Observe this in good light conditions.

2

2. Fill the enclosed pipette as full as possible with electrolyte out of the diaphragm cap.
3. Hold the pipette opening very close to the diaphragm and direct a few pressure surges out of the pipette onto the diaphragm. But do not press any air out of the pipette.

CAUTION!

Flush the pipette thoroughly with water after use and retain it in the original sensor packaging.

Assembling the diaphragm cap

1. Place the electrode shaft vertically onto the filled diaphragm cap.
2. Do not close the air vent opening underneath the hose seal with your fingers.
3. Turn the diaphragm cap by hand as far as it will go so that no gap can be seen between the diaphragm cap and the electrode shaft. When screwing it shut, excess electrolyte should be allowed to escape unchecked through the vent hole underneath the hose seal.

Fitting the sensor

CAUTION!

- Only install the sensor in bypass fittings type DLG III A, DLG III B or DGM to guarantee the necessary flow requirements. Undefined deviations can occur when using other bypass fittings.
- Depressurise the system before fitting the sensor in the bypass fitting. Close the stopcocks before and after the bypass fitting.
- The sensor must only be slowly pushed in or pulled out of the bypass fitting.
- Do not exceed the maximum operating pressure of 1 bar (bypass fitting DLG III) or 3 bar (bypass fitting DGM).
- Do not allow the minimum flow to fall below 30 l/h. Monitor the flow on the connected measuring /control device. If the measured value is used for control, switch off the control if the minimum flow rate is undershot or switch to the base load.
- Avoid installations that allow air bubbles to form in the sample water. Air bubbles that adhere to the diaphragm of the sensor can result in too low a measured value and then lead to incorrect metering in a control circuit.

→ Also observe the instructions and safety information contained in the operating instructions for the bypass fitting.

DLG III

1. → Push the O-ring from below over the sensor up to the clamp disc.
2. → Introduce the sensor into the DLG III.
3. → Secure the sensor with threaded plugs.

DGM

1. → Push the O-ring from below over the sensor up to the clamp disc; leave a washer in the DGM.
2. → Introduce the sensor into the DGM and tighten securely with a clamping screw until the O-ring seals. The correct insertion depth of the sensor is defined by the clamp disc.

5 Installation

- User qualification: trained qualified personnel or electrical technician, see *Chapter 1.2 'Users' qualifications' on page 7*

WARNING!

Connection to external devices

Possible consequence: Fatal or very serious injuries

– Ensure that the connected measuring /control device is galvanically isolated from the sensor.

– Do not allow the supply voltage to fall below 16 V DC, even for short periods of time.
  – Ensure that the current source can be loaded with a minimum of 35 mA at a minimum of 16 V DC. Maximum load: 1.0 W
  – Too low a supply voltage may result in an incorrect measured value.

The interface requirements are automatically met when connecting to ProMinent measuring /control devices.

CAUTION!

Incorrect metering

Possible consequence: Slight or minor injuries. Material damage.

– Do not switch off the measuring system during intermittent operation.
  – Switch on the feeder assemblies with a time delay if necessary.

– An increase in the sensor's response time by > 5 minutes can be expected when there has been an absence of ozone for longer than 4 weeks.

Install in a manner that ensures the supply voltage of the measuring /control device never dips. Too low a supply voltage causes an incorrect measured value and can lead to dangerous over-metering in a control circuit.

Electrical installation

1. Turn the top part of the sensor a quarter turn counter-clockwise and remove it.
2. Loosen the clamping screw on the M12 threaded connector and feed through the measuring line from the measuring / control device.

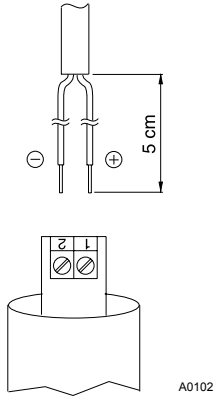

Fig. 4: 2-wire connection.

3. Strip the cable ends, fit the cable ends with cable end sleeves (⌀ max = 0.5 mm^2) and connect the cable ends to the 2-wire connector: 1 = plus, 2 = minus.
4. Insert approx. 5 cm of the measuring line into the sensor.
5. Tighten the clamping screw on the threaded connector.
6. Push the top part of the sensor right into the sensor shaft and tighten the top part clockwise up to the stop.

6 Starting up the sensor

- User qualification: trained user, see *Chapter 1.2 'Users' qualifications' on page 7*

The measuring /control device can be switched on after a successful installation. The run in period of the sensor must then be allowed to elapse.

CAUTION!

- The power supply to the measuring / control device and sensor must not be interrupted. Recommissioning must be carried out after a long voltage interruption (> 24 h). Allow sensor to run in and calibrate it.
- Do not switch off the measuring system during intermittent operation. Response times of longer than 5 minutes must be expected with a t90 after operation for > 1 month without the presence of ozone. Switch on the feeder assembly with a time delay if necessary!
- The current signal must not exceed 20 mA. Otherwise the current signal can dip, the sensor will be damaged and trigger dangerous over-metering in a control circuit. A monitoring facility should be installed to avoid over-metering. The monitoring facility must permanently switch off the ozone regulation and trigger an alarm. The monitoring facility must not have an automatic reset capability.
- Avoid installations that could cause air bubbles to form in the sample water! Air bubbles that adhere to the diaphragm of the sensor can result in too low a measured value and thus lead to dangerous over-metering in a control circuit.
- The sensor must always be kept moist after commissioning.

6.1 Allow sensor to run in

Run in period	
The sensor requires a specific run in period to display a steady display value.	
Initial commissioning:	1 ... 2 h
After replacing the diaphragm	1 h
Recommissioning:	1 ... 2 h

CAUTION!

– Longer run in periods apply if the air between the gauze and the diaphragm is not expelled.

6.2 Calibrating the sensor

CAUTION!

– A slop calibration must be carried out following the replacement of a diaphragm cap or electrolyte.
– The slope calibration must be repeated at regular intervals to ensure perfect operation of the sensor.
– Observe the applicable national guidelines for calibration intervals.

Prerequisites

The sensor is stable; no drift or oscillating readings if possible for at least 5 minutes. This is generally guaranteed if the following conditions are fulfilled:

– *The run in period has elapsed.*
– *There is permitted flow over the bypass fitting.*
– *There is temperature balance between the sensor and the sample water; wait approx. 15 minutes.*

Zero point calibration

If the sensor is operated with a ProMinent measuring /control device, then zero point calibration is not generally necessary. However, perform zero point calibration if you are using the sensor at the lower threshold of the measuring range.

1. Immerse the sensor in a bucket of clean water without disinfectant or oxidant (e.g. commercially available still mineral water).
2. Stir with the sensor until the measured value on the measuring /control device is stable for 5 min.
3. Calibrate the measuring /control device to zero in accordance with its operating instructions.
4. Re-install the sensor in the bypass fitting (e.g. the DGMA; DLG III).

Slope calibration

Calibrating at a higher temperature

As ozone in the water is only physically dissolved, it gasses out of the medium very quickly at high temperatures (> 30 °C). It is therefore essential that the DPD measurements are performed quickly. There should on no account be more than 1 minute between taking the sample and mixing it with the reagents. In this case, the red dye should be generated by the addition of the reagent directly at the sampling point and then the measurement should be conducted in the laboratory as quickly as possible.

1. Determine the ozone content of the sample water using a suitable measuring kit (e.g. the DPD 4)
2. Set the determined value on the measuring /control device in accordance with its operating instructions.

   ⇨ Repeat the calibration after one day to ensure that the sensor has reached its maximum sensitivity (slope).

7 Maintaining and repairing the sensor

User qualification: instructed user, see
Chapter 1.2 'Users' qualifications' on page 7

CAUTION!

- Maintain the sensor regularly in order to avoid over-metering in a control circuit due to incorrect measured values.
- Observe the applicable national guidelines for maintenance intervals.
- Do not touch the electrodes or bring them into contact with substances containing grease.
- Do not unscrew the diaphragm cap when cleaning the diaphragm.

Maintenance interval

Experience-based values for clear water: 1 month.

Other applications: depending on the operating conditions.

Maintenance work

1. Regularly check the sensor for dirt, fouling and air bubbles. Where possible, avoid contamination of the diaphragm with particles, precipitation, etc. Clear air bubbles by increasing the flow in the bypass fitting.
2. Regularly check the display value of the sensor on the control device using a suitable reference method.
3. If necessary, recalibrate the sensor.
4. If calibration is no longer possible, the diaphragm cap must be cleaned or replaced and the calibration repeated.

Cleaning the diaphragm

1. Do not unscrew the diaphragm cap.
2. Rub the diaphragm with a damp cloth.

Carrying out repairs

The sensor can only be repaired in the factory. Return the sensor to the manufacturer in its original packaging. Prepare the sensor beforehand, as described in chapter *Chapter 9 'Decommissioning' on page 26*.

8 Troubleshooting

User qualification: instructed user, see
↳ *Chapter 1.2 'Users' qualifications' on page 7*

All possible errors in the reference method should initially be taken into consideration in the event of large deviations between the measured value on the sensor and the measured value in the reference method. The reference measurement may need to be repeated several times if necessary.

8.1 Troubleshooting the sensor

Sensor: Troubleshooting

The complete measuring station must be considered when troubleshooting. This comprises:

- Measuring /control device
- Electrical cable and connections.
- Bypass fitting and hydraulic connections.
- Sensor.

The possible causes of faults in the table below principally refer to the sensor. Before commencing with the troubleshooting, make sure that the operating instructions are observed:

- Ozone content according to the measuring range.
- Temperature of the sample water 5 ... 45 °C and constant.
- Flow rate 30 ... 60 l/h.
- pH value constant and within the stability range of ozone (pH 4 ... 11).

The sensor simulator (order no.1004042) can be used to localise the fault in the measuring /control device. Detailed troubleshooting on the measuring /control device is listed in the operating instructions for the measuring /control device.

All possible errors in the reference method should initially be taken into consideration in the event of large deviations between the measured value on the sensor and the measurement value in the reference method. The reference measurement may need to be repeated several times if necessary.

Fault	Possible cause	Remedy
Sensor cannot be calibrated – display on measuring /control device greater than the DPD-4 measurement	Run in period too short.	See "Run in period".
	Diaphragm cap damaged.	Replace diaphragm cap, allow sensor to run in, calibrate it.
	Troublesome substances in the water.	Check water for troublesome substances and remedy this.
	Short circuit in the measuring line.	Identify short circuit and eliminate the cause.
	DPD chemicals out of date.	User new DPD chemicals, repeat calibration.

Fault	Possible cause	Remedy
Sensor cannot be calibrated – display on measuring /control device less than the DPD-4 measurement	Run in period too short.	See "Run-in time"
	Deposits on the diaphragm cap.	Remove the deposits - see "Maintenance", replace diaphragm cap; allow sensor to run in, calibrate it.
	Sample water flow rate too low.	Correct flow rate.
	Air bubbles on the outside of the diaphragm.	Remove air bubbles by tapping them and increase flow rate if necessary.
	No electrolyte in diaphragm cap.	Fill with new electrolyte.
Measured value display shows "zero"	Ozone content below the lower limit of the measuring range.	Add ozone and then repeat calibration or use a suitable sensor.
	Sensor incorrectly connected to the measuring /control device.	Connect sensor correctly to the measuring /control device.
	Run in period too short.	See "Run in period".
	Sensor defective.	Replace sensor.
Measured value display unsteady	Air bubbles on the outside of the diaphragm.	Remove air bubbles by tapping them and increase flow rate if necessary.
	Diaphragm damaged.	Replace diaphragm cap, allow sensor to run in, calibrate it.
	Cause lies in the control device.	Eliminate cause.

* If the reference electrode appears shiny silver or white, it must be regenerated. However, brown/grey discolourations are normal.

.

9 Decommissioning

User qualification: instructed user, see
↳ *Chapter 1.2 'Users' qualifications' on page 7*

CAUTION!

- Before dismantling the sensor, switch off the downsteam measuring /control device or switch to manual mode. An incorrect measured value may occur at the measuring /control device input due to the failure of the sensor and lead to uncontrolled metering in a control circuit.
- Depressurise the system before dismantling the sensor. To do so, close the stopcocks before and after the bypass fitting. Liquid escapes when dismantling the sensor under pressure.
- First disconnect the measuring /control device from the power supply in the event of an emergency. If liquid escapes from the bypass fitting (DGM/DGL III), close the stopcocks at the inlet and outlet installed by the customer.
- Observe the plant operator's safety information before opening the bypass fitting.

Decommissioning the sensor.

1. Disconnect the sensor from the power source.
2. Depressurise the bypass fitting.
3. Loosen the clamping screen on the bypass fitting.
4. Slowly remove the sensor from the bypass fitting.
5. Unscrew and empty the diaphragm cap over a sink or similar vessel.
6. Clean the electrodes and diaphragm cap thoroughly with clean, warm water so that there is no longer any adhering electrolyte and then allow them to dry.
7. Loosely screw on the diaphragm cap to protect the electrodes.

10 Disposing of the sensor

Disposal of used parts

User qualification: instructed user, see
Chapter 1.2 'Users' qualifications' on page 7

NOTICE!

Regulations governing the disposal of used parts

– Note the national regulations and legal standards that currently apply in your country

You can dispose of the electrolyte in accordance with the electrolyte's material safety data sheet.

The manufacturer takes back decontaminated and clean used parts.

You will find the current decontamination declaration to download on the manufacturer's homepage.

11 Technical data

Parameter	Specification
Measured variable:	Ozone (O_3)
Area of application:	measuring and regulating ozone in process, service and cooling water. Monitoring the absence of ozone.
Measuring ranges:	OZR 1-mA-2 ppm: 0.02 ... 2.00 mg/l
Dissolution:	corresponds to the lower limit of the measuring range
Rated gradient:	at pH 7.2; T= 25 °C, flow rate: 50 l/h in the DGMa
	OZR 1-mA-2 ppm: 6.00 mA/ppm
Response time:	T_{90} approx. 60 seconds
pH range:	stability range of ozone
Temperature range:	5 ... 45 °C, temperature-compensated, no sudden changes in temperature (sample water)
	5 ... 50 °C (ambient air)
Pressure:	maximum of 1 bar and free flow
Flow rate:	sample water through bypass fitting DLG III, DGM
	Optimum: 50 l/h, at least: 20 l/h, maximum: 100 l/h
Cross sensitivity:	chlorine dioxide, peracetic acid PAA, bromine, bromamine
Diaphragm cap service life:	typically 3 ... 6 months, depending on the water quality
Materials:	Diaphragm cap: PVDF
	Electrode shaft: PVC-C
Supply voltage:	16 ... 24 V DC; min 35 mA at 16 V DC
Output signal:	4 ... 20 mA
Degree of protection:	IP 65
Storage temperature:	between 5 ... 50 °C

12 Ordering information

Standard scope of supply:

- Sensor OZR 1-mA-2 ppm complete
- Bottle with electrolyte (100 ml)
- Replacement diaphragm cap and nozzle
- Pipette (plastic)
- Operating instructions
- Small screwdriver

Complete set

- The sensor can only be ordered as a complete set:
  - 1 sensor OZR 1-mA-2 ppm, (1051647)

Consumables:

- Set consisting of:
  - 2 diaphragm caps
  - 1 bottle of electrolyte (100 ml), order no. 1024022
- Diaphragm cap, order no. 1023895
- Bottle with electrolyte (100 ml), order no. 1023896

Accessories:

- Measuring /control device DULCOMETER®
- Bypass fitting DLG III B, order no. 914956
- Bypass fitting mounting kit for DLG III, order no. 815079
- Two-wire measuring line (2 x 0.24 mm^2, Ø 4 mm), order no. 725122
- DULCOMETER® simulator, order no. 1004042
- Sampling tap 25 mm, order no. 1004739
- Magnetic stirrer, 100 - 240 V, 50 - 60 Hz, order no. 790915
- Magnetic stirring rod, 15 x 6 mm, PTFE, order no. 790917
- Mounting bracket for magnetic stirrer, PVC, incl. screws with threaded sockets, order no. 1000166

13 Directives / standards adhered to

EC directives:

- EC EMC Directive (2004/108/EC)

International standards:

- EN 61010-1
- EN 60335-1
- EN 60529
- EN 61326-1

You will find the EC Declaration of Conformity to download on our homepage.

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