dSolvotrode

6.00203.300

Sensor leaflet

8.0109.8004EN / v11 / 2023-03-31

Metrohm

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Technical Communication
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This documentation has been prepared with great care. However, errors can never be entirely ruled out. Please send comments regarding possible errors to the address above.

Disclaimer

Deficiencies arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc., are expressly excluded from the warranty. Unauthorized modifications to the product (e.g. conversions or attachments) exclude any liability on the part of the manufacturer for resulting damage and its consequences. Instructions and notes in the Metrohm product documentation must be strictly followed. Otherwise, Metrohm's liability is excluded.

Table of contents

1 Overview

1.1 dSolvotrode – Product description

The dSolvotrode is a combined pH electrode for nonaqueous acid-base titrations. The dSolvotrode is a dTrode (digital electrode) for OMNIS.

1.2 dSolvotrode – Overview

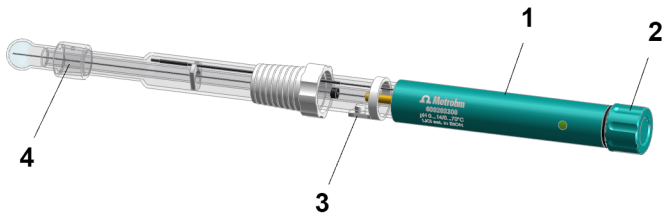


Figure 1 dSolvotrode

1	**Electrode head**	**2**	**Protective cap**
3	**Filler opening**	**4**	**Ground-joint diaphragm** Flexible.

2 Functional description

2.1 pH electrode – Functional description

The glass membrane of the pH electrode consists of a silicate framework containing lithium ions. When the glass surface is immersed in an aqueous solution, then a thin hydrated layer (gel layer) forms on the outside and inside of the glass surface.

Because the proton concentration in the internal buffer of the pH electrode is constant (pH 7), a stationary condition arises on the internal side of the glass membrane. If the proton concentration in the measuring solution changes, an ion exchange takes place in the outer hydrated layer, thus leading to a change of potential on the glass membrane. Only when this ion exchange has reached a stationary condition, the potential of the pH electrode is also constant.

3 Delivery and packaging

3.1 Delivery

Inspect the delivery immediately upon receipt:

- Check the delivery against the delivery note to ensure completeness.
- Check the product for damage.
- If the delivery is incomplete or damaged, contact your regional Metrohm representative.

3.2 Packaging

The product and accessories are supplied in protective special packaging. Keep this packaging to ensure safe transportation of the product. If a transport locking device is present, keep this as well for future reuse.

3.3 Unpacking and assessing the dSolvotrode

1 Unpacking the electrode

Remove the electrode with storage vessel from the packaging.

2 Removing the storage vessel

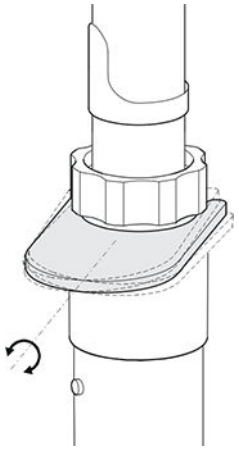


Figure 2 Releasing the electrode from the storage vessel

- Hold the electrode and storage vessel firmly in your hand so that the electrode cannot slip away.
- Position the tool between the storage vessel and SGJ sleeve.

- **Carefully** push the tool to the side to release the electrode.
  Do not tip the tool forwards!

  Avoid applying excess pressure to the tool. Otherwise, the electrode could be released too abruptly.

3 **Checking the electrode for proper function**

- **Preparing the electrode:**
  (see "", chapter , page 0)
- **Conditioning the electrode:**
  (see "Regenerating the dSolvotrode", chapter 4.1, page 5)
- **Calibrating the electrode:**
  (see "Calibrating the dSolvotrode", chapter 4.2, page 5)

Defective electrodes must be sent back for warranty processing within 2 months (starting from the day of delivery).

3.4 Storing the dSolvotrode

CAUTION

Property damage caused by dried out sensor

Destruction of the sensor due to drying out.

- Do not let the sensor dry out.
- Follow the storage instructions.

The electrode head must be stored as follows to protect it from water, solvents, dust and mechanical influences:

1 Screw the protective cap *(1-**2**)* onto the electrode head *(1-**1**)*.

2 Store the electrode in the storage vessel. When doing so, ensure that the electrode above the flexible ground-joint diaphragm *(1-**4**)* is immersed in the storage solution.

Use the reference electrolyte as a storage solution.

3 Close the filler opening *(1-**3**)*.

4 Operation and control

4.1 Regenerating the dSolvotrode

1. Open the filler opening *(1-**3**)* of the electrode.
2. Immerse the glass membrane of the electrode in distilled water for several minutes.
3. Remove the electrode from the water.
4. Detach the ground-joint diaphragm *(1-**4**)*.
5. Let a small amount of electrolyte solution drain from the electrode.
6. Close the ground-joint diaphragm *(1-**4**)*. If necessary, refill with electrolyte.
7. Rinse the electrode with distilled water.

4.2 Calibrating the dSolvotrode

1. Rinse the electrode with distilled water.
2. **Calibrating the electrode with the first buffer**
   Immerse the electrode in buffer solution (pH 7) and start the calibration.
3. After a successful measurement, remove the electrode from the buffer and rinse it with distilled water.
4. **Calibrating the electrode with the second buffer**
   Repeat steps 2 and 3 with the second buffer.
5. **Calibrating the electrode with the third buffer, if necessary**
   Repeat steps 2 and 3 with the third buffer.
6. Use the following information to determine if the electrode meets the requirements:

- **Slope:**
  70–140%
- **pH:**
  6.7–8.7
- **Offset of potential:**
  –10 to 70 mV

5 Maintenance

5.1 dSolvotrode – Replacing the electrolyte

1. Open the filler opening *(1-**3**)*.
2. Unscrew the ground-joint diaphragm *(1-**4**)* or use a plastic pipette to empty the electrode.
3. Fill the electrode with electrolyte up to the filler opening.
4. Close the filler opening *(1-**3**)* if the electrode is not used immediately.
5. Immerse the electrode in a storage solution overnight.

   Then, the electrode is ready for use again.

The Solvotrode must not be filled with lithium perchlorate in glacial acetic acid. This electrolyte corrodes the seals in the electrode head and causes a short circuit.

5.2 Cleaning the dSolvotrode

Clean the electrode regularly to ensure a good electrolyte outflow during the measurement.

Never treat the electrode in an ultrasonic bath. The electrode could become damaged.

1. Detach the ground-joint diaphragm *(1-**4**)*.
2. Let a small amount of electrolyte solution drain from the electrode.
3. Close the ground-joint diaphragm *(1-**4**)*.
4. Fill the electrode with the new electrolyte solution up to the filler opening.

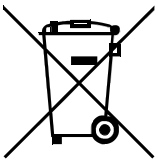
If the electrode is contaminated with oil products:

- Clean the electrode with a suitable solvent between measurements and before storage.
- Then rinse the electrode with ethanol and condition it with distilled water for a few minutes.

6 Troubleshooting

Problem	Cause	Remedy
The diaphragm is jammed	The electrolyte in the storage vessel has evaporated.	Immerse the electrode in hot water (max. 70 °C). Optionally, add some dishwashing detergent to the water.
Slow response	Electrostatic charge	Do not dab the glass membrane with a towel.
	Solid deposits on membrane surface	Clean the electrode with a solvent/strong acid.
Zero point shift	The electrode was in dry storage	Store the electrode in water overnight.
	Solid deposits on membrane surface	Clean the electrode with a solvent/strong acid.
	Reference system contaminated or dried out	Clean the reference system with a reference electrolyte and refill it. Then, store the electrode in the corresponding storage solution.
	Ground-joint diaphragm contaminated	Loosen the ground-joint diaphragm and clean it mechanically.
Slope too low	Solid deposits on membrane surface	Clean the electrode with a solvent/strong acid.
	Reference system contaminated or dried out	Clean the reference system with a reference electrolyte and refill it. Then, store the electrode in the corresponding storage solution.
	Ground-joint diaphragm contaminated	Loosen the ground-joint diaphragm and clean it mechanically.
Reduced sensitivity	Hydrated layer of the glass membrane destroyed by nonaqueous solvent.	Soak the glass membrane as described.

7 pH electrode – Disposal



This product is covered by European Directive, WEEE – Waste Electrical and Electronic Equipment.

The correct disposal of the old product reduces negative effects on the environment and public health.

1 Draining the electrolyte

Detach the ground-joint diaphragm and let the electrolyte drain.

2 Disposing of the electrolyte

Dispose of the electrolyte in accordance with the legal provisions.

3 Disposing of the electrode

Put the electrode in electronic waste recycling.

Local authorities, waste disposal companies or dealers provide more detailed information on disposal.

8 Technical specifications

8.1 Ambient conditions

Nominal function range	+5 to +45 °C	at max. 80% relative humidity, non-condensing
Storage	+5 to +45 °C	

8.2 pH electrode – Dimensions

Measurements

Shaft diameter	12 mm
Maximum installation length	125 mm

8.3 pH electrode – Housing

Materials

Shaft material	Glass

8.4 pH electrode – Connectors specifications

Connector	Metrohm plug-in head Q

8.5 dTrodes – Display specifications

Status display	LED	green-red

8.6 dSolvotrode – Measurement specifications

pH range	0–14
Temperature range	0–70 °C
Minimum immersion depth	30 mm

8.7 dTrode – Analog measurement connection

Potentiometric

Measuring range	–1,900 to +1,900 mV	
Resolution	1.28 µV	
Measuring accuracy	±0.5 mV	in the measuring range –1,900 mV to +1,900 mV
Input resistance	≥ $1*10^{12}$ Ω	
Offset current	≤ ±$1*10^{-12}$ A	

Temperature

Pt1000		
Measuring range	–150 to +250 °C	
Resolution	approx. 0.002 °C	
Measuring accuracy	±0.4 °C	in the measuring range –20.0 to +150.0 °C

Reference conditions

Relative humidity	≤60%	
Ambient temperature	+25 °C (±3 °C)	
Instrument status		min. 30 minutes in operation

Measuring accuracy	applies for all measuring ranges without sensor error, under reference conditions, measuring interval 100 ms

Valid for the measurement contacts of the analog measurement connection installed in the sensor. These connections are not accessible after installation.