

# dSolvotrode



6.00203.300

Sensor leaflet

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## **dSolvotrode**

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# 1 Overview

## 1.1 dSolvotrode – Product description

The dSolvotrode is a combined pH electrode for nonaqueous acid-base titrations.

## 1.2 dSolvotrode – Overview

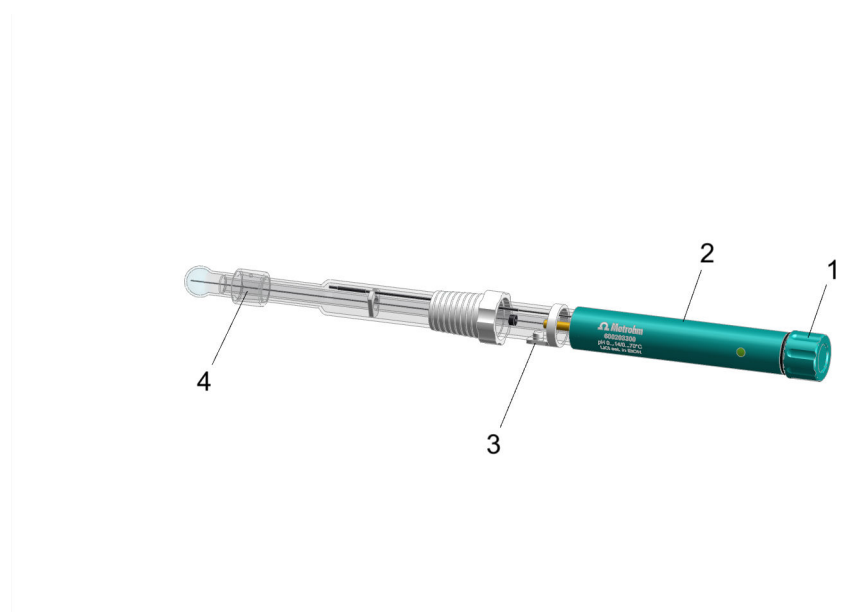


Figure 1 dSolvotrode

**1 Protective cap**

**3 Filler opening**

**2 Electrode head**

**4 Ground-joint diaphragm**  
Flexible.

## 2 Functional description

## 2.1 dSolvotrode – Functional description

The glass membrane of the dSolvotrode 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 dSolvotrode 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 dSolvotrode is also constant.



## 3 Transport and storage

### 3.1 Electrode – Checking the delivery

Immediately upon arrival of the merchandise, check the shipment to ensure absence of damage.

### 3.2 Electrode – Storing the packaging

The product is supplied in extremely protective special packaging. Keep this packaging, as only this ensures safe transportation of the product.

### 3.3 Unpacking and inspecting the electrode

#### 1 Unpacking the electrode

Remove the electrode with storage vessel from the packaging.

#### 2 Removing the storage vessel

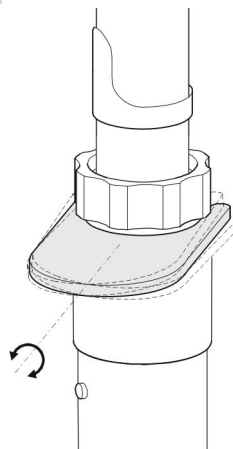


Figure 2 Releasing the electrode from the storage vessel

- 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!**



## NOTICE

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

### 3 Inspecting the electrode for proper function

- **Preparing the electrode:**  
*Preparing the dSolvotrode (see chapter 4.1, page 6)*
- **Conditioning the electrode:**  
*Regenerating the dSolvotrode (see chapter 5.1, page 9)*
- **Calibrating the electrode:**  
*Calibrating the dSolvotrode (see chapter 5.2, page 9)*



## NOTICE

Defective electrodes must be sent back for warranty processing within two 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 (1-1) onto the electrode head (1-2).
- 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.



## NOTICE

Use the reference electrolyte as a storage solution.

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

## 4 Installation

## 4.1 Preparing the dSolvotrode

## 1 Filling with reference electrolyte

Open the closure of the filler opening (1-3) and, if necessary, fill reference electrolyte up to the filler opening.

## 2 Rinsing the electrode



## CAUTION

## Property damage caused by electrostatic charge

Useless measurement results due to electrostatically charged electrode and damage through mechanical treatment.

- Never dab the electrode membrane dry.

Rinse the electrode with distilled water.

### 3 Connecting the electrode

- Unscrew the protective cap (1-1).
- Position the cable connection on the electrode head such that the slot in the cable connection is on the guide lug of the electrode head.
- Push the socket in the cable connection into the plug inside the electrode head.
- Push the outer ring of the cable connection over the electrode head.

Ensure that the guide lugs in the electrode head are in the grooves of the cable connection.

- Push the cable connection onto the electrode head until it snaps in place.



## NOTICE

To remove the cable, first release the outer ring and then carefully pull the cable connection from the electrode head.

When doing so, be sure not to pull on the cable itself but the cable connector instead.

## 4.2 Mounting the electrode



The electrode must sit securely in the titration head.



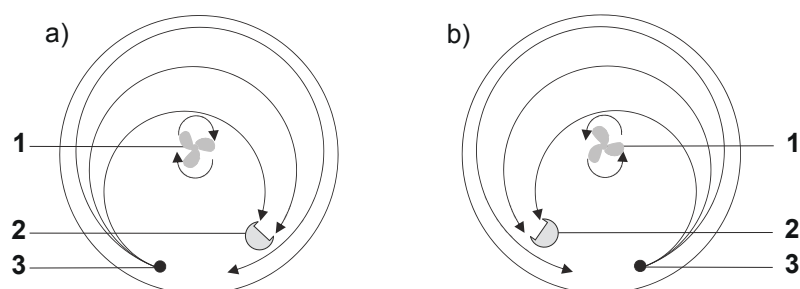
## NOTICE

For automatic procedures, ensure that the cables have enough room to move.

During the titration, it is important that the solution is mixed well. The stirring rate should be high enough to form a small vortex. If the stirring rate is too high, then air bubbles will be aspirated. These may result in incorrect measured values. If the stirring rate is too low, then the solution is only mixed slowly and the reaction time or titration time increases accordingly.

In order for the measurement to be taken in a well-mixed solution after the addition of the titrant, the titration tip should be positioned where tur-

bulence is high. Furthermore, the distance between the addition of the titrant and the electrode should be as large as possible. Therefore, take into account the stirring direction (counterclockwise or clockwise) when positioning the electrode and titration tip.



*Figure 3* Diagrams showing rod stirrer, electrode and titration tip during a titration. a) clockwise stirring direction, b) counterclockwise stirring direction.

<b>1</b>	<b>Rod stirrer</b>	<b>2</b>	<b>Electrode</b>
<b>3</b>	<b>Titration tip</b>		

## 5 Operation and control

### 5.1 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.

### 5.2 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 - 70 mV



## 6 Maintenance

### 6.1 dSolvotrode – Changing/refilling 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.



#### CAUTION

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.

### 6.2 Cleaning the dSolvotrode

The electrode should be cleaned regularly to ensure a good electrolyte draining rate during the measurement.

- 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.



## NOTICE

Do not treat the electrode in ultrasonic baths! The electrode could become damaged.



## NOTICE

If the electrode is contaminated with oil products, clean the electrode with a suitable solvent between measurements and before storage.

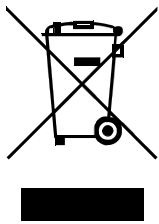
Then rinse the electrode with ethanol and condition it with distilled water for a few minutes.



## 7 Troubleshooting

Problem	Cause	Remedy
<b>Reduced sensitivity</b>	<i>Hydrated layer of the glass membrane destroyed by nonaqueous solvent.</i>	Soak the glass membrane as described.
<b>Slope too low</b>	<i>Solid deposits on membrane surface</i>	Clean the electrode with a solvent/strong acid.
	<i>Reference system contaminated or dried out</i>	Clean the reference system with a reference electrolyte and refill it. Then, store the electrode in the corresponding storage solution.
	<i>Ground-joint diaphragm contaminated</i>	Loosen the ground-joint diaphragm and clean it mechanically.
<b>Slow response</b>	<i>Electrostatic charge</i>	Do not dab the glass membrane with a towel.
	<i>Solid deposits on membrane surface</i>	Clean the electrode with a solvent/strong acid.
<b>Zero point shift</b>	<i>The electrode was in dry storage</i>	Store the electrode in water overnight.
	<i>Solid deposits on membrane surface</i>	Clean the electrode with a solvent/strong acid.
	<i>Reference system contaminated or dried out</i>	Clean the reference system with a reference electrolyte and refill it. Then, store the electrode in the corresponding storage solution.
	<i>Ground-joint diaphragm contaminated</i>	Loosen the ground-joint diaphragm and clean it mechanically.

## 8 dSolvotrode – Disposal



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

The correct disposal of your old instrument will help to prevent negative effects on the environment and public health.

Proceed as follows to dispose of the electrode:

### 1 Draining the electrolyte

Detach the ground-joint diaphragm (*1-4*) 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.

More details about the disposal of your old product can be obtained from your local authorities, from waste disposal companies or from your local dealer.



## 9.5 dSolvotrode – Display specifications

<b>Status display</b>	LED	green - red
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## 9.6 dSolvotrode – Measurement specifications

<b>pH range</b>	0 - 14
<b>Temperature range</b>	0 - 70 °C
<b>Minimum immersion depth</b>	30 mm