dUnitrode

6.00200.300

Sensor leaflet

8.0109.8001EN / 2020-08-31

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Table of contents

1 Overview

1.1 dUnitrode – Product description

The dUnitrode is a combined pH glass electrode with a Pt1000 temperature sensor for measurements and titrations in difficult samples and at high temperatures.

1.2 dUnitrode – Overview

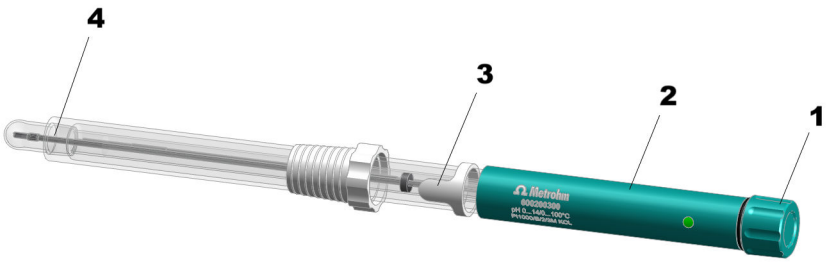


Figure 1 dUnitrode

1	**Protective cap**	**2**	**Electrode head**
3	**Filler opening**	**4**	**Fixed ground-joint diaphragm**

2 Functional description

2.1 dUnitrode – Functional description

The glass membrane of the dUnitrode 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 dUnitrode 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 dUnitrode 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

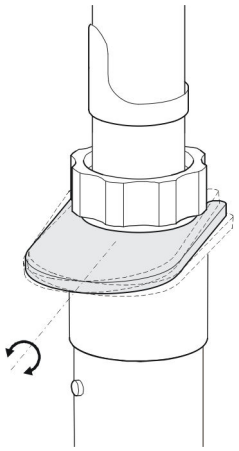


Figure 2 Releasing the electrode from the storage vessel

- 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 dUnitrode (see chapter 4.1, page 6)
- **Calibrating the electrode:**
  Calibrating the dUnitrode (see chapter 5.1, 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 dUnitrode

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 is immersed in the storage solution via the fixed ground-joint diaphragm *(1-**4**)*.

NOTICE

We recommend storing electrodes with
3 mol/L of potassium chloride as a reference electrolyte in the storage solution (6.2323.000). This prevents the glass membrane from aging and the electrode can be used without prior conditioning.

The storage solution may only be used for this electrolyte; we recommend to store all other electrolytes in the reference electrolyte.

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

4 Installation

4.1 Preparing the dUnitrode

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.
- Rotate the outer ring 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.

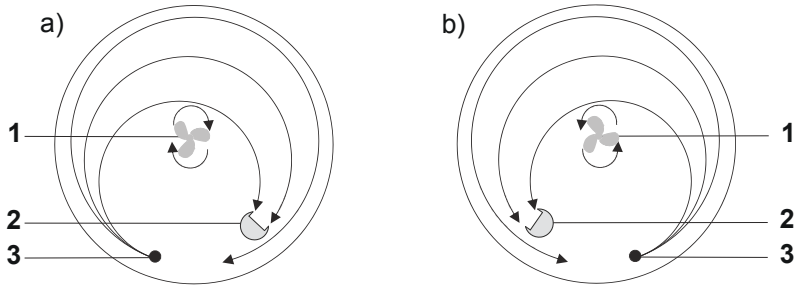


Figure 3 Diagrams showing rod stirrer, electrode and titration tip during a titration. a) clockwise stirring direction, b) counterclockwise stirring direction.

1 Rod stirrer	**2 Electrode**
3 Titration tip	

5 Operation and control

5.1 Calibrating the dUnitrode

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:**
  95 %...103 %
  pH:
  6.5...7.5
- **Offset of potential:**
  –30 - 30 mV

6 Maintenance

6.1 dUnitrode – Changing/refilling the electrolyte

1. Open the filler opening *(1-**3**)*.
2. Use a plastic pipette to drain the reference electrolyte from the electrode.
3. Rinse the inside of the electrode with the new electrolyte and empty it again.
4. Fill the electrode with electrolyte up to the filler opening.
5. Close the filler opening *(1-**3**)* if the electrode is not used immediately.
6. Immerse the electrode in a storage solution overnight.

   Then, the electrode is ready for use again.

6.2 Cleaning the dUnitrode

1. Rinse the electrode with distilled water.

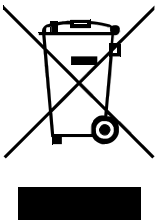
NOTICE

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

7 Troubleshooting

Problem	Cause	Remedy
Slope too low	*Solid deposits on membrane surface*	Clean the electrode with a solvent/strong acid.
	Deposition of proteins on membrane surface	Clean the electrode with 5% pepsin in 0.1 mol/L of HCl.
	Reference system contaminated or dried out	Clean the reference system with a reference electrolyte and refill it. Then, store the electrode in storage solution.
	Ground-joint diaphragm contaminated	Clean the electrode with pHit kit (6.2325.000).
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.
	Deposition of proteins on membrane surface	Clean the electrode with 5% pepsin in 0.1 mol/L of HCl.
Zero point shift	*The electrode was in dry storage*	Store the electrode in a storage solution overnight.
	Solid deposits on membrane surface	Clean the electrode with a solvent/strong acid.
	Deposition of proteins on membrane surface	Clean the electrode with 5% pepsin in 0.1 mol/L of HCl.
	Reference system contaminated or dried out	Clean the reference system with a reference electrolyte and refill it. Then, store the electrode in storage solution.
	Ground-joint diaphragm contaminated	Clean the electrode with pHit kit (6.2325.000).

8 Electrode – 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

Use a plastic pipette to remove the electrolyte from the electrode.

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 Technical specifications

9.1 Ambient conditions

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

9.2 dUnitrode – Dimensions

Measurements

Shaft diameter	12 mm
Maximum installation length	125 mm

9.3 dUnitrode – Housing

Materials

Shaft material	Glass

9.4 dUnitrode – Connectors specifications

Connector	Metrohm plug-in head Q

9.5 dUnitrode – Display specifications

Status display	LED	green - red

9.6 dUnitrode – Measurement specifications

pH range	0 - 14
Temperature range	
Short term	0 - 100 °C
Long term	0 - 80 °C
Minimum immersion depth	20 mm