

dAquatrode Plus



6.00202.300

Sensor leaflet

8.0109.8003EN / 2020-08-31



Metrohm AG
Ionenstrasse
CH-9100 Herisau
Switzerland
Phone +41 71 353 85 85
Fax +41 71 353 89 01
info@metrohm.com
www.metrohm.com

dAquatrode Plus

6.00202.300

Sensor leaflet

8.0109.8003EN /
2020-08-31

Technical Communication
Metrohm AG
CH-9100 Herisau
techcom@metrohm.com

This documentation is protected by copyright. All rights reserved.

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.

Table of contents

1	Overview	1
1.1	dAquatrode Plus – Product description	1
1.2	dAquatrode – Overview	1
2	Functional description	2
2.1	dAquatrode Plus – Functional description	2
3	Transport and storage	3
3.1	Electrode – Checking the delivery	3
3.2	Electrode – Storing the packaging	3
3.3	Unpacking and inspecting the electrode	3
3.4	Storing the dAquatrode Plus	4
4	Installation	6
4.1	Preparing the dAquatrode Plus	6
4.2	Mounting the electrode	7
5	Operation and control	9
5.1	Calibrating the dAquatrode Plus	9
6	Maintenance	10
6.1	dAquatrode Plus – Changing/refilling the electrolyte	10
6.2	Cleaning the dAquatrode Plus	10
7	Troubleshooting	11
8	Electrode – Disposal	12
9	Technical specifications	13
9.1	Ambient conditions	13
9.2	dAquatrode Plus – Dimensions	13
9.3	dAquatrode Plus – Housing	13
9.4	dAquatrode Plus – Connectors specifications	13
9.5	dAquatrode Plus – Display specifications	14
9.6	dAquatrode Plus – Measurement specifications	14

1 Overview

1.1 dAquatrode Plus – Product description

The dAquatrode Plus is a combined pH glass electrode with Pt1000 temperature sensor for measurements in ion-deficient, aqueous solutions.

1.2 dAquatrode – Overview

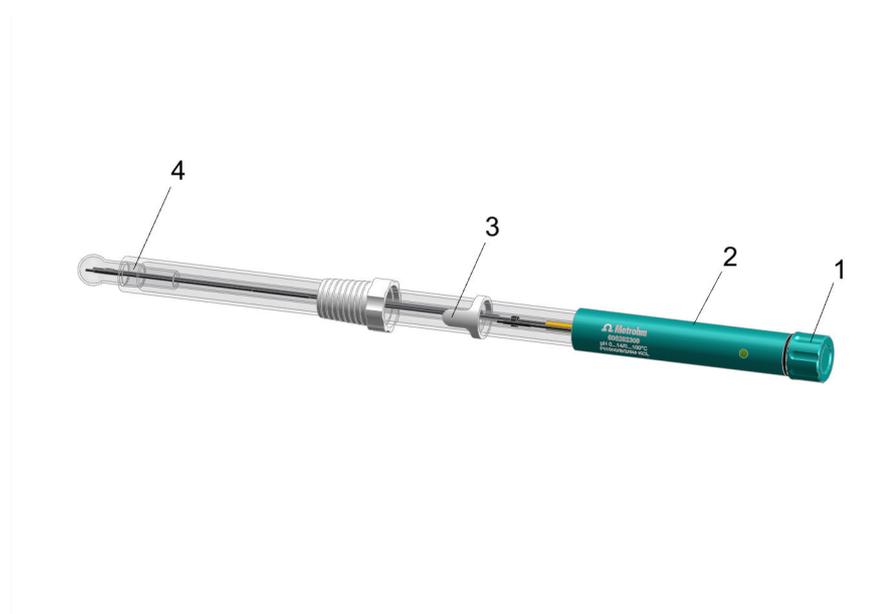


Figure 1 dAquatrode

1 Protective cap

3 Filler opening
For bridge electrolyte

2 Electrode head

4 Fixed ground-joint diaphragm



2 Functional description

2.1 dAquatrode Plus – Functional description

The glass membrane of the dAquatrode Plus 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 dAquatrode Plus 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 dAquatrode Plus 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

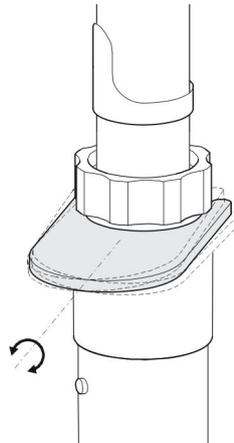


Figure 2 Releasing the electrode from the storage vessel

- 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 dAquatrode Plus (see chapter 4.1, page 6)
- **Calibrating the electrode:**
Calibrating the dAquatrode Plus (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 dAquatrode Plus

**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 bridge 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 bridge electrolyte.

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



4 Installation

4.1 Preparing the dAquatrode Plus

1 Filling with bridge electrolyte

Open the closure of the filler opening (1-3) and, if necessary, fill the bridge 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.

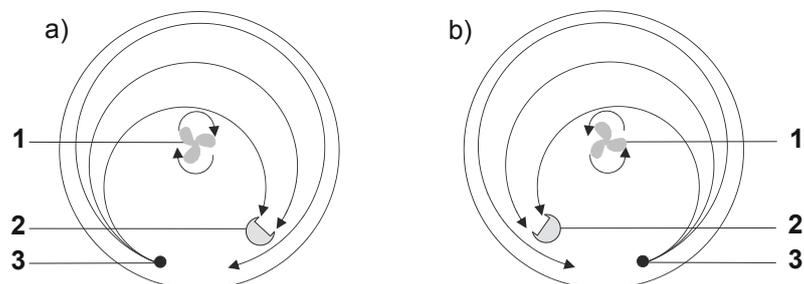


Figure 3 Diagrams showing rod stirrer, electrode and titration tip during a titration. a) clockwise stirring direction, b) counterclockwise stirring direction.

1 Rod stirrer

2 Electrode

3 Titration tip

5 Operation and control

5.1 Calibrating the dAquatrode Plus

- 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 dAquatrode Plus – Changing/refilling the electrolyte

- 1 Open the filler opening (1-3).
- 2 Use a plastic pipette to drain the bridge 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 dAquatrode Plus

- 1 Rinse the electrode with distilled water.



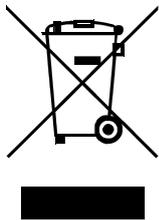
NOTICE

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

7 Troubleshooting

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

Measurements

<i>Shaft diameter</i>	12 mm
<i>Maximum installation length</i>	125 mm

9.3 dAquatrode Plus – Housing

Materials

<i>Shaft material</i>	Glass
-----------------------	-------

9.4 dAquatrode Plus – Connectors specifications

Connector	Metrohm plug-in head Q
-----------	---------------------------

