

dAg ring electrode



6.00402.300

Sensor leaflet

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1 Overview

1.1 dAg ring electrode – Product description

The dAg ring electrode is a combined metal electrode for precipitation titrations with alteration of the pH value. The dAg ring electrode is a dTrode (digital electrode) for OMNIS.

1.2 dAg ring electrode – Overview

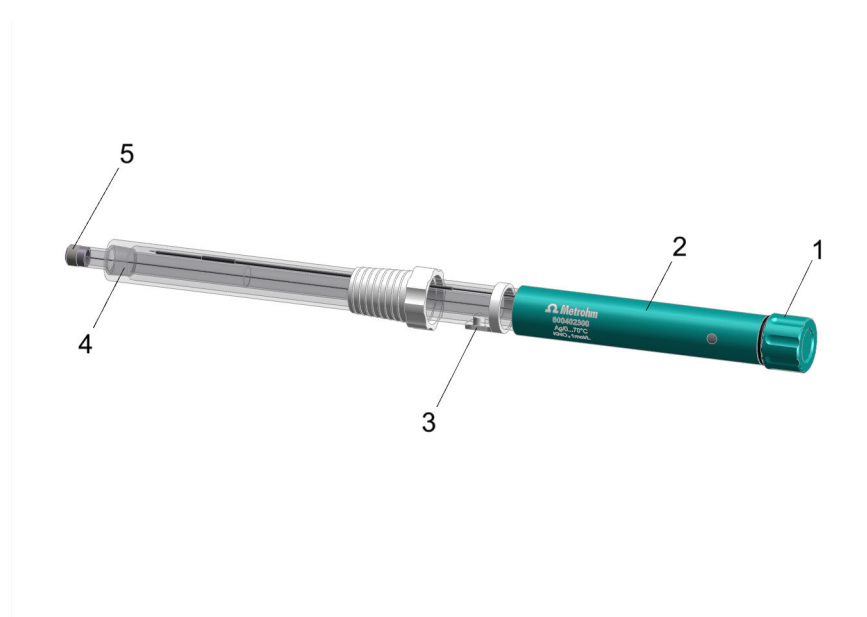


Figure 1 dAg ring electrode

1	Protective cap	2	Electrode head
3	Filler opening	4	Diaphragm
5	Metal ring		



2 Functional description

2.1 Ag metal electrode – Functional description

Ag metal electrodes have a bare metal surface that is exposed to the solution. If the sample solution contains ions of this metal, an equilibrium develops on the surface of the metal that depends on the concentration of the metal ions.

Metal ions are taken up by the metal surface and simultaneously released into the solution. This concentration-dependent equilibrium is characterized by a corresponding potential (Galvani potential).

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 sensor

NOTICE

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

i Defective sensors must be sent back for warranty processing within two months (starting from the day of delivery).

Required accessories:

- Tool for fixed sensors (included)

1 Unpacking the sensor

Remove the sensor with storage vessel from the packaging.

2 Removing the storage vessel

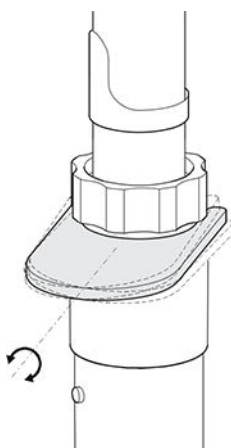


Figure 2 Loosening the sensor from the storage vessel

- Hold the sensor and storage vessel firmly in your hand so that the sensor cannot slip away.
- Position the tool between the storage vessel and the ground-joint sleeve.
- **Carefully** push the tool to the side to release the sensor.
Do not tip the tool forwards!

3 Checking the sensor for proper function

- **Preparing the sensor:**
(see "Preparing the dAg ring electrode", chapter 4.1, page 6)
- **Checking the electrode:**
(see "Assessing a metal electrode", chapter 5.2, page 9)

3.4 Storing the dAg ring electrode

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 diaphragm (1-4) is immersed in the corresponding storage solution.
 - i** We recommend using the reference electrolyte as a storage solution.
- 3 Close the filler opening (1-3).

.....

 Always store the electrode in the storage solution.

- i** 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.

- i** 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 turbulence 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.

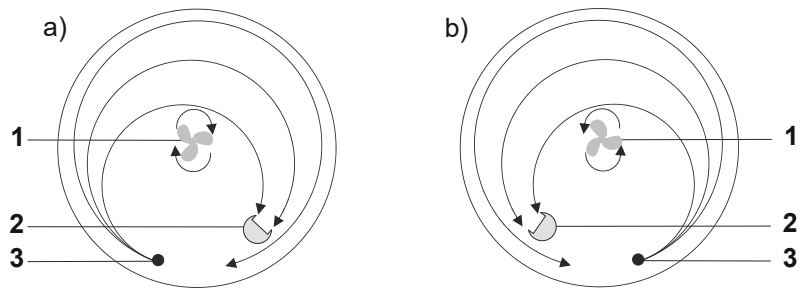


Figure 3 Diagrams showing rod stirrer, electrode and titration tip during a titration. a) clockwise stirring direction, b) counterclockwise stirring direction.

1 Rod stirrer

2 Electrode

3 Titration tip

5 Maintenance

5.1 Metal electrode – Changing/refilling the electrolyte

- 1 Open the filler opening.
- 2 Use a plastic pipette to empty the electrode.
- 3 Rinse the inside of the electrode with the new electrolyte.
- 4 Fill the electrode with electrolyte up to the filler opening.
- 5 Close the filler opening if the electrode is not used immediately.
- 6 Immerse the electrode in electrolyte solution overnight.
Then, the electrode is ready for use again.

5.2 Assessing a metal electrode

Carrying out a standard titration

- 1 Fill a 100-mL beaker with 50 mL of deionized water.
- 2 Add 2 mL of hydrochloric acid ($c=0.1$ mol/L).
- 3 While stirring this mixture, titrate it with silver nitrate ($c=0.1$ mol/L) under the following conditions:

Method	DET U
Dosing rate	Max.
Signal drift	50 mV/min
Min. waiting time	0 s
Max. waiting time	26 s
Measuring point distance	4
Min. increment	10.0 μ L



Dosing rate	Max.
Stop volume	3 mL
Stop EP	9
Filling rate	Max.
EP criterion	5
EP recognition	All

4 Compare the measurement result with the following specifications:

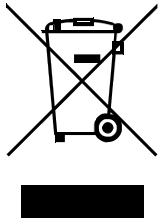
- **Consumption (EP) [mL]:**
1.95–2.05
- **Potential jump [mV]:**
 $\Delta U_{90-110\%} > 70 \text{ mV}$
- **Titration time [s]:**
approx. 150

i If the measurement result does not correspond to the specifications, clean the electrode and run the test again. If titration times are excessive, the stirring rate and the arrangement of the stirrer, pipetting tip and electrode should be checked.

6 Troubleshooting

Problem	Cause	Remedy
Slow response	The Ag layer is passivated by the deposition of silver halide, silver sulfide and silver oxide.	Clean the metal ring with toothpaste or a polishing set (6.2802.000) or immerse the electrode in concentrated NH_3 .

7 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.

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 Metal electrode – Dimensions

Measurements

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

8.3 Metal electrode – Housing

Materials

<i>Shaft material</i>	Glass
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8.4 Metal electrode – Connectors specifications

Connector	Metrohm plug-in head Q
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8.5 dTrodes – Display specifications

Status display LED green-red

8.6 dAg ring electrode – Measurement specifications

pH range 0–14

Temperature range 0–70 °C

Minimum immersion depth 20 mm

8.7 dTrode – Analog measurement connection

Potentiometric

Measuring range –1,900 to +1,900 mV

Resolution 1.28 μ V

Measuring accuracy ± 0.5 mV in the measuring range
–1,900 mV to +1,900 mV

Input resistance $\geq 1 \cdot 10^{12} \Omega$

Offset current $\leq \pm 1 \cdot 10^{-12}$ 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 $\leq 60\%$

Ambient temperature +25 °C (± 3 °C)

Instrument status min. 30 minutes in
operation

