

# dAg ring electrode



6.00402.300

Sensor leaflet

8.0109.8008EN / 2020-08-31





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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.

## 1.2 dAg ring electrode – Overview

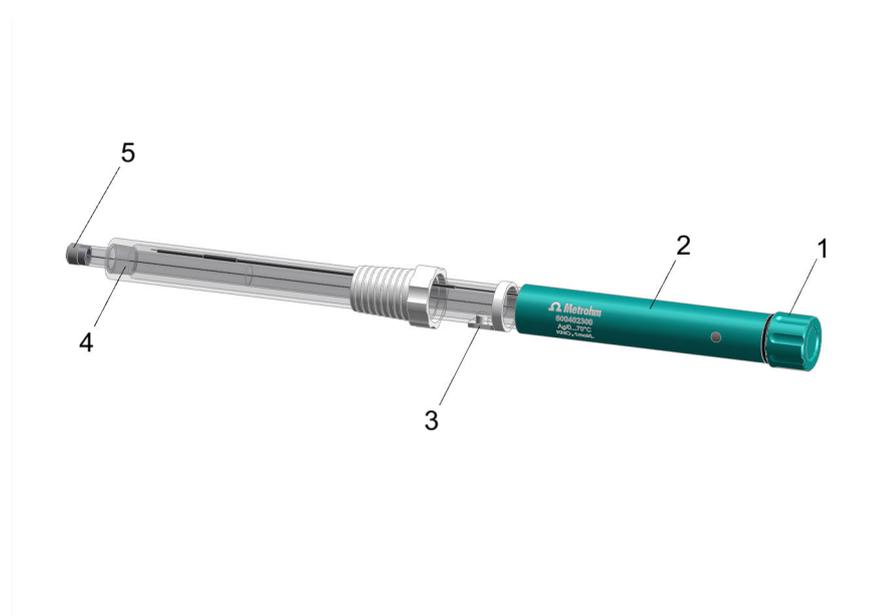


Figure 1 dAg ring electrode

**1 Protective cap**

**3 Filler opening**

**5 Metal ring**

**2 Electrode head**

**4 Diaphragm**



## 2 Functional description

### 2.1 dAg ring 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 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 checking the electrode

#### 1 Unpacking the electrode

Remove the electrode with storage vessel from the packaging.

#### 2 Removing the storage vessel

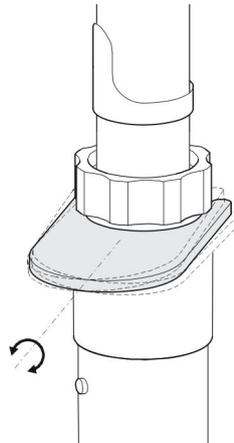


Figure 2 Releasing the electrode from the storage vessel

- 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 Checking the electrode for proper function**

- **Preparing the electrode:**  
*Preparing the dAg ring electrode (see chapter 4.1, page 5)*
- **Checking the electrode:**  
*Checking the dAg ring electrode (see chapter 5.2, page 8)*

**NOTICE**

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

## 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.

**NOTICE**

We recommend using the reference electrolyte as a storage solution.

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

**NOTICE**

Always store the electrode in the storage solution.

## 4 Installation

### 4.1 Preparing the dAg ring electrode

#### 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 Cleaning the electrode

- Rinse the electrode with distilled water.
- If there is excess contamination on the metal ring, clean it with a moist towel and toothpaste or with the polishing set (6.2802.000).
- If necessary, use a suitable solvent to degrease the electrode.



#### NOTICE

The electrode should be rinsed before each measurement.  
Frequent abrasive cleaning is not recommended.

#### 3 Cleaning a diaphragm that is clogged with silver chloride

- Close the filler opening (1-3).
- Immerse the electrode in a concentrated ammonia solution or 7% thiourea solution in 0.1 mol/L of HCl for approximately 2 hours.
- Rinse the electrode with distilled water.
- Refill with 1 mol/L of  $\text{KNO}_3$  as a reference electrolyte.
- Immerse the electrode in 1 mol/L of  $\text{KNO}_3$  for several hours.

#### 4 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 stops and 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 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.

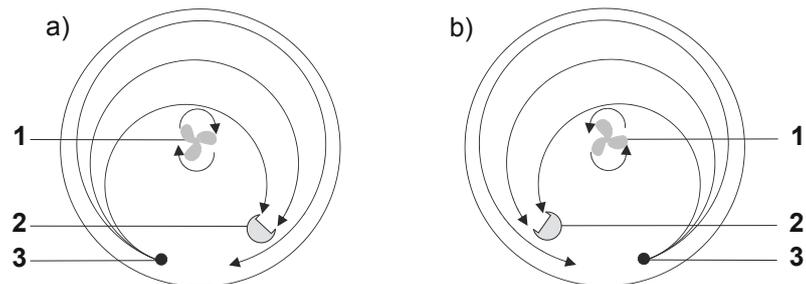


Figure 3 Diagrams showing rod stirrer, electrode and titration tip during a titration. a) clockwise stirring direction, b) counterclockwise stirring direction.

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**1 Rod stirrer**

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**2 Electrode**

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**3 Titration tip**

## 5 Maintenance

### 5.1 dAg ring electrode – Changing/refilling the electrolyte

- 1** Open the filler opening (1-**3**).
- 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 (1-**3**) 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 Checking the dAg ring electrode

#### Using standard titration to inspect the electrode

- 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 $\mu$ 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



## NOTICE

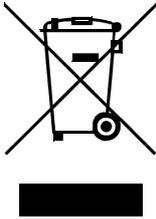
If the measurement result does not correspond to the specifications, clean the electrode and run the test again. If titration times are excessive, the stirring rate and the arrangement of the stirrer, pipetting tip and electrode should be checked.



# 6 Troubleshooting

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
<b>Slow response</b>	<i>The Ag layer is passivated by the deposition of silver halide, silver sulfide and silver oxide.</i>	Clean the metal ring with toothpaste or a polishing set (6.2802.000) or immerse the electrode in concentrated NH <sub>3</sub> .

## 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
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Storage	+5 to +45 °C
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### 8.2 dAg ring electrode – Dimensions

#### Measurements

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

### 8.3 dAg ring electrode – Housing

#### Materials

<i>Shaft material</i>	Glass
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### 8.4 dAg ring electrode – Connectors specifications

Connector	Metrohm plug-in head Q
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