dAg Titrode

6.00404.300

Sensor leaflet

8.0109.8013EN / v6 / 2023-03-31

Metrohm

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Technical Communication
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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.

Disclaimer

Deficiencies arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc., are expressly excluded from the warranty. Unauthorized modifications to the product (e.g., conversions or attachments) exclude any liability on the part of the manufacturer for resulting damage and its consequences. Instructions and notes in the Metrohm product documentation must be strictly followed. Otherwise, Metrohm's liability is excluded.

Table of contents

1 Overview

1.1 dAg Titrode – Product description

The dAg Titrode is a metal electrode for precipitation titrations without alteration of the pH value. The dAg Titrode is a dTrode (digital electrode) for OMNIS.

1.2 dAg Titrode – Overview

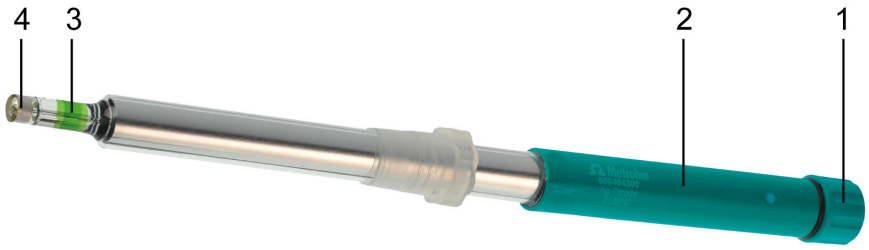


Figure 1 dAg Titrode

1	**Protective cap**	**2**	**Electrode head**
3	**Glass membrane**	**4**	**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.

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**

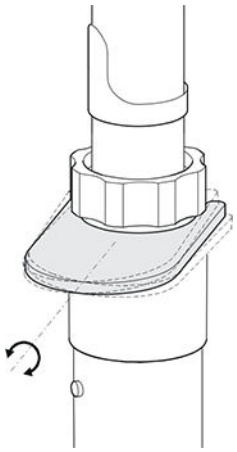


Figure 2 Loosening the sensor from the storage vessel

- 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 Titrode", chapter 4.1, page 5)
  Checking the electrode:
  (see "Assessing a metal electrode", chapter 5.1, page 8)

3.4 Storing the dAg Titrode

The electrode head must be stored as follows to protect it from water, solvents, dust and mechanical influences:

1 Screw the protective cap onto the electrode head .

2 Store the electrode in the storage vessel. When doing so, ensure that the glass membrane is immersed in the corresponding storage solution.

We recommend using distilled water as a storage solution. Always store the electrode in the storage solution.

4 Installation

4.1 Preparing the dAg Titrode

1 Cleaning the electrode

CAUTION

Property damage caused by damaged glass membrane

Electrode damage caused by damaged glass membrane

- Never touch the electrode glass membrane with your hand.
- Only treat the electrode glass membrane with a suitable detergent according to instructions.

- 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.

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

2 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.

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.

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.

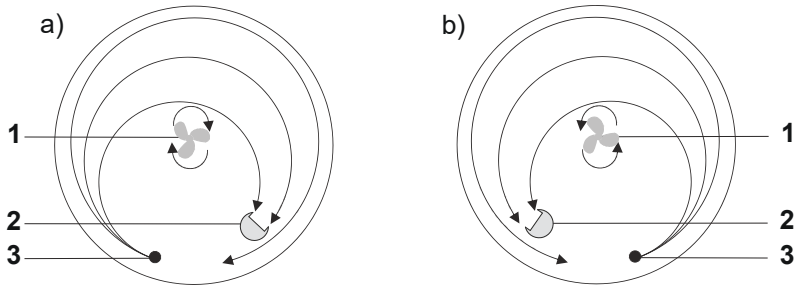


Figure 3 Diagrams showing rod stirrer, electrode and titration tip during a titration. a) clockwise stirring direction, b) counterclockwise stirring direction.

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

5 Maintenance

5.1 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 µL
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:

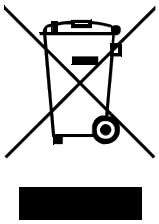
- **Consumption (EP) [mL]:**
  1.95–2.05
- **Potential jump [mV]:**
  $deltaU_{90–110\%}$ > 70 mV
- **Titration time [s]:**
  approx. 150

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 Metal 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 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

Shaft diameter	12 mm
Maximum installation length	125 mm

8.3 Metal electrode – Housing

Materials

Shaft material	Glass

8.4 Metal electrode – Connectors specifications

Connector	Metrohm plug-in head Q

8.5 dTrodes – Display specifications

Status display	LED	green-red

8.6 Metal electrode – Measurement specifications

pH range	0–14	
Temperature range	0–80 °C	
Minimum immersion depth	20 mm	

8.7 dTrode – Analog measurement connection

Potentiometric

Measuring range	–1,900 to +1,900 mV	
Resolution	1.28 µV	
Measuring accuracy	±0.5 mV	in the measuring range –1,900 mV to +1,900 mV
Input resistance	≥ $1*10^{12}$ Ω	
Offset current	≤ ±$1*10^{-12}$ 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	≤60%	
Ambient temperature	+25 °C (±3 °C)	
Instrument status		min. 30 minutes in operation

Measuring accuracy

applies for all measuring ranges without sensor error, under reference conditions, measuring interval 100 ms

Valid for the measurement contacts of the analog measurement connection installed in the sensor. These connections are not accessible after installation.