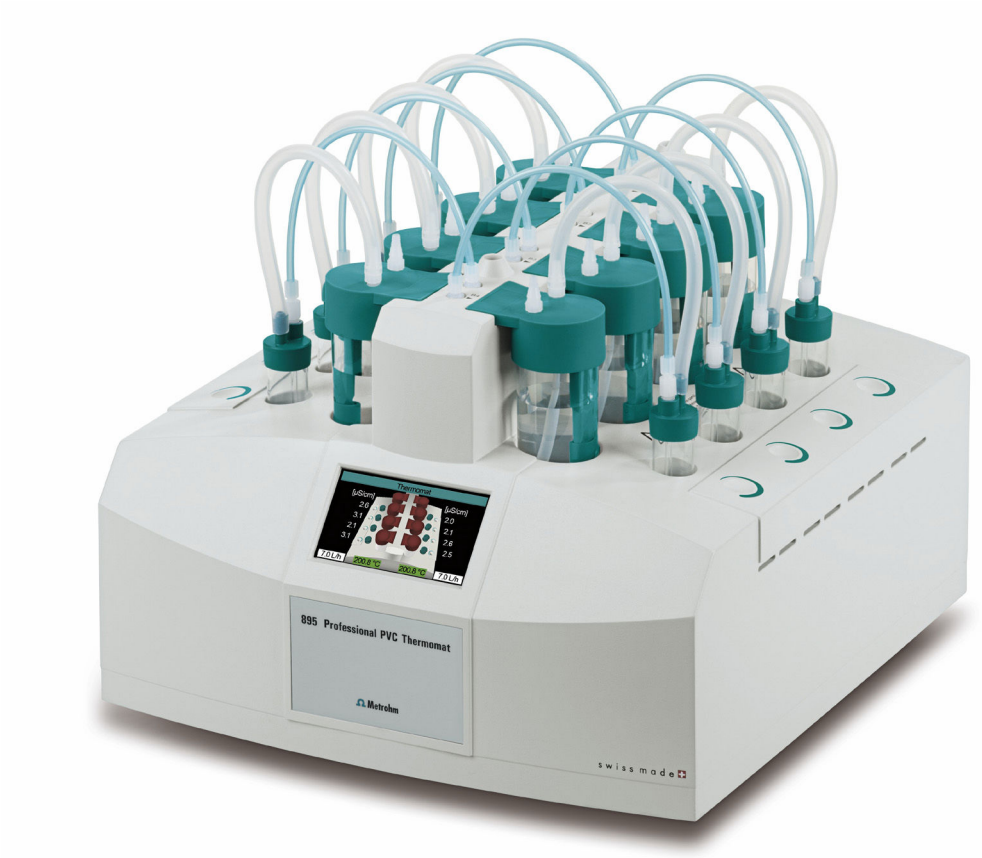
895 Professional PVC Thermomat



Manual

8.895.8001EN / v5 / 2024-01-09

Metrohm

Metrohm AG
CH-9100 Herisau
Switzerland
+41 71 353 85 85
info@metrohm.com
www.metrohm.com

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Technical Communication
Metrohm AG
CH-9100 Herisau

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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.

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1 Introduction

1.1 Device description

The 895 Professional PVC Thermomat is a computer-controlled measuring instrument for determining the thermostability of PVC.

It is equipped with two **heating blocks** each with 4 measuring positions. Each block can be heated individually, i.e., 4 samples can each be measured at two different temperatures or 8 samples at the same temperature. The measurements at the individual measuring positions can be started individually for this.

The 895 Professional PVC Thermomat is **controlled** by means of the **StabNet** computer software and a computer that is connected via the USB interface. Up to 4 instruments can be controlled and monitored by each computer, hence allowing a maximum of 32 samples to be analyzed at the same time.

StabNet determines the **stability time** fully automatically. Besides the **stability time**, the so-called **induction time** can also be determined.

The results of the determinations are saved in a database together with all method and determination data. Determinations can be searched for, sorted, filtered, exported and printed in the **Database** program part. Apart from graphically displaying single and multiple curves, the software is also capable of conducting recalculations with changed parameters and extrapolating the results to a certain temperature.

1.2 Displaying accessories

Up-to-date information on the scope of delivery and on optional accessories can be found on the Metrohm website.

1 Searching for a product on the website

- Go to *https://www.metrohm.com*.
- Click on 🔍.
- Enter the article number of the product (e.g. **2.1001.0010**) into the search field and press **[Enter]**.

The search result is displayed.

2 Displaying product information

- To display the products matching the search term, click on **Product models**.

- Click on the desired product.

Detailed information regarding the product is displayed.

3 Displaying accessories and downloading the accessories list

- To display the accessories, scroll down to **Accessories and more**.
  - The **scope of delivery** is displayed.
  - Click on **[Optional parts]** for the optional accessories.
- To download the accessories list, click on **[Download accessories PDF]** under **Accessories and more**.

NOTE

Metrohm recommends keeping the accessories list for reference purposes.

1.3 Symbols and conventions

The following symbols and formatting may appear in this documentation:

*(5-**12**)*	**Cross-reference to figure legend** The first number refers to the figure number, the second to the instrument part in the figure.
1	**Instruction step** Perform the steps one after the other.
Method	**Dialog text**, **parameter** in the software
File ▶ New	Menu or menu item
[Continue]	**Button** or **key**
	**WARNING** This symbol draws attention to a possible life-threatening hazard or risk of injury.
	**WARNING** This symbol draws attention to a possible hazard due to electrical current.
	**WARNING** This symbol draws attention to a possible hazard due to heat or hot instrument parts.

	**WARNING** This symbol draws attention to a possible biological hazard.
	**WARNING** Warning of optical radiation
	**CAUTION** This symbol draws attention to possible damage to instruments or instrument parts.
	**NOTICE** This symbol highlights additional information and tips.

2 Safety

WARNING

Operate this instrument only according to the information contained in this documentation.

This instrument left the factory in a flawless state in terms of technical safety. To maintain this state and ensure non-hazardous operation of the instrument, the following instructions must be observed carefully.

Hot reaction vessels

WARNING

The reaction vessels can become very hot.

Avoid any contact with the hot reaction vessels. Place these in the vessel holders provided for cooling down.

Flammable substances

WARNING

The heating block of the 895 Professional PVC Thermomat can be heated to 229.9 °C.

Flammable substances may ignite at such temperatures.

Adjust the oven's maximum heating temperature to the sample that is to be analyzed.

2.1 Responsibility of the operator

The operator must ensure that basic regulations on occupational safety and accident prevention in chemical laboratories are observed. The operator has the following responsibilities:

- Instruct personnel in the safe handling of the product.
- Train personnel in the use of the product according to the user documentation (e.g. install, operate, clean, eliminate faults).
- Train staff on basic occupational safety and accident prevention regulations.
- Provide personal protective equipment (e.g. protective glasses, gloves).
- Provide suitable tools and equipment to carry out the work safely.

The product may be used only when it is in perfect condition. The following measures are required to ensure the safe operation of the product:

- Check the condition of the product before use.
- Remedy defects and malfunctions immediately.
- Maintain and clean the product regularly.

2.2 Requirements for operating personnel

Only qualified personnel may operate the product. Qualified personnel are persons who meet the following requirements:

- Basic regulations on occupational safety and accident prevention for chemical laboratories are known and complied with.
- Knowledge of handling hazardous chemicals is present. Personnel have the ability to recognize and avoid potential dangers.
- Knowledge regarding the application of fire prevention measures for laboratories is available.
- Safety-relevant information is communicated and understood. The personnel can operate the product safely.
- The user documentation has been read and understood. The personnel operate the product according to the instructions in the user documentation.

2.3 Electrical safety

The electrical safety when working with the instrument is ensured as part of the international standard IEC 61010.

WARNING

Only personnel qualified by Metrohm are authorized to carry out service work on electronic components.

WARNING

Never open the housing of the instrument. The instrument could be damaged by this. There is also a risk of serious injury if live components are touched.

There are no parts inside the housing which can be serviced or replaced by the user.

Supply voltage

WARNING

An incorrect supply voltage can damage the instrument.

Only operate this instrument with a supply voltage specified for it (see rear panel of the instrument).

Protection against electrostatic charges

WARNING

Electronic components are sensitive to electrostatic charges and can be destroyed by discharges.

Do not fail to pull the power cord out of the power socket before you set up or disconnect electrical plug connections at the rear of the instrument.

2.4 Tubing and capillary connections

CAUTION

Leaks in tubing and capillary connections are a safety risk. Tighten all connections well by hand. Avoid applying excessive force to tubing connections. Damaged tubing ends lead to leakage. Appropriate tools can be used to loosen connections.

Check the connections regularly for leakage. If the instrument is used mainly in unattended operation, then weekly inspections are mandatory.

2.5 Flammable solvents and chemicals

WARNING

All relevant safety measures are to be observed when working with flammable solvents and chemicals.

- Set up the instrument in a well-ventilated location (e.g. fume cupboard).
- Keep all sources of flame far from the workplace.
- Clean up spilled liquids and solids immediately.
- Follow the safety instructions of the chemical manufacturer.

2.6 Danger from biological substances

If the instrument is used for biological hazardous substances, it must be marked in accordance with regulations.

In case of a return shipment to Metrohm or a Metrohm Service partner, the instrument or component has to be decontaminated and the hazard symbol for biological hazardous substances must be removed. A declaration of decontamination must be enclosed.

WARNING

Danger of infection and poisoning from biological hazardous substances

Poisoning from toxins and/or infections from samples contaminated with microorganisms.

- Wear protective equipment.
- Use exhaust equipment when working with vaporizing hazardous substances.
- Dispose of biologically contaminated substances properly.

3 Overview of the instrument

3.1 Front of the instrument

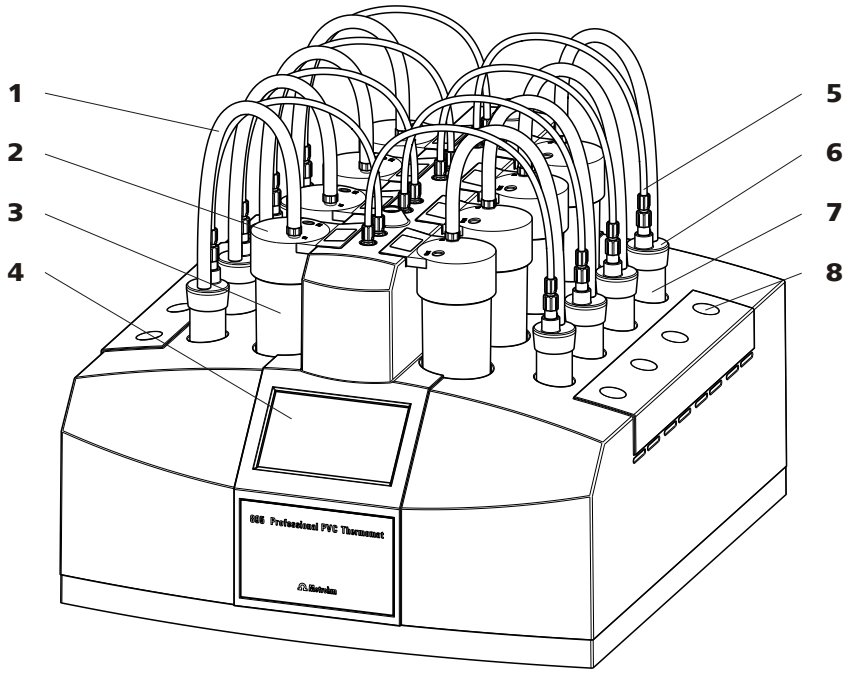


Figure 1 Front 895 Professional PVC Thermomat

1	**Silicone tubing (6.1816.010)** For connecting the reaction vessel to the measuring vessel.	**2**	**Measuring vessel cover (6.0913.130)** Contains an integrated conductivity measuring cell.
3	**Measuring vessel (6.1428.107)**	**4**	**Instrument display** Displays the status of the instrument and the individual measuring positions.
5	**FEP tubing 250 mm (6.1805.080)** For supplying air into the reaction vessel.	**6**	**Reaction vessel cover (6.2753.107)**
7	**Reaction vessels (6.1429.040)**	**8**	**Start buttons**

3.2 Rear of the instrument

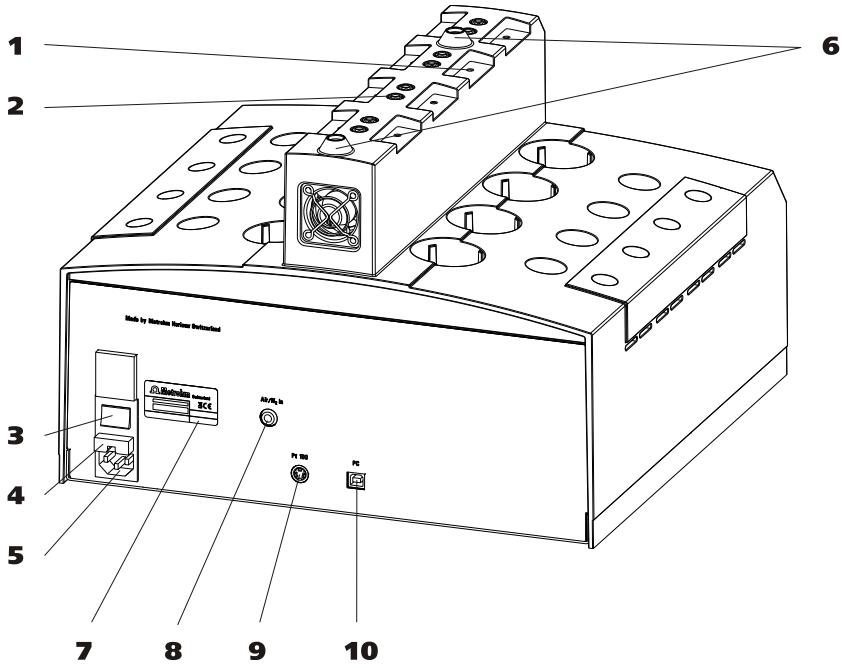


Figure 2 895 Professional PVC Thermomat rear

1	**Electrode connector** For connecting the conductivity measuring cell integrated in the measuring vessel cover.	**2**	**Air supply connector** For connecting the FEP tubing 250 mm.
3	**Power switch** For switching the instrument on and off. I = ON / 0 = OFF.	**4**	**Fuse holder** For replacing fuses *(see chapter 4.3.2, page 19)*.
5	**Power socket** Please note the important information on the power connection *(see chapter 4.3, page 18)*.	**6**	**Collection tube holder** For fastening the optional exhaust air collection tube (6.2757.000).
7	**Type plate** Contains specifications concerning supply voltage and serial number.	**8**	**"Air/N_2 in" connector**
9	**Pt100 connector** For connecting an external temperature sensor.	**10**	**USB connector** For connecting the computer.

3.3 Instrument display

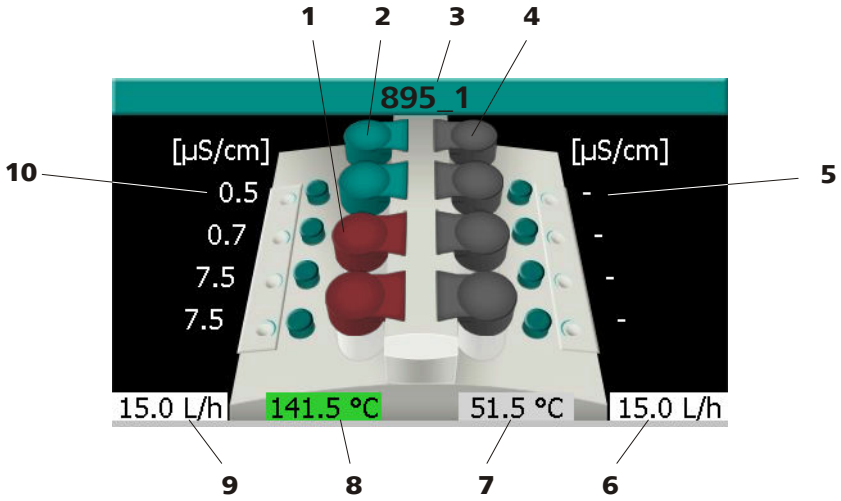


Figure 3 Instrument display

1 **Measuring vessel cover red** This measuring position is not available for a determination (determination is running or multiple determination has not yet been completed).	**2** **Measuring vessel cover green** A determination can be started on this measuring position.
3 **Instrument name** The instrument name display corresponds to the configuration in StabNet.	**4** **Measuring vessel cover gray** This measuring position is not available for starting a determination (instrument not connected to computer or no method loaded).
5 **Conductivity display block B** Shows the measured conductivity. Dash (-) is displayed = Conductivity cannot be displayed (no sensor connected or no valid measuring signal).	**6** **Gas flow display block B** Shows the gas flow measured on block B (gray background: gas flow switched off; white background: gas flow switched on).
7 **Temperature display block B** Shows the temperature measured on block B (gray background: heater switched off; red background: temperature not stable; green background: temperature stable).	**8** **Temperature display block A** Shows the temperature measured on block A (gray background: heater switched off; red background: temperature not stable; green background: temperature stable).
9 **Gas flow display block A** Shows the gas flow measured on block A (gray background: gas flow switched off; white background: gas flow switched on).	**10** **Conductivity display block A** Shows the measured conductivity. Dash (-) is displayed = Conductivity cannot be displayed (no sensor connected or no valid measuring signal).

4 Installation

4.1 Setting up the device

4.1.1 Packaging

The instrument is supplied in protective packaging together with the separately packed accessories. Keep this packaging, as only this ensures safe transportation of the instrument.

4.1.2 Checks

Immediately after receipt, check whether the shipment has arrived complete and without damage by comparing it with the delivery note.

4.1.3 Setup location

CAUTION

Heat accumulation

Placing the instrument in a tight space or covering the housing may lead to overheating and subsequent damage to the instrument.

- Set the device up freestanding, to allow the air to circulate around the instrument.
- Do not cover the device.

The instrument has been developed for operation indoors and may not be used in explosive environments.

Place the instrument in a location of the laboratory which is suitable for operation and free of vibrations and which provides protection against corrosive atmosphere and contamination by chemicals to the extent possible.

The instrument should be protected against excessive temperature fluctuations and direct sunlight.

NOTE

In order to improve accessibility of the measuring positions, the instrument can also be placed on the optionally available turning ring (6.2059.000).

4.2 Mounting accessories

4.2.1 Mounting the external nitrogen (N_2) supply

NOTE

Nitrogen has to be used for determining the thermostability of PVC.

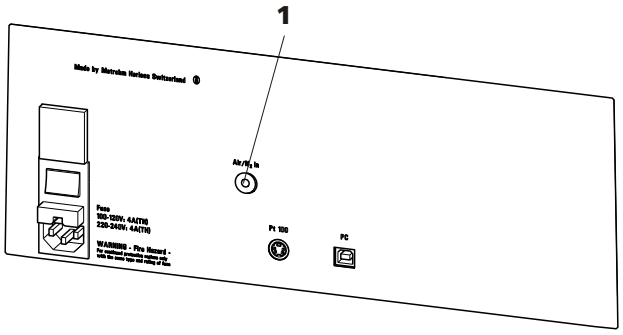


Figure 4 Nitrogen supply connector

1 "Air/N_2 in" connector

The following accessories have to be mounted on the rear of the 895 Professional PVC Thermomat for the feed line:

Mount the accessories for the external nitrogen supply as follows:

1 Mounting the connection tubing

- Screw one end of the connection tubing (6.1805.030) (150 cm) to the **"Air/N_2 in"** connector on the rear of the 895 Professional PVC Thermomat.
- Screw the 6.1808.020 connecting piece to the other end of the connection tubing.

2 Connecting the gas supply

- Mount the gas supply of the nitrogen bottle to the tubing olive of the connecting piece (6.1808.020).
- Set the gas flow to 1.5 bar by means of the reducing valve on the gas bottle.

4.2.2 Assembling the reaction and measuring vessels

The following figure shows in detail how the accessory parts for measuring the thermostability have to be mounted and connected to one another.

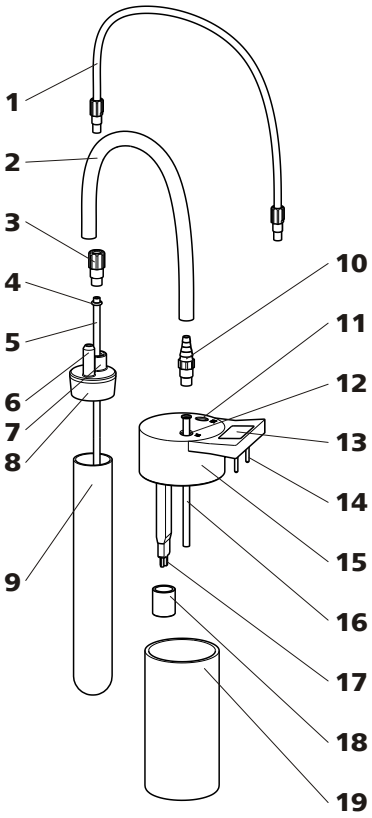


Figure 5 Equipping the reaction and measuring vessels

1	**FEP tubing 250 mm (6.1805.080)** For supplying nitrogen into the reaction vessel.	**2**	**Silicone tubing (6.1816.010)** For connecting the reaction vessel to the measuring vessel.
3	**Thread adapter M8/M6 (6.1808.090)**	**4**	**O-ring (6.1454.040)**
5	**Air tube (6.2418.120)**	**6**	**Tubing connector** For connecting the silicone tubing.
7	**Thread adapter M8/M6 connector**	**8**	**Reaction vessel cover (6.2753.107)**
9	**Reaction vessel (6.1429.040)**	**10**	**Tubing adapter M8/olive (6.1808.050)** For connecting the silicone tubing to the **In** opening.
11	**Opening "Out"** For removing the nitrogen from the measuring vessel.	**12**	**Opening "In"** For supplying the nitrogen to the measuring vessel.

13	**Label field** For attaching labels (e.g. 6.2250.000 laminated labels).
14	**Connector plug**
15	**Measuring vessel cover (6.0913.130)** Contains an integrated conductivity measuring cell.
16	**PTFE cannula (6.1819.080)** For supplying the nitrogen to the measuring solution.
17	**Electrode**
18	**Protection ring**
19	**Measuring vessel (6.1428.107)**

Proceed as follows to mount the measuring vessel and the reaction vessel:

1 Mounting the measuring vessel cover

- Screw the PTFE cannula from above into the **In** opening of the measuring vessel cover.
- Screw the M8/olive tubing adapter into the **In** opening of the measuring vessel cover.
- Pour 50 - 80 mL of deionized water into the measuring vessel (the exact quantity depends on the application).
- Place the measuring vessel cover onto the measuring vessel.

2 Mounting the reaction vessel cover

- Place the O-ring (6.1454.040) over the upper end of the air tube.
- Feed the air tube (6.2418.xx0) into the connector of the reaction vessel cover (6.2753.107) from above.
- Gently screw the M8/M6 thread adapter into the connector while pressing the air tube against the thread adapter from below. Then fix the air tube onto the reaction vessel cover by firmly tightening the thread adapter.
- Blow out the reaction vessel with nitrogen to free it from foreign substances (e.g. dust or cardboard shreds).
- Before putting the cover in place, briefly rotate the upper part of the reaction vessel in your hand. This slightly lubricates the glass and facilitates removal of the lids after the measurement.
- Place the reaction vessel cover on the reaction vessel.

NOTE

The air tube must be in a vertical position in the reaction vessel.

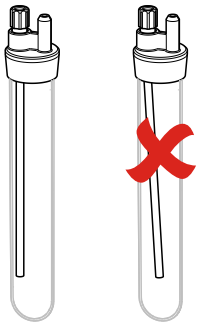


Figure 6 Mounting the air tube: correct - incorrect

4.2.3 Inserting vessels / Establishing tubing connections

After you have assembled the reaction and measuring vessels, insert them in the 895 Professional PVC Thermomat and establish the tubing connections *(see chapter 3.1, page 9)* as follows:

1 Inserting the measuring vessel

- Fill distilled water into the measuring vessel.
- Place the measuring vessel cover onto the measuring vessel.
- Insert the measuring vessel into the openings provided on the 895 Professional PVC Thermomat. While doing so, carefully guide the connector plug into the electrode connector.
- Connect the white silicone tubing to the M8/olive tubing adapter of the measuring vessel cover.

2 Mounting the tubing for the air supply

- Screw the FEP tubing 250 mm to the air supply connections of the 895 Professional PVC Thermomat.

3 Inserting the reaction vessel

- Fill the reaction vessel with the sample.
- After the required reaction temperature has been reached, insert the reaction vessel with the mounted reaction vessel cover in the openings provided on the 895 Professional PVC Thermomat.

4 Establishing the tubing connections

- Connect the white silicone tubing that is connected to the measuring vessel cover to the tubing connector of the reaction vessel cover.
- Screw the FEP tubing 250 mm which is connected to the M8/olive tubing adapter of the 895 Professional PVC Thermomat to the M8/M6 thread adapter of the reaction vessel cover.

NOTE

The optional clear glass measuring vessels (6.1428.030) may also be used in place of the polystyrene measuring vessel (6.1428.107).

In contrast to the polystyrene vessel, the measuring vessel (6.1428.030) can also be cleaned with acetone.

4.2.4 Mounting the exhaust air collection tube

The optional exhaust air collection tube (6.2757.000) can be mounted on the 895 Professional PVC Thermomat for targeted removal of the exhaust air.

NOTE

A total of 8 pieces of silicone tubing (6.1816.010) (220 mm) are required in addition to the exhaust air collection tube.

Proceed as follows to mount the collection tube:

1 Mounting the exhaust air collection tube

- Insert the exhaust air collection tube with both support pins into the collection tube holders on the 895 Professional PVC Thermomat in such a way that the connector to the exhaust air removal is located to the rear.

2 Connecting the measuring vessels

- Screw the M8/olive tubing adapter into the **Out** opening of the measuring vessel cover.
- Connect one end of the silicone tubing to the M8/olive tubing adapter.
- Insert the other end of the silicone tubing into the corresponding opening on the collection tube.
- Seal the unused openings on the collection tube with the enclosed stoppers.

3 Connecting the exhaust air collection tube

- Connect a suitable tubing to the connector of the exhaust air collection tube and connect it to an active suction device (e.g. water-jet pump).

4.3 Power connection

WARNING

There is a risk of fire if the instrument is operated with an incorrect mains fuse!

Follow the regulations below for the mains connection.

4.3.1 Connecting the instrument to the power grid

WARNING

Electric shock from electrical potential

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the instrument while the power cord is still connected.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
- Unplug the power plug immediately if you suspect that moisture has gotten inside the instrument.
- Only personnel who have been issued Metrohm qualifications may perform service and repair work on electrical and electronic parts.

Connecting the power cord

Accessories

Power cord with the following specifications:

- Length: max. 2 m
- Number of cores: 3, with protective conductor
- Instrument plug: IEC 60320 type C13
- Conductor cross-section 3x min. 0.75 mm^2 / 18 AWG
- Power plug:
  - according to customer requirement (6.2122.XX0)
  - min. 10 A

NOTE

Do not use a not permitted power cord!

1 Plugging in the power cord

- Plug the power cord into the instrument's power socket.
- Connect the power cord to the power grid.

4.3.2 Replacing fuses

The fuse holder of the 895 Professional PVC Thermomat contains two fuses:

- Two **slow-acting 4 A** fuses

WARNING

Ensure that the instrument is never put into operation with fuses of another type, otherwise there is a risk of fire!

Proceed as follows to replace defective fuses:

1 Pulling out the power cord

- Pull the power cord out of the power socket of the 895 Professional PVC Thermomat.

2 Removing the fuse holder

- Release the fuse holder located on the rear of the instrument above the power socket by pressing the catch spring and pull out the holder completely.

3 Replacing the fuses

- Carefully remove the defective fuses from the fuse holder and replace them with two new **slow-acting 4 A** fuses:

4 Inserting the fuse holder

- Push the fuse holder back into the instrument until it latches into place.

4.3.3 Switching the instrument on and off

The power switch *(2-**3**)* is used to switch the 895 Professional PVC Thermomat on and off. The instrument display is switched on when the instrument is switched **on**.

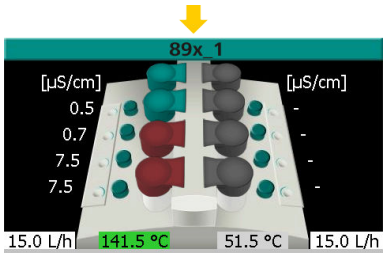


Figure 7 Instrument display with instrument name

The instrument 895 Professional PVC Thermomat has been recognized by the **StabNet** computer program and the instrument name entered has been transmitted.

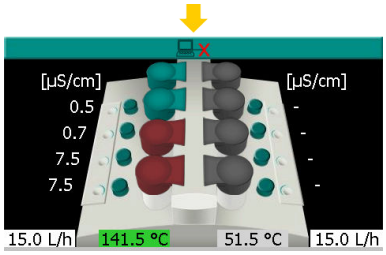


Figure 8 Instrument display with "no connection" symbol

The USB connection between the instrument 895 Professional PVC Thermomat and the computer has been interrupted and the corresponding symbol is displayed.

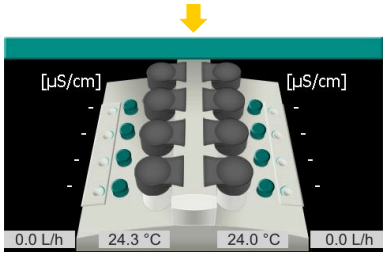


Figure 9 Instrument display without instrument name and symbol

The instrument 895 Professional PVC Thermomat is connected to the computer but the **StabNet** computer program has been closed.

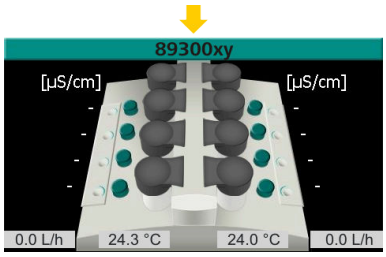


Figure 10 Instrument display with serial number

The instrument 895 Professional PVC Thermomat has been started, but the **StabNet** computer program was not previously started.

4.4 Connecting a computer

4.4.1 Connecting the 895 Professional PVC Thermomat and the computer

NOTE

The **StabNet** computer program has to be installed before you can connect the instrument to the computer.

The **StabNet** computer program allows you to control up to 4 instruments.

Connect and set up the 895 Professional PVC Thermomat as follows:

1. Establish a connection between the USB interface *(2-**10**)* of the 895 Professional PVC Thermomat and the required USB interface on the computer using the USB cable (6.2151.130).
2. Start the **StabNet** computer program.
3. Switch on the 895 Professional PVC Thermomat using the power switch.
4. Wait for the instrument 895 Professional PVC Thermomat to be detected and installed.
5. Enter the instrument information into the dialog fields of the 895 Professional PVC Thermomat configuration.

NOTE

You will find detailed information regarding the **StabNet** computer program in the Tutorial.

The instrument name entered in the configuration must appear on the instrument display *(3-**3**)*.

5 Operation

5.1 Thermomat method

The determination of the thermostability of polyvinyl chloride according to part 1 of DIN 53 381 is based on the fact that PVC decomposes at increased temperatures by releasing HCl. The hydrochloric acid that is formed is transferred into the measuring vessel with a gas flow (usually N_2) and absorbed there in the measuring solution (distilled water). The progress of the decomposition is registered by measuring the conductivity. The stability time and the induction time are determined.

The **stability time** is defined as the time until a conductivity difference of 50 µS/cm has been achieved.

The **induction time** is the time that is required to reach the break point of the conductivity curve. This method is used for testing PVC at all stages of fabrication and for testing stabilizers.

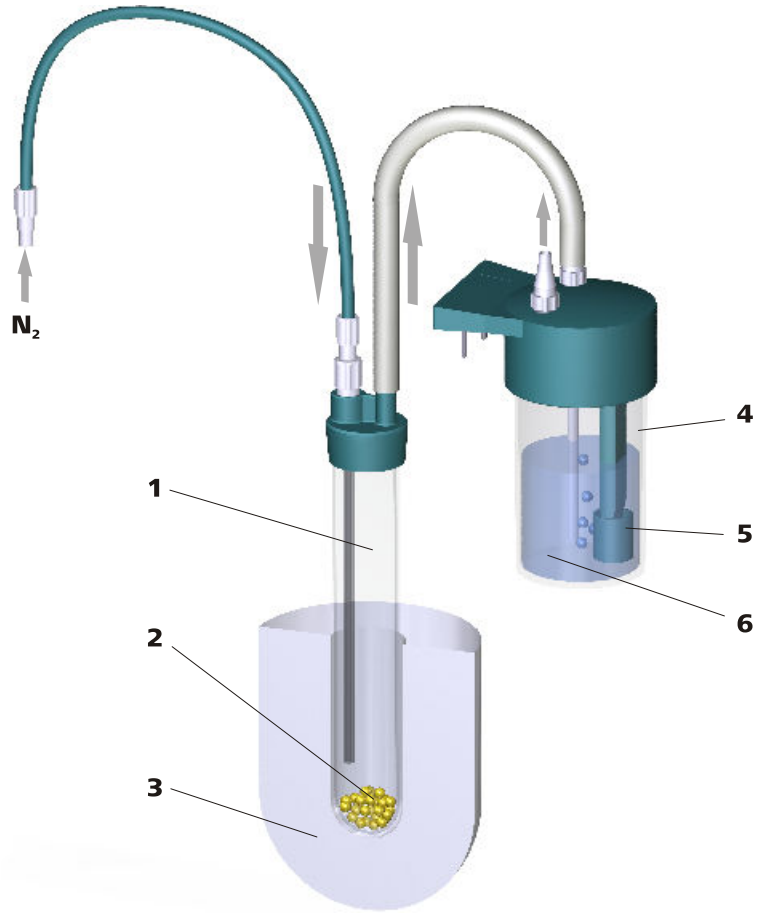


Figure 11 Measuring arrangement (schematic representation)

1	**Reaction vessel**	**2**	**Sample**
3	**Heating block**	**4**	**Measuring vessel**
5	**Conductivity measuring cell**	**6**	**Measuring solution**

5.2 Calibration functions

5.2.1 Determining the cell constant

The cell constants can be either entered manually or determined automatically by means of a defined standard solution, e.g. the conductivity standard 100 µS/cm (6.2324.010).

NOTE

You will find detailed information regarding the **StabNet** computer program in the Tutorial.

5.2.2 Determining the temperature correction

Temperature correction indicates the deviation of the current sample temperature from the temperature of the heating block and forms part of the method as a parameter.

It can be determined automatically with the calibrated, external temperature sensor.

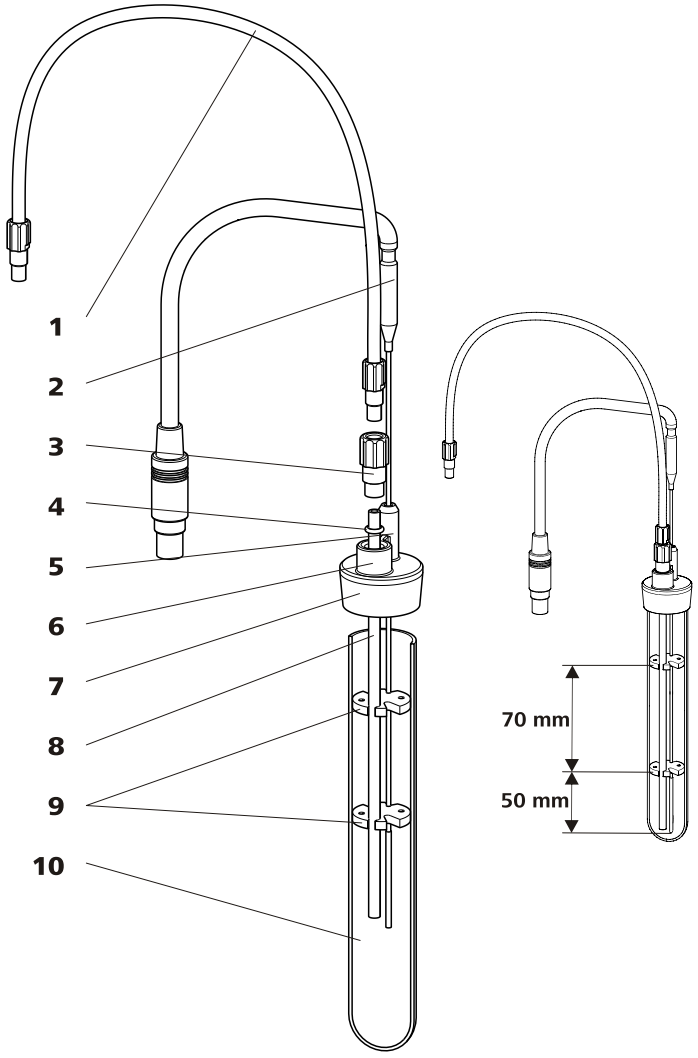


Figure 12 Assembling the reaction vessel for determining the temperature correction

1 **FEP tubing 250 mm (6.1805.080)** For supplying air into the reaction vessel.	**2** **Pt100 temperature sensor (6.1111.010)**
3 **Thread adapter M8/M6 (6.1808.090)**	**4** **O-ring (6.1454.040)**
5 **Temperature sensor opening** For inserting the temperature sensor.	**6** **Connector** For connecting the thread adapter M8/M6.

7	**Reaction vessel cover (6.2753.107)**	**8**	**Air tube (6.2418.000)**
9	**Spacer (6.2042.040)**	**10**	**Reaction vessel (6.1429.040)**

Preparing the determination of the temperature correction

The figure shows in detail how the accessory parts are to be assembled for the determination of the temperature correction. Proceed as follows:

1 Preparing the reaction vessel cover

- Mount the air tube on the reaction vessel cover.
- Clamp the first spacer at a distance of approx. 12 cm from the lower end onto the air tube.
- Clamp the second spacer at a distance of approx. 5 cm from the lower end onto the air tube.
- Insert the temperature sensor from above into the temperature sensor opening and fasten it in the corresponding openings of the spacers.

2 Preparing the reaction vessel

- Fill the reaction vessel with 5 g silicone oil (6.2326.000).
- Place the reaction vessel cover with the temperature sensor on the reaction vessel.
- Push the temperature sensor all the way down (the sensor must touch the vessel base).

3 Inserting and connecting the reaction vessel

- Insert the reaction vessel with the mounted reaction vessel cover in the measuring position 2 or 3 of the required heating block.
- Screw one end of the FEP tubing 250 mm to the M8/M6 thread adapter of the reaction vessel cover.
- Screw the other end of the FEP tubing to the corresponding connector of the 895 Professional PVC Thermomat.
- Connect the temperature sensor to the Pt100 connector *(2-**9**)* on the rear of the 895 Professional PVC Thermomat.

NOTE

You will find detailed information regarding the **StabNet** computer program in the Tutorial.

5.3 Determinations

5.3.1 Preparing the instrument and the accessories

The cleanliness of instrument and accessory parts is an indispensable prerequisite for **reliable, reproducible and correct analysis results**. Even the slightest contamination could catalytically accelerate the oxidative decomposition and lead to completely incorrect results. Therefore, always observe the instructions for use of measuring and reaction vessels in this chapter.

Check and prepare the instruments and vessels as follows:

1 Checking the positions for reaction vessels

- Check whether the positions in the heating block are clean and empty.
  Blow out contamination and dust in the positions with nitrogen.
  If the instrument is not used, always seal the corresponding positions with the stoppers.

2 Filling the measuring vessels

NOTE

Only use **measuring vessels** and accessories which are **absolutely clean** and in a **flawless condition**.

- Fill the cleaned measuring vessels with **60 mL distilled water** each.
  For analysis times of more than 24 h approx. 7 mL more distilled water must be added per day to compensate for the evaporation loss, so that the electrodes remain safely immersed.

3 Inserting the measuring vessels

- Place the clean measuring vessel covers equipped with a PTFE cannula on the measuring vessels.
- Insert the measuring vessels with the measuring vessel covers into the openings provided for this on the 895 Professional PVC Thermomat while carefully guiding the connector plugs of the cover into the electrode connectors.

4 Weighing in samples

NOTE

Use **new reaction vessels and air tubes** for each measurement. Blow out the reaction vessels with nitrogen before use so that any adhering particles are removed.

- Weigh in **0.5 g of the samples** in each reaction vessel.

5 Mounting the accessories

- Hold the upper edge of the reaction vessel in your hand (e.g. in the recess between your thumb and index finger) and rotate the glass once.
  This serves to cover the degreased glasses with a light **fat film** so that the vessel covers can be removed more easily after the determination.
- Insert an air tube into the connector of the reaction vessel cover, fix it with the O-ring and fasten it by screwing in the M8/M6 thread adapter.
- Place the reaction vessel cover on the reaction vessel. Turn the cover in such a way that the air tube is as close as possible to the vessel wall.
- Connect the white silicone tubing to the tubing connector of the reaction vessel cover.
- Place the prepared reaction vessel in the vessel holder.

5.3.2 Preparing the determination

1 Selecting the method (StabNet)

- In the Workplace program part, click on the symbol within the block A area and select a **Method** for block A.
- If required, also select a method for block B.

NOTE

Different methods with different temperatures and gas flows can be selected for block A and block B.

2 Starting the heater (StabNet)

- In the **Workplace** program part, click on the **[Start]** button for **Heater** within the block A area.

- If required, also switch on the heater for **Block B**.

The color of the temperature display on the 895 Professional PVC Thermomat changes to red during the heating phase.

The color of the temperature display on the 895 Professional PVC Thermomat changes to green once the setpoint temperature has been reached.

Heating period to 120 °C: approx. 45 min.

Heating period to 200 °C: approx. 60 min.

NOTE

If you wish to switch off the heating, click on the **[Stop]** button.

3 Enter sample identification (StabNet)

- Enter the sample identifications **Ident** and **Info 1 - 3** for all sample positions used.

The entries for **Ident** and **Info 1 - 3** can be selected from the **Text templates**.

NOTE

The **Info 2** and **Info 3** info fields can be activated in the subwindow **Properties - Sample data** in the **Method** program part.

4 Connecting and inserting reaction vessels

NOTE

The temperature defined in the method has to be reached before you insert the reaction vessels, i.e., the temperature display has to be **green**.

- Seal the unused positions with stoppers or empty reaction vessels for protection against impurities.
- Connect the white silicone tubing which is connected to the reaction vessel covers to the M8/olive tubing adapter of the measuring vessel covers.
- Screw the pieces of FEP tubing 250 mm to the M8/M6 thread adapters of the reaction vessel covers and the air supply connectors of the 895 Professional PVC Thermomat.

- Insert the prepared reaction vessels into the recesses of the heating block.
- Press the start button to start the data recording immediately after inserting each single reaction vessel.

5.3.3 Cleaning the accessories

1 Cleaning the measuring vessels and accessories

- Clean used **measuring vessels** after pouring off the measuring solution with ethanol or 2-propanol (**do not use acetone!**) or in the dishwasher.
  Pre-clean with dishwashing detergent in the case of severe contamination.
- Pre-clean with dishwashing detergent in the case of severe contamination.
- Thoroughly rinse with distilled water.
- Clean the **measuring vessel covers**, the **PTFE cannula** and the **electrodes** with acetone or 2-propanol or in the dishwasher and thoroughly rinse with distilled water.
  Pre-clean with dishwashing detergent in the case of severe contamination.
  Remove the protective ring to facilitate cleaning of the electrodes.

2 Cleaning the reaction vessels and accessories

- Dispose of used **reaction vessels** and **air tubes** and use new reaction vessels and air tubes for the next measurement.
- Clean the **reaction vessel covers** with acetone or 2-propanol or in the dishwasher and rinse with distilled water.
  Pre-clean with dishwashing detergent in the case of severe contamination.
- Then heat the **reaction vessel covers** in the drying oven for 2 hours at 80 °C.

NOTE

Replace the reaction vessel covers if they no longer sit tightly on the reaction vessel or the material is brittle.

3 Cleaning the tubing

- Clean the **silicone tubing** with acetone or 2-propanol or in the dishwasher and rinse with distilled water.
  Pre-clean with dishwashing detergent in the case of severe contamination.

- Then heat the **silicone tubing** in the drying oven for 2 hours at 80 °C.

6 Operation and maintenance

6.1 General notes

6.1.1 Care

The 895 Professional PVC Thermomat requires appropriate care. Excess contamination of the instrument may result in functional disruptions and a reduction in the service life of the otherwise sturdy mechanics and electronics.

Spilled chemicals and solvents should be removed immediately. Above all, the plug connections on the rear of the instrument (in particular the power socket) should be protected from contamination.

CAUTION

Although this is largely prevented by design measures, the power plug should be unplugged immediately if aggressive media have found their way into the interior of the instrument to prevent serious damage to the instrument electronics. In such cases, Metrohm Service must be informed.

6.1.2 Maintenance by Metrohm Service

Maintenance of the 895 Professional PVC Thermomat is best carried out as part of annual service, which is performed by specialist personnel from Metrohm. If you are frequently working with caustic and corrosive chemicals, we recommend a shorter maintenance interval.

Metrohm Service offers every form of technical advice for maintenance and service of all Metrohm instruments.

6.1.3 Cleaning the instrument

WARNING

Danger of poisoning and chemical burns from chemical hazardous substances

Poisoning and/or chemical burns through contact with aggressive chemical substances.

- Only use detergents that do not cause any unwanted side reactions with the materials to be cleaned.
- Clean contaminated surfaces.
- Wear protective equipment.
- Use exhaust equipment when working with vaporizing hazardous substances.
- Dispose of chemically contaminated materials (e.g. cleaning material) properly.

WARNING

Electric shock from electrical potential

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the instrument.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) from moisture.
- If you suspect that moisture has gotten into the instrument, disconnect the instrument from the energy supply. Then, notify Metrohm Service.
- Only personnel who have been issued Metrohm qualification may perform service and repair work on electric and electronic parts.

Cleaning the surfaces of the product

Prerequisites

- The product is disconnected from the power grid.

1 Clean the surfaces with a damp cloth.

NOTE

If the suspicion arises that liquids have found their way into the product, disconnect the instrument from the power grid and contact your Metrohm service engineer.

NOTE

Water or ethanol can be used as a cleaning medium.

NOTE

The connectors at the rear of the product must only be cleaned with a dry cloth.

7 Troubleshooting

7.1 Problems

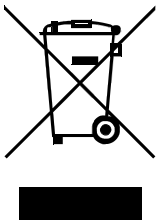
Problem	Cause	Remedy
No air flow can be detected in the measuring vessel (it does not bubble), although an air flow can be discerned in the reaction vessel.	*The connection is blocked.*	▪ Check the tubing connector on the reaction vessel cover for blockage and, if necessary, clean. ▪ Check the silicone tubing for blockage and, if necessary, clean. ▪ Check the tubing adapter and the PTFE cannula on the measuring vessel cover for blockage and, if necessary, clean.
	The connection is leaking.	Check the silicone tubing for leakages and, if necessary, replace.
	The reaction vessel cover does not sit correctly or tightly enough.	▪ If the reaction vessel cover is oblique or not completely mounted, press it all the way down. ▪ If the reaction vessel cover is loose on the reaction vessel despite correct assembly, the cover has to be replaced.
	The connection is wrongly connected.	▪ Make sure that the PTFE cannula for air supply is connected to the **In** opening of the measuring vessel cover. ▪ Make sure that the silicone tubing is connected to the tubing adapter that is mounted on the **In** opening. ▪ Make sure that the reaction vessel is connected to the measuring vessel that belongs to the corresponding measuring position.
The induction times are not reproducible for multiple determinations.	*The reaction vessels used are not clean.*	▪ Clean the reaction vessels of particles (dust, cardboard, etc.) with nitrogen before weighing in the sample. ▪ Only use new, unused reaction vessels.
	The reaction vessels used are scratched on the inside.	Only use new, unused reaction vessels.

Problem	Cause	Remedy
	The reaction vessel cover does not sit correctly or tightly enough.	▪ If the reaction vessel cover is oblique or not completely mounted, press it all the way down. ▪ If the reaction vessel cover is loose on the reaction vessel despite correct assembly, the cover has to be replaced.
	The connection to the measuring vessel is not mounted correctly.	Ensure that no nitrogen can escape through leaks when transferring from the reaction vessel to the measuring vessel.
	The temperature in different positions of a heating block differs, as sample has burnt on at one or more places in the recess of the heating block.	If necessary, carefully remove contamination from the **cold** heating block.
	The sample is not homogenous.	Homogenize the sample.
The stability times are not reproducible for multiple determinations.	*The cell constant was not determined or does not correspond to the value entered.*	▪ Determine the cell constant. ▪ Make sure that the assignment of the conductivity sensors is correct, so that the determined cell constant actually corresponds to the measuring cell used. ▪ Make sure that the measuring cell is not contaminated. Clean if necessary.
	The conductivity measuring cell is contaminated.	Check the measuring cell and, if necessary, clean.
	See also: The induction times are not reproducible for multiple determinations.	
The induction time is longer/shorter than expected.	*The temperature is not selected correctly.*	▪ Make sure that the correct method for the determination has been selected. ▪ Check whether the **Sample temperature** and the **Temperature correction** are indicated correctly in the method.
	See also: The induction times are not reproducible for multiple determinations.	

Problem	Cause	Remedy
The stability time is longer/shorter than expected.	*The conductivity change is not correctly defined.*	Make sure that the value defined for the conductivity change in the method is correct.
	See also: The stability times are not reproducible for multiple determinations.	
	See also: The induction time is longer/shorter than expected.	
The measurement curves are extremely noisy.	*The nitrogen supply for the measuring solution is directed to the conductivity measuring cell.*	Loosen the tubing adapter on the measuring vessel cover and turn the PTFE cannula such that the nitrogen is no longer directed to the electrode and fix it in this position.
	Gas bubbles adhere to the conductivity measuring cell during measurement.	▪ Make sure that the measuring cell is clean and free of fat. If necessary, clean thoroughly. ▪ In some cases, ultrapure water contains a large proportion of dissolved air. In this case, degas the ultrapure water before the measurement for 5 to 10 min in a vacuum.
The curve shows a step which means that the induction time is no longer determined correctly.	*Side reactions occur at the start or during the measurement. These reactions cause the conductivity in the measuring cell to rise.*	▪ Use the **Evaluation suppression** in the method. ▪ In addition to **Endpoint(s)** activate also **Conductivity** (e.g. 200 µS/cm) as stop criterion in the method and select the **Stop once all the criteria have been fulfilled** option. The evaluation parameters can be optimized on the basis of this curve, or the curve can be evaluated manually. ▪ Increase the **Evaluation sensitivity** method parameter.
The curve shows a step at the start of the measurement, which has not occurred in previous measurements.	*The reaction vessel cover and/or the tubing still contain residues from previous measurements. These residues are then transferred to the measuring vessel with the flow of warm air during a new measurement.*	▪ Thoroughly clean the reaction vessel cover and the silicone tubing. ▪ Replace the reaction vessel cover and the silicone tubing from time to time.

Problem	Cause	Remedy
The induction time is not evaluated automatically, although a significant break point can be noticed in the curve.	*The **Evaluate induction time** option is deactivated in the method.*	Activate the evaluation of the induction time in the method.
	*The **Evaluation suppression** option preventing the evaluation of the curve in the corresponding time period is defined in the method.*	Deactivate the corresponding option in the method.
	Automatic detection of the induction time is not yet possible.	Keep the determination running until the induction time is automatically found.
	The curve progression is too flat, with the result that automatic detection of the induction time is not possible.	▪ Reduce the **Evaluation sensitivity** method parameter. ▪ Evaluate the curves manually using tangents.
	*An inappropriately high value was used in the method for the **Evaluation sensitivity**. This value makes a curve evaluation impossible.*	Enter a lower value (e.g. 1.0) for the **Evaluation sensitivity** option in the method.
The measurement aborts without an endpoint being found.	*The measurement has been stopped manually.*	Keep the measurement running until the endpoint is automatically found.
	A time or conductivity defined as a stop criterion in the method is reached before the endpoint.	▪ Activate the **Stop once all the criteria have been fulfilled** option in the method. ▪ Increase the value for time or conductivity. ▪ Deactivate time or conductivity as stop criterion.

8 Recycling and disposal



This product is covered by European Directive 2012/19/EU, 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.

More details about the disposal of your old instrument can be obtained from your local authorities, from waste disposal companies or from your local dealer.

9 Technical specifications

9.1 General data

Number of instruments that can be connected	1–4
Number of samples per instrument	1–8 (4 each per heating block)
Sample amount	0.5 gram

9.2 Temperature control and measurement

Sample temperature setting range	50–220 °C
Temperature correction	±0–9.9 °C (Can be entered manually or determined automatically using the external temperature sensor.)
Temperature measuring range	0–300 °C
Resolution	0.1 °C
Maximum deviation of the heating block temperature from the set value (50–220 °C)	±0.3 °C
Reproducibility of the set temperature	typ. ±0.2 °C
Maximum temperature difference between different measuring positions per block	typ. < 0.3 °C
Temperature fluctuations	typ. < 0.1 °C (With operating temperature attained, reaction vessels inserted and identically filled and 20 L/h air throughput.)

Shutdown temperature	260 ± 15 °C (Resetting and troubleshooting carried out by Metrohm Service.)
Heating time for the instrument	approx. 45 min (from 20 °C to 120 °C) approx. 60 min (from 20 °C to 220 °C)
External temperature of the instrument	< 50 °C (at operating temperature 220 °C)

9.3 External temperature sensor

Sensor	4-pin for sensor Pt100 (6.1111.010)

9.4 Conductivity measurement

Sensor	Conductivity measuring cell, integrated in the measuring vessel cover (6.0913.130)
Electrode	Conductivity measuring cell with 2 stainless steel electrodes
Measuring principle	AC current measurement with 1 kHz frequency and approx. 1.0 V amplitude (peak to peak)
Cell constant	1.0–1.2 (The exact value can be entered manually or determined automatically)
Measuring range	0–400 µS/cm (at c = 1)
Resolution	0.1 µS/cm
Display range	0–999 µS/cm
Maximum deviation from measured value	±(0.5 µS/cm + 1% of the measured value)

9.5 Gas flow regulation

Volumetric flow range	1–25 L/h at 25 °C and 1013 mbar
Maximum deviation from the set range	±(0.25 L/h + 5% of the measured value)
Maximum permissible pressure, "Air/N_2 in" connector	3 bar

9.6 USB interface

USB connector	USB plug type B

9.7 Power connection

Nominal voltage range	100 - 120 V and 220 - 240 V ± 10% (autosensing)
Frequency	50 and 60 Hz (autosensing)
Power consumption	450 VA_{max}
Fuse	Diameter 5 mm, length 20 mm 4.0 ATH (slow-acting)

9.8 Ambient conditions

Nominal function range	+5 to +45 °C at max. 80% relative humidity, non-condensing
Storage	+5 to +45 °C at max. 80% relative humidity, non-condensing
Altitude / Pressure range	Max. 2,000 m.a.s.l. sea level / min. 800 mbar
Overvoltage category	II
Pollution degree	2

9.9 Dimensions/Material

Width	383 mm
Height	277 mm (without accessories)
Depth	393 mm
Weight	15.4 kg (without accessories)
Lid material	Baydur®110 FR-6 with flame retardation for fire class UL94VO, CFC-free
Base material	Steel sheet, coated

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