885 Compact Oven SC

Manual

8.885.8002EN

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Although all the information given in this documentation has been checked with great care, errors cannot be entirely excluded. Should you notice any mistakes please send us your comments using the address given above.

Documentation in additional languages can be found on *http://products.metrohm.com* under **Literature/Technical documentation**.

Table of contents

Table of figures

1 Introduction

1.1 Instrument description

The 885 Compact Oven SC is used whenever the heating up of a sample and/or the thermal expulsion of moisture in solids or liquids is required. In combination with a coulometric or volumetric KF titrator, the 885 Compact Oven SC is the ideal analysis system for water determination in samples that contain disruptive components or from which moisture can be removed only with difficulty.

One of its decisive advantages is the reduction of sample preparation to a minimum. Thanks to the use of hermetically sealed sample vessels ("headspace vials"), the filling of the samples can be accomplished directly on-site. The PTFE-coated septa guarantee a constant, non-falsified water content, even after prolonged holding times.

Thanks to the combination of a sample changer with an oven module, automated processing of several samples in a single sample series is possible. This ensures that only the smallest possible amount of work is required.

The sample heated in the oven module releases its moisture in the form of water vapor, which is conveyed into a measuring cell with the aid of a gas flow. An air pump is installed for the purpose of generating the gas flow. An inlet valve is available for nitrogen or other inert gases. The determination of the moisture can be accomplished in the measuring cell either coulometrically or volumetrically according to Karl Fischer.

1.1.1 Instrument components

The 885 Compact Oven SC has the following components:

- **Turntable**
  Permanently mounted sample rack with 17 positions for sample vials and 1 position for a conditioning vessel.
- **Lift with working head**
  Working head with needle adapter and tubing for the gas flow.
- **Oven**
  Oven module made of aluminum with software-operated temperature control for heating the sample vessel.
- **Fan**
  Propeller fan for cooling the oven module.
- **Inlet valve**
  Valve for switching over the source of the gas flow.

- **Air pump**
  Pump for generating the gas flow.
- **Outlet heater**
  Heating tubing for preventing the condensation of moisture.
- **Operating unit**
  Monochrome LCD display and keyboard.

1.1.2 Intended use

The 885 Compact Oven SC is designed for usage as an auxiliary device for automated sample preparation in analytical laboratories. Its main area of application is moisture determination according to Karl Fischer (coulometric or volumetric). The 885 Compact Oven SC enables the application of thermal gas extraction technology.

This instrument is suitable for processing chemicals and flammable samples. The usage of the 885 Compact Oven SC therefore requires that the user has basic knowledge and experience in the handling of toxic and caustic substances. Knowledge with respect to the application of the fire prevention measures prescribed for laboratories is also mandatory.

1.2 About the documentation

Caution

Please read through this documentation carefully before putting the instrument into operation. The documentation contains information and warnings which the user must follow in order to ensure safe operation of the instrument.

1.2.1 Symbols and conventions

The following symbols and styles are used 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** Carry out these steps in the sequence shown.
Method	**Dialog text**, **parameter** in the software
File ▸ New	Menu or menu item
[Next]	**Button** or **key**

	**Warning** This symbol draws attention to a possible life 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.
	**Caution** This symbol draws attention to a possible damage of instruments or instrument parts.
	**Note** This symbol marks additional information and tips.

1.3 Safety instructions

1.3.1 General notes on safety

Warning

This instrument may only be operated in accordance with the specifications in this documentation.

This instrument has 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.

1.3.2 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.

Mains voltage

Warning

An incorrect mains voltage can damage the instrument.

Only operate this instrument with a mains 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.

Always pull the mains cable out of the mains connection socket before connecting or disconnecting electrical appliances on the rear panel of the instrument.

1.3.3 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.

1.3.4 Personnel safety

Warning

Wear protective goggles and working clothes suitable for laboratory work while operating the 885 Compact Oven SC. It is also advisable to wear gloves when caustic liquids are used or in situations where glass vessels could break.

Warning

The oven module can exhibit temperatures of up to 250 °C. Sample vessels and components of the sample rack can also become so hot (<60 °C), that the skin could suffer burns in the event of contact.

Never touch the rack, sample vessels or oven when the heating is turned on. Be aware of the current value on the temperature display.

Wear working gloves.

Do not fail to switch off the device before attempting to clean it and wait until the oven has cooled down.

Warning

Always install the safety shield supplied with the equipment before using the instrument for the first time. Pre-installed safety shields are not allowed to be removed.

The 885 Compact Oven SC may not be operated without a safety shield!

Warning

Personnel are not permitted to reach into the working area of the instrument while operations are running!

A **considerable risk of injury** exists for the user.

Warning

In the event of a possible jamming of a drive, the mains plug must be pulled out of the socket immediately. Do not attempt to free jammed sample vessels or other parts while the instrument is switched on. A jamming can only be cleared when the instrument is in a voltage-free status; this action generally involves a **considerable risk of injury**.

Warning

The 885 Compact Oven SC is **not** suitable for usage in biochemical, biological or medical environments in its basic equipment version.

Appropriate protective measures must be implemented in the event that potentially infectious samples or reagents are being processed.

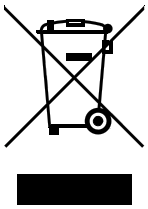
1.3.5 Flammable solvents and chemicals

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.
- Keep all sources of flame far from the workplace.
- Clean up spilled liquids and solids immediately.
- Follow the safety instructions of the chemical manufacturer.

1.3.6 Recycling and disposal

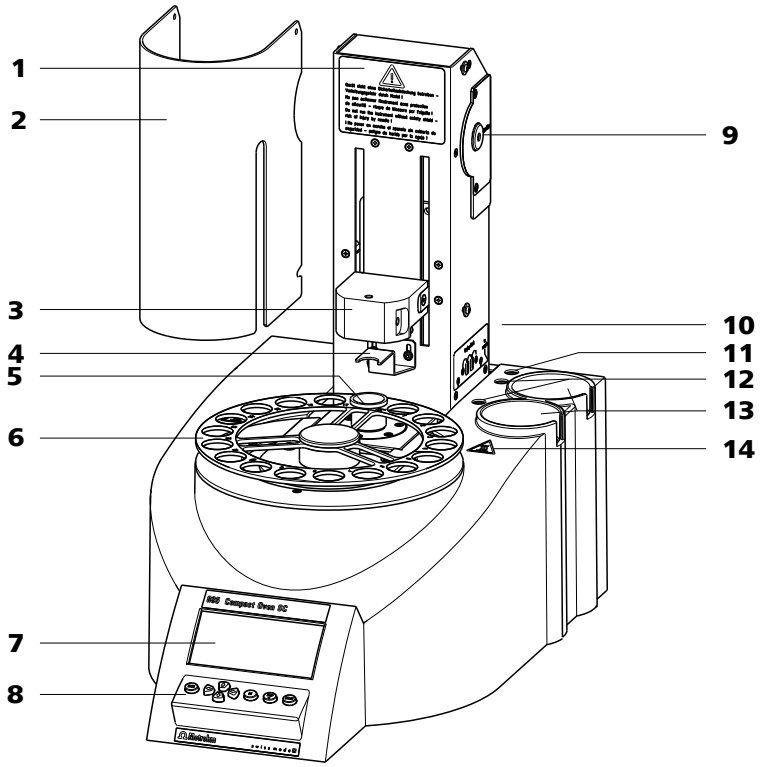


This product is covered by European Directive 2002/96/EC, WEEE – Waste from Electrical and Electronic Equipment.

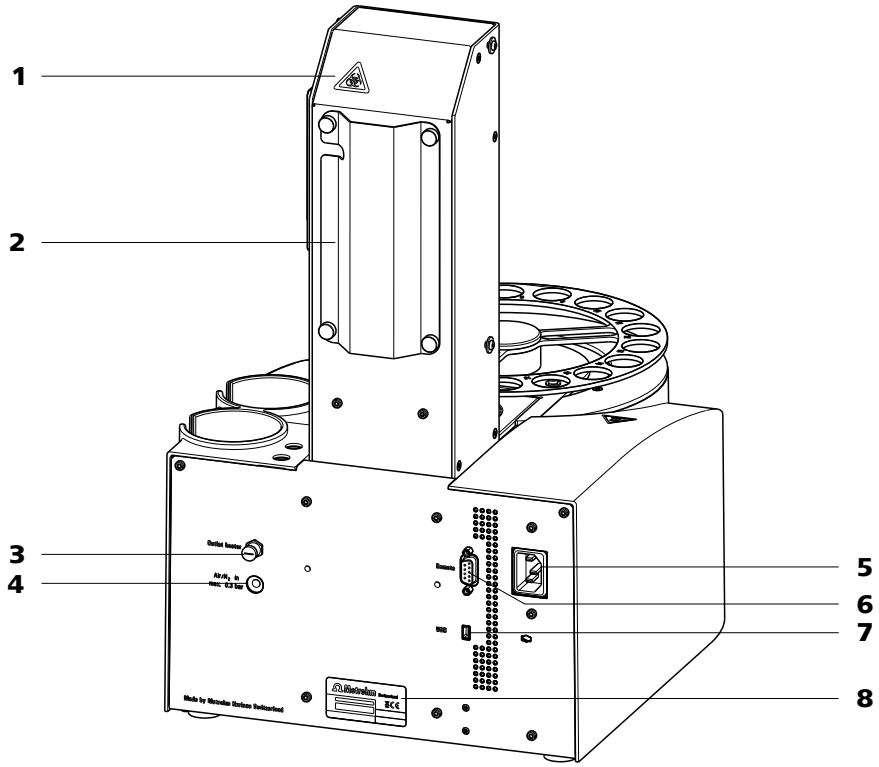
The correct disposal of your old equipment will help to prevent negative effects on the environment and public health.

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

2 Overview of the instrument



1	**Warning instruction**	**2**	**Safety shield (6.2751.170)**
3	**Lift with distributor**	**4**	**Deflector sheet** For deflecting the vial while the lift is traveling upwards.
5	**Conditioning position** For a conditioning vial.	**6**	**Sample rack** For 17 samples.
7	**Display**	**8**	**Keypad**
9	**Air pump inlet** With 6.2724.010 dust filter.	**10**	**Instruction sign** Displays the tubing of the drying flasks.
11	**Gas outlet** For the tubing for testing. With M6 thread.	**12**	**Gas connections** For the drying flasks. With M6 thread.
13	**Recesses in the housing** For the drying flasks.	**14**	**Warning symbol** Warns against hot surfaces.



1	**Warning symbol** See *page 5*	**2**	**Tubing and cable cover**
3	**Outlet heater connection** For the heating tubing.	**4**	**Air/nitrogen connector** With M6 inner thread. Inlet for external gassing.
5	**Mains connection socket**	**6**	**Remote connector** For connecting instruments with a remote interface. D-Sub, 9-pin.
7	**USB (OTG) connector** For connecting printers, USB sticks, USB hubs, etc.	**8**	**Type plate** Contains specifications concerning mains voltage and serial number.

3 Installation

3.1 Setting up the instrument

3.1.1 Packaging

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

3.1.2 Checks

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

3.1.3 Location

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, free of vibrations, protected from corrosive atmosphere, and contamination by chemicals.

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

3.2 Mounting the stand plate

The titration cell must be fitted as close to the device as possible. Two stand plates (6.2001.050 and 6.2001.060) with support rods are available for this purpose, each of which is supplied with a KF titrator.

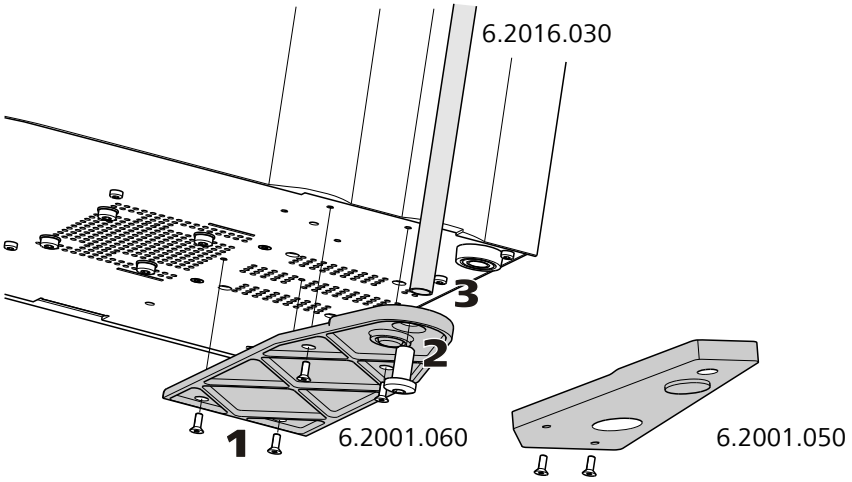


Figure 1 Mounting the stand plate

Proceed as follows:

1 Screw the stand plate to the base of the 885 Compact Oven SC with the screws provided, see figure.

2 Guide the large cylinder screw into the opening of the stand plate from the bottom.

3 Screw the 6.2016.030 support rod tight on the cylinder screw. Fasten in place with a hexagon key.

3.3 Removing the safety shield

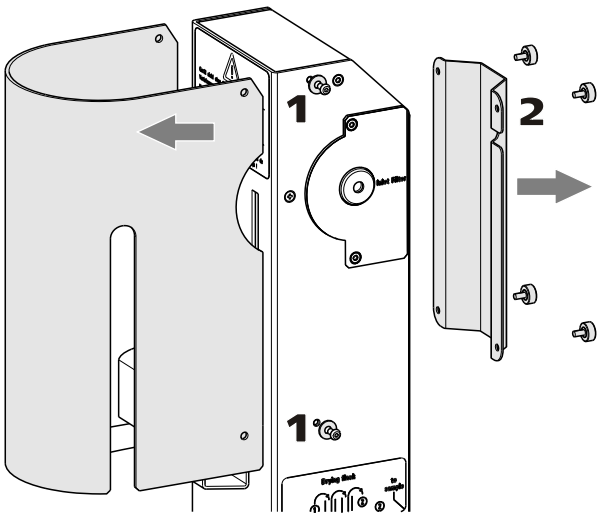


Figure 2 Removing the coverings

If you remove the safety shield before, the installation of the accessories is easier to carry out. Proceed as follows:

1 Loosen the hexagon screws on the sides of the tower and remove the safety shield.

2 Loosen the knurled screws on the rear of the tower and remove the cable cover.

Do not forget to refasten the safety shields after the installation of the accessories.

3.4 Mounting the needles

The length of the needle holder defines how deeply the piercing needle penetrates the sample vessel.

If there is a danger that the heated sample could clog the needle, then use the **6.2049.050 needle holder** which is 73 mm in length. In this case the piercing needle penetrates the sample vessel only slightly deeper than the exhaust air needle and has no contact with the sample itself.

Caution

Movement with the needle holder 6.2049.050 may not extend more deeply than up to **Lift position 78 mm**.

The **6.2049.040 needle holder**, which is 58 mm in length, ensures that the needle penetrates the liquid or powdery sample. The carrier gas can flow through the sample and effect an efficient expulsion of the moisture it contains. The 6.2049.040 needle holder can be ordered from Metrohm if required.

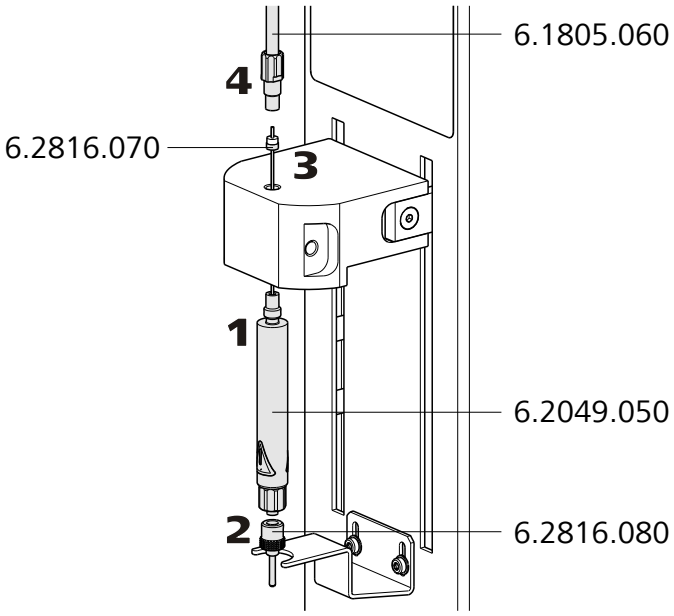


Figure 3 Mounting the needles

Mount the needles as follows:

1 Screw the **6.2049.050 needle holder** into the distributor on the guide head.

2 Screw the **6.2816.080 exhaust air needle** onto the Luer connector of the needle holder.

3 Carefully guide the **6.2816.070 piercing needle** into the opening of the distributor from above and allow it to drop down.

Note

Take care to ensure that the white PTFE seal is positioned securely on the needle.

4 Screw the **6.1805.060 FEP tubing** by hand onto the opening of the distributor.

5 Tightly screw the other end of the tubing to the gas outlet opening (labeled with **to sample**) next to the tower, see figure.

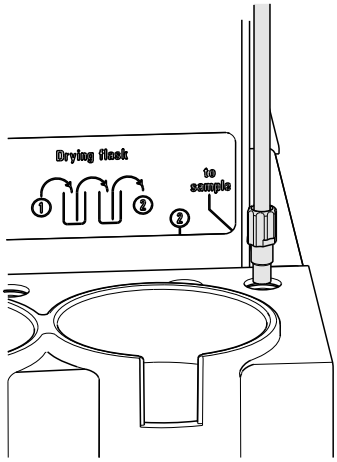


Figure 4 Connecting the tubing to the gas outlet

3.5 Assembling the drying flasks

Two drying flasks with desiccant are integrated into the gas flow in order to dry the gas that is conveyed. Dust (e.g. from the desiccant) must be prevented from finding its way into the sample vessel.

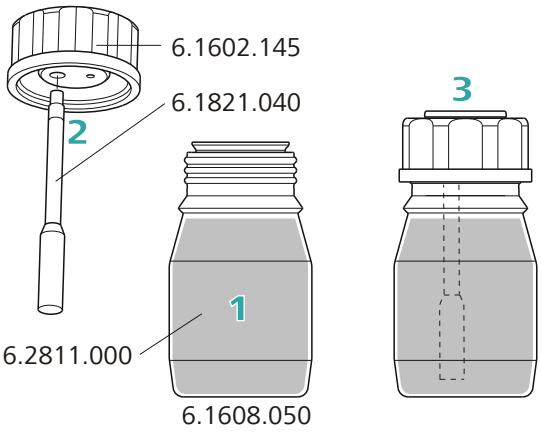


Figure 5 Preparing the drying flasks

Prepare both drying flasks as follows:

1. Fill both **6.1608.050 drying flasks** with **6.2811.000 molecular sieve**.

2. Screw one **6.1821.040 filter tube** into each of the **6.1602.145 drying flask covers** from below. Tighten the filter tubes well by hand.

3. Screw the two drying flask covers with the filter tubes onto the drying flasks. Tighten the covers well by hand.

Note

If drying flask covers or filter tubes are not sufficiently tightly screwed on, then this will prevent a precise, regular gas flow. The error message "Flow rate error" will appear as a rule when there are leaks in the threaded connections.

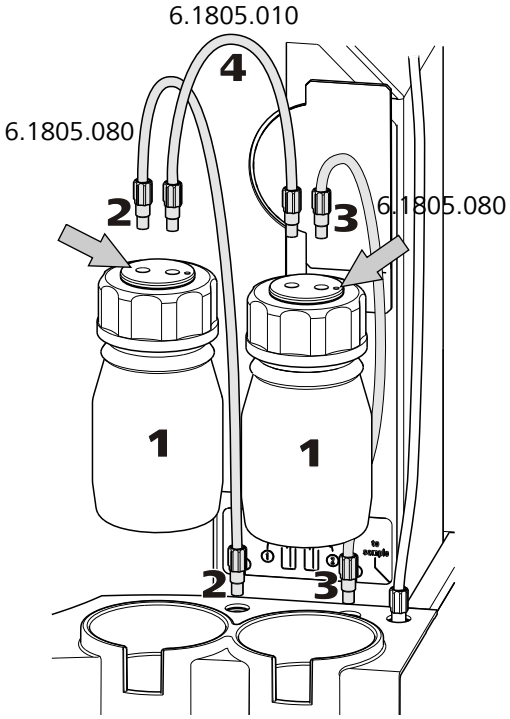


Figure 6 Mounting drying flasks and tubings

Mount the FEP tubings as follows:

1 Insert the two drying flasks that have been prepared into the holders, see figure.

2 Screw one 6.1805.080 FEP tubing (25 cm in length) to the gas outlet (at the rear on the left, labeled **1**). Screw the other tubing end on the front drying flask to the M6 connector **without** point marking (see left-hand arrow).

3 Screw the second 6.1805.080 FEP tubing (25 cm in length) to the gas inlet (at the rear on the right, labeled **2**). Screw the other tubing end on the rear drying flask to the M6 connector **with** point marking (see right-hand arrow).

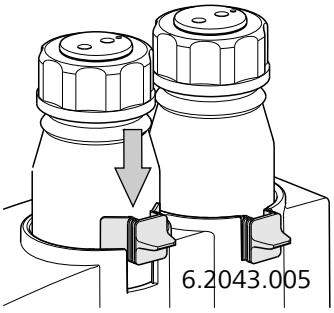
4 Screw the 6.1805.010 FEP tubing (13 cm in length) tightly onto the remaining M6 connectors of the drying flasks.

The figure **Drying flask** on the right-hand side of the instrument displays the diagram for the tubing.

Note

Tighten the screw connections well by hand.

You can fasten the drying flasks with the 6.2043.005 holding clamps, see figure.



3.6 Mounting the heating tubing

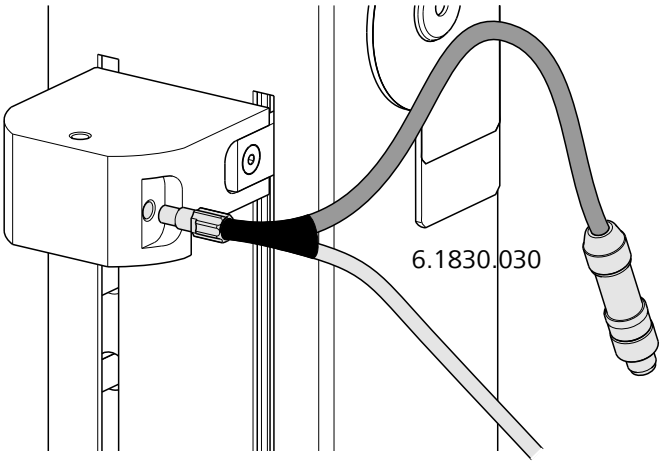


Figure 7 Mounting the heating tubing

Proceed as follows:

1 Screw the M6 connector of the **6.1830.030 heating tubing** into the side opening of the distributor on the guide head.

2 Connect the heating tubing cable to the **Outlet heater** connector on the rear of the instrument.

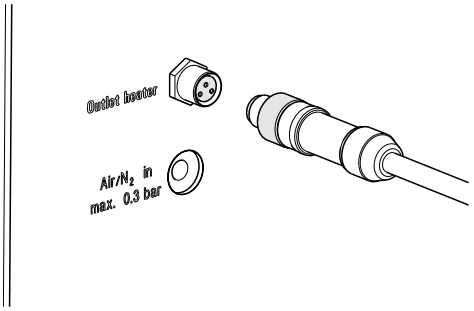


Figure 8 Connecting the heating tubing

Rotate the plug in such a way that the three contact pins match the alignment of the corresponding openings on the socket. Press the plug against the socket and rotate the front knurled screw in a clockwise direction.

Note

The heating jacket of the heating tubing is heated up to approx. 40…50 °C as soon as the instrument is switched on. This prevents the condensation of moisture in the tubing when this is expelled from the sample and transferred with the aid of a carrier gas into a KF titration cell.

3.7 Mounting the safety shield

Now you can remount the safety shield. Proceed as follows:

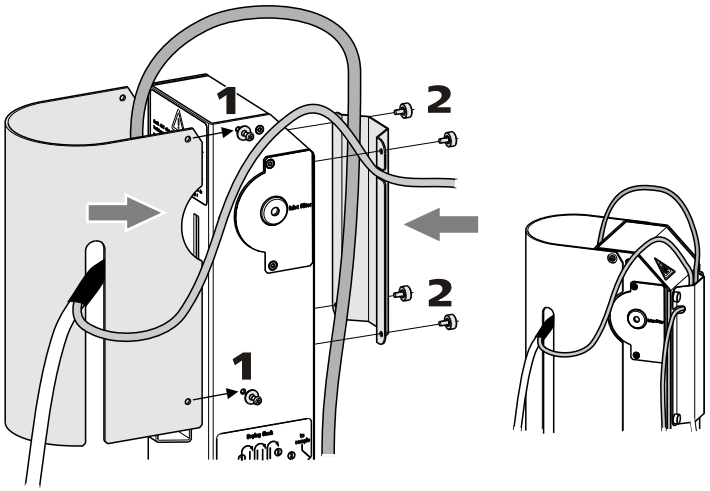


Figure 9 Mounting the coverings

1 Fasten the safety shield with the four hexagon screws to the sides of the tower. The heating tubing and its connection cable must be guided through the slot of the cover.

2 Fasten the cable cover with the four knurled screws to the rear side of the tower. The gas supply tubing must be guided underneath the cover. The connection cable of the heating tubing must be guided through the lateral recess of the cover, see figure.

Warning

The 885 Compact Oven SC may not be operated without a safety shield!

3.8 Mounting the dust filter

The built-in air pump must be protected against dust. A **6.2724.010 dust filter** must be placed on the air inlet (**Inlet filter**) on the right-hand side of the housing for this reason.

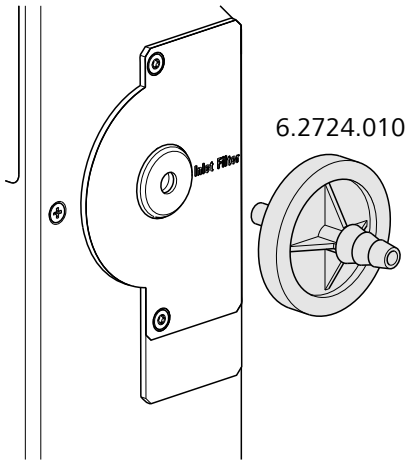


Figure 10 Mounting the dust filter

Note

The dust filter should be replaced once a year.

3.9 Assembling the air/nitrogen connector

If compressed air, nitrogen or another gas is to be used for transferring the expelled moisture, then a separate connector is available on the rear of the instrument.

A tubing with M6 thread can be connected directly to the connector **Air/ N_2 in**. Enclosed with the instrument is the **6.1808.040 M6/M8 tubing adapter** for a tubing with an M8 thread. The **6.1808.050 M8/tubing olive** can also be put in place in order to connect a simple tubing.

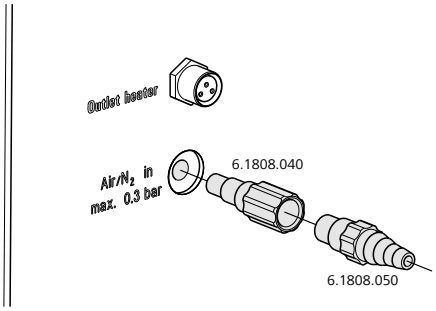


Figure 11 External gas supply connection

Warning

If gas is supplied from a pressure line or a pressure vessel, then it is imperative that a pressure reduction valve be placed upstream. The gas pressure may not exceed a maximum overpressure level of 0.3 bar.

3.10 Inserting the heating tube into the KF titration cell

The 885 Compact Oven SC can be used in combination with a KF coulometer or a volumetric KF titrator. The mounting of the tip of the heating tube is accomplished in different ways for the respective KF titration cells.

Coulometric KF titration cell

- Remove the protective cover from the tip of the heating tube and the E.3010.032 O-ring.
- Disassemble the accompanying **6.1446.170 heating tube stopper** into three parts.

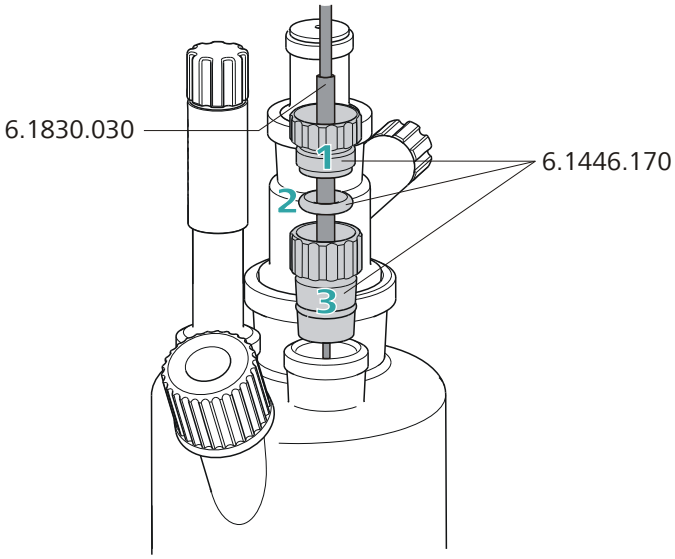


Figure 12 Coulometric KF titration cell

Proceed as follows:

1 Guide the upper part of the heating tube stopper over the tip of the **6.1830.030 heating tube** as shown in the illustration.

2 Guide the O-ring of the heating tube stopper over the heating tube.

3 Guide the lower part of the heating tube stopper over the heating tube and screw the three parts together (not too tightly).

4 Insert the stopper with the tip of the heating tube into one of the two SGJ openings of the KF titration cell

5 Shift the tip vertically in such a way that the outlet opening of the tubing is immersed as deeply as possible. The tip must not however be permitted to get in the way of the stirring bar in the KF titration cell. Afterwards give the heating tube stopper its final tightening.

Volumetric KF titration cell

- Remove the protective cover from the tip of the heating tube and the E.3010.032 O-ring. The latter you will still need.
- A **6.2730.020 septum stopper** is enclosed with every KF titrator made by Metrohm. Disassemble this septum stopper into three parts and remove the septum. It will not be required.

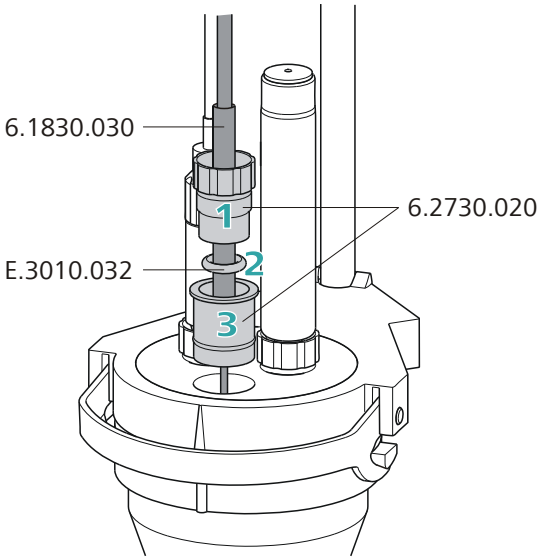


Figure 13 Volumetric KF titration cell

Proceed as follows:

1 Guide the upper part of the septum stopper over the tip of the **6.1830.030 heating tube** as shown in the illustration.

2 Guide the **E.3010.032** O-ring over the heating tube.

This O-ring is also part of the 6.1244.040 set of seals that is enclosed with each KF titrator. It cannot be reordered individually.

3 Guide the lower part of the septum stopper over the heating tube and screw the three parts together (not too tightly).

4 Insert the stopper with the tip of the heating tube into the front opening of the KF titration cell

5 Shift the height of the tip of the heating tube vertically in such a way that the outlet opening of the tubing is immersed as deeply as possible. The tip must not however be permitted to get in the way of the stirring bar in the KF titration cell. Afterwards give the septum stopper its final tightening.

3.11 Remote connections

The 885 Compact Oven SC can be used as a control device for a simple automation system with a large variety of different instruments. Even older Metrohm instruments can thus be integrated into an automated analysis system.

3.11.1 Remote cable

The following connecting cable can be used with the 885 Compact Oven SC:

6.2141.340 (9-pin/ 25-pin)

- For connections with a 756/831 coulometer, a 7xx Titrino or a Titrando by means of a Remote Box 6.2148.010.

The cable transmits start and stop signals from the 885 Compact Oven SC to the connected titrator and status signals (Cond OK, EOD) from the titrator to the 885 Compact Oven SC.

3.11.2 Example systems

The following illustrations show typical automation systems with different instrument combinations.

885 — 756/831 Coulometer/7xx Titrino

The standard combination for water determinations with a 7xx Coulometer or a 7xx KF Titrino.

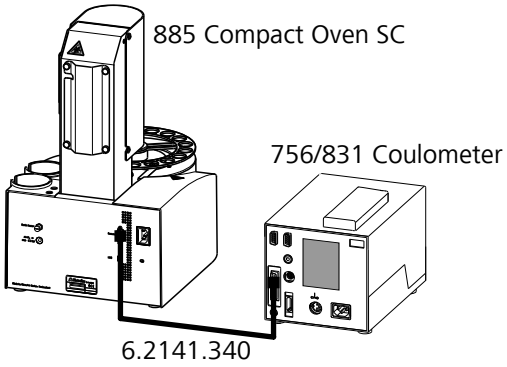


Figure 14 Remote connection 885 Compact Oven SC - Coulometer or 7xx KF Titrino

The titrator is operated in the KFC or KF mode. The sample series is started on the 885 Compact Oven SC

885 — 851 Titrando

The standard combination for water determinations with a Titrando and a Touch Control.

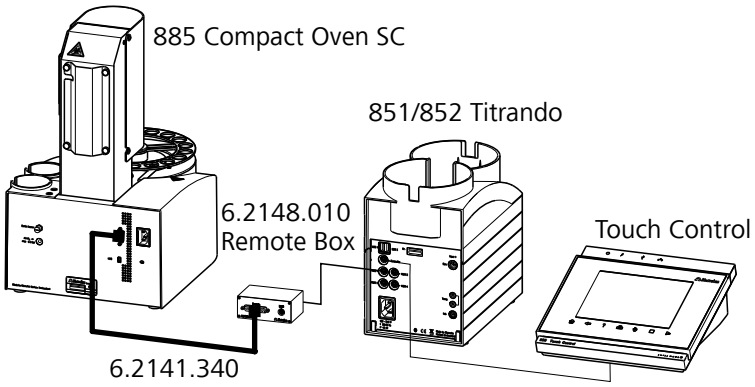


Figure 15 Remote connection 885 Compact Oven SC - Remote Box - 851/852 Titrando

The Titrando is operated in KFC mode. The sample series is started on the 885 Compact Oven SC.

3.12 Connecting a keyboard, printer and other USB devices

The 885 Compact Oven SC has a USB (OTG) connector. Use the provided 6.2151.100 adapter USB MINI (OTG) - USB A for connecting USB devices as e.g. printers, keyboards or USB sticks, see the following figure.

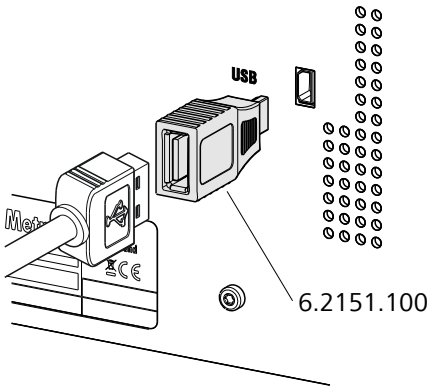


Figure 16 Connecting USB devices

Caution

Switch the instrument off before connecting or disconnecting a USB device or a USB stick.

The 885 Compact Oven SC can only recognize the device immediately after switching on.

The following devices can be operated **directly on the USB connector with the 6.2151.100 adapter**:

- USB sticks (for the backup or storing of methods)
- 6.2147.000 numerical USB keypad
- USB hub (with or without an own power supply)

The **6.2147.000 numerical USB keypad** serves for comfortable numerical input and for navigating in the dialog. In addition, it provides two USB connectors. Connect additional USB devices to the keypad.

Note

Most of the USB devices need a so-called hub in order to work correctly.

A USB hub is a distributor to which several USB devices can be connected. USB hubs are available in specialty stores in a number of different models.

The USB (OTG) connector of the 885 Compact Oven SC has no such hub. The 6.2147.000 numerical USB keypad has a USB hub and two USB connectors.

The following devices can **only be connected to a 6.2147.000 numerical keypad or to a USB hub**:

- Printer (with USB connector, use the 6.2151.020 connecting cable)
- Barcode reader (with USB cable)
- Mouse (PC mouse with USB cable, for navigating in the dialog)

The following devices can **only be connected to a USB hub**:

- PC keyboard (with USB cable, for the comfortable input of letters and numbers)
- Keypad with numerical keypad (with USB cable)

If you wish to connect **several different instruments without own power supply**, then you must possibly use a USB hub with own power supply (*self powered*). The USB (OTG) connector of the 885 Compact Oven SC is not designed for supplying power to several devices with elevated electricity requirements.

Examples:

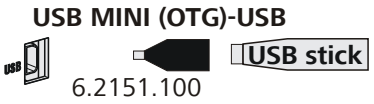


Figure 17 Connecting the USB stick

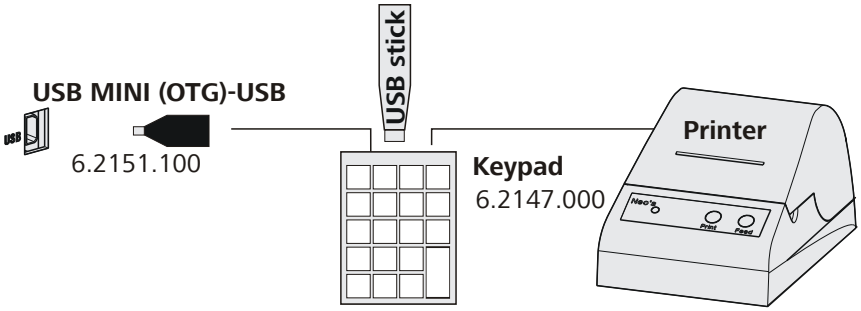


Figure 18 Connecting the 6.2147.000 USB keyboard with USB stick and printer

3.13 Connecting the mains cable

Warning

This instrument must not be operated except with the mains voltage specified for it (see rear of the instrument).

Protect the connection sockets against moisture.

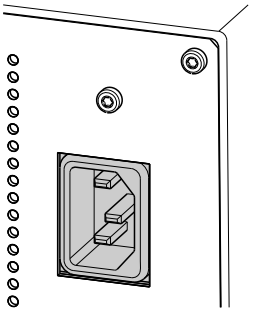


Figure 19 Connecting the mains cable

4 Automation sequence

4.1 Execution sequences

This automation sequence is comprised of three sequences:

- Start sequence
- Sample sequence
- End sequence

These sequences cannot be modified. However, the parameters which are decisive for a determination can be set in order to match specific methods *(see Chapter 7.1, page 51)*.

Start sequence

This command sequence is run one time after the method has been started. It is used for conditioning the entire system.

The oven is heated to the set temperature. The tubing system is rinsed with the carrier gas until all moisture has been expelled. The moisture is titrated in the titration cell.

The titrator is connected with the 885 Compact Oven SC by means of a remote cable. The latter starts the conditioning on the titrator through a control line in the remote cable. Once the titration cell is conditioned, the titrator switches a signal line to active. This signal line is monitored by the 885 Compact Oven SC.

The following steps are carried out in sequence:

- Move to the conditioning beaker
- Lower lift, pierce vial
- Switch on the gas flow
- Start conditioning at the titrator
- Heat the oven to the temperature set
- Wait while conditioning
  The signal line **Cond OK** must be active for 60 s.

Sample sequence

This command sequence is executed for every sample (or blank). It is repeated for each sample.

The total number of samples (or repetitions) and the rack position of the first sample (or blank) are entered when the method is started.

The following steps are carried out in sequence:

- Scan the **Cond OK** signal of the titrator
- Switch off the gas flow

- Move to the sample beaker
- Lower lift, pierce vial, move vial into oven
- Switch on the gas flow
- Start the titration at the titrator
- Record temperature and gas flow, wait for end of titration (**EOD** signal)
- Print out the report (optional)
- Switch off the gas flow
- Move to the conditioning beaker
- Lower lift, pierce vial
- Switch on the gas flow
- Wait while conditioning
  The signal line **Cond OK** must be active for 60 s.

End sequence

This command sequence is run one time after the last sample sequence. The parameter **End of series** can be used to control a slightly variant behavior.

The following steps are carried out in sequence:

- Switch off the gas flow
- Move to the conditioning beaker, do not lower the lift
- Stop titrator (only with **End of series** = **Stop**)
  The titrator is not stopped with **End of series** = **Conditioning**, i.e. the titration cell continues to be conditioned.
- Switch off the oven heating

4.2 Oven heating

The target temperature of the oven is established as quickly as possible with a high-performance heater and controlled by a reliable regulator. The oven temperature is continuously corrected and maintained as precisely as possible at the set value.

Note

The display always shows the oven temperature, not the temperature of the sample in the vessel. This can deviate from the oven temperature by several °C, because the flowing carrier gas cools the sample.

The heating is switched on automatically when the device is switched on. The oven will be heated to the temperature defined in the currently loaded method *(see page 51)*.

5 Operation

5.1 Switching the instrument on and off

Switching on the instrument

Proceed as follows:

1 ▪ Press the red **[STOP]** key.
The instrument is initialized and a system test performed. This process takes some time.

The main dialog is displayed:

Switching off the instrument

The instrument is switched off with the **[STOP]** key. The fact that the key needs to be pressed down for an extended time prevents accidental switch off.

Proceed as follows:

1 ▪ Keep the red **[STOP]** key pressed down for at least 3 s.

A progress bar is displayed. If the key is released during this time, then the instrument will not be switched off.

5.2 Fundamentals of operation

5.2.1 The keypad

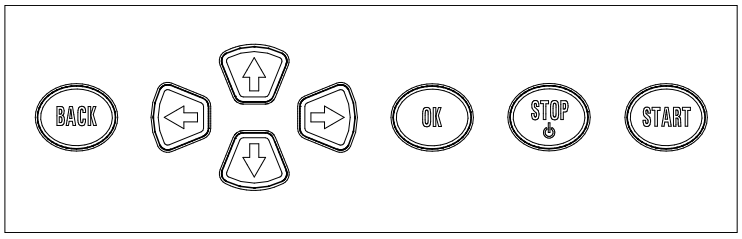


Figure 20 Keypad 885 Compact Oven SC

BACK Apply the input and exit the dialog.

⇧ ⇩ Move the selection bar either up or down by one line at a time. Select the character to be entered in the text editor.

⇦ ⇨	Select the character to be entered in the text and number editor. Select the individual functions in the function bar.
OK	Confirm the selection.
STOP	Stop an ongoing method run or a manual function. Switch the instrument on/off.
START	Start a method run.

5.2.2 Structure of the dialog windows

The current dialog title is displayed on the left-hand side of the title line. The current status of the system is displayed in the upper right-hand corner:

ready	The instrument is in normal status.
busy	A method has been started.
hold	A method has been paused.

Some dialogs have a so-called function bar on the bottom line. The functions contained therein can be selected with the arrow keys **[⇦]** or **[⇨]** and executed with **[OK]**.

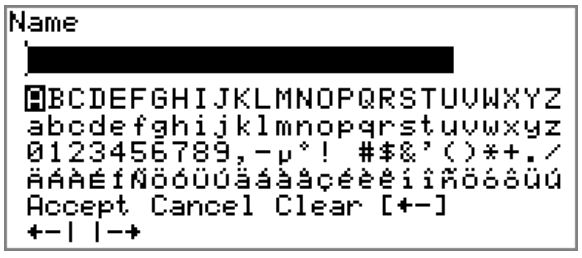
5.2.3 Navigating in the dialog

The selection bar is displayed in inverted style. Use the arrow keys **[⇧]** and **[⇩]** to move the selection bar upward or downward one line at a time. If a dialog text is marked with " **>** ", then additional settings are available in a subordinate dialog. Use **[OK]** to access this dialog.

Example: System settings

Use the **[BACK]** key to return to the next higher level.

5.2.4 Entering text and numbers



In the editing dialog for text or numerical input you can select the individual characters with the arrow keys. Use **[OK]** to apply the character in the input field. The following functions are available:

Editing function	Description
Accept	The modification is applied and the editing dialog is exited.
Cancel	The editing dialog is exited without applying the modification.
Clear	The content of the input field is deleted completely.
[←]	The character left of the cursor is deleted (backspace).
←|	Text editor only The cursor within the input field is shifted to the left by one character each time that **[OK]** is pressed.
|→	Text editor only The cursor within the input field is shifted to the right by one character each time that **[OK]** is pressed.
[BACK]	The modification is applied and the editing dialog is exited.

The **[BACK]** key has the same function as **Accept**.

5.3 Methods

The 885 Compact Oven SC operates with a specified procedural method. Various settings can be parameterized individually in the procedural method, depending on application. An optimized method run can be saved as a reusable method.

5.3.1 Creating a new method

Proceed as follows to create a new method:

1 Open the method table

- In the main dialog, select **Method** and press **[OK]**.

The method table opens:

2 Load an empty method template

- Use the arrow keys to select **New** and press **[OK]**.

The method template is now loaded and is displayed in the main dialog under **Method**.

If a new method has been created, then the individual parameters can be modified under **Menu ▶ Parameters**.

5.3.2 Saving a method

If you modify method parameters, then you can save these as your own method. A maximum of 100 methods can be saved.

To save a method, proceed as follows:

1 Open the method table

- In the main dialog, select **Method** and press **[OK]**.

The method table opens:

2 Modify/apply the method name

- In the function bar, select **Store** and press **[OK]**.
  A method name will be suggested for new methods. If the method has already been saved once, then the method name will be displayed:

Apply the name:

- Press **[BACK]**.

The method will be saved and the method table is displayed.

Enter a new name:

- Press **[OK]**.
  The text editor opens.
- Enter a method name (max. 12 characters) and apply with **Accept** or **[BACK]**.
- Press **[BACK]**.

The method will be saved and the method table is displayed.

5.3.3 Loading a method

To load a method, proceed as follows:

1 Open the method table

- In the main dialog, select **Method** and press **[OK]**.

The method table with the stored methods opens:

2 Select a method

- Select the desired method.

3 Load the method

- In the function bar, select **Load** and press **[OK]**.

The method is now loaded and is displayed in the main dialog under **Method**.

5.3.4 Exporting a method

The methods can be exported on a connected USB stick.

Note

This function is possible only if a USB stick is connected as an external storage medium.

To export a method, proceed as follows:

1 Open the method table

- In the main dialog, select **Method** and press **[OK]**.

The method table with the stored methods opens:

2 Select a method

- Select the desired method.

3 Export the method

- In the function bar, select **Export** and press **[OK]**.

The method is being exported. The directory structure on the USB stick is listed in *chapter 6.2, page 44*.

5.4 Performing a sample series

Blanks should always be at the first sample position so that the blank values determined are available with every sample processing.

5.4.1 Starting the sample series

Starting a sample series

A suitable method must be loaded before a sample series is started *(see Chapter 5.3.3, page 32)*. The necessary parameters) can then be modified.

1 Define the sample series

Press the **[START]** key.

You can now enter the quantity and the first rack position of the samples to be processed.

2 Enter the number of samples

- Select **Number of samples** and press **[OK]**.
- Enter the number of samples including the blanks.
- Close the input dialog with **[BACK]** or **Accept**.

Note

Take care to ensure that the number of samples matches the number of sample data entered in the titrator.

3 Enter the rack position of the first sample

- Select **Next sample pos.** and press **[OK]**.
- Enter the starting position of the sample series.
- Close the input dialog with **[BACK]** or **Accept**.

The value for the number of samples remains saved for the next sample series. The position of the first sample is increased with each method run.

You can still cancel the start of the sample series at this time with **[BACK]** or **[STOP]**.

4 Close the sample series dialog

Close the dialog with the **[BACK]** key.

Stopping a sample series

A sample series can be canceled at any time.

1 Press the **[STOP]** key.

The method run is stopped. The sample series cannot be resumed.

5.4.2 Pausing a sample series and continuing

Pausing a sample series

A method run of the 885 Compact Oven SC can be paused and then continued again. The connected instruments are however **not** paused.

Note

Interruption of the method run is not possible during the execution of commands during which the 885 Compact Oven SC waits for a signal from the connected titrator. This is the case during the conditioning of the titration cell and the execution of the KF titration.

A function bar with the entry "**Hold**" is displayed during the run of a sample series in the so-called "Live" dialog.

1 Press the **[OK]** key.

The method run is paused. However, currently running movements of the sample rack or the lift will be finished.

Instead of the "**Hold**" function, "**Continue**" is displayed in the function bar.

Continuing sample series

If a method run is paused, then the "**Hold**" status is displayed in the title bar, see previous figure. The sequence can be continued with the "**Continue**" function.

In the "**Hold**" status, a method run can be stopped completely, and with it the entire sample series, by pressing the **[STOP]** key.

1 Press the **[OK]** key.

As is also the case at the start of a sample series, a request dialog appears here in which the number of samples to be processed can

still be changed. It is thus possible to shorten a sample series or to extend it, without stopping it.

2 Press the **[OK]** key and enter the number of samples that still need to be processed. The current sample must be taken into account.

3 Press the **[START]** key.

The sample series continues.

5.5 Printing a report manually

Menu ▸ Print reports

To print a report manually, proceed as follows:

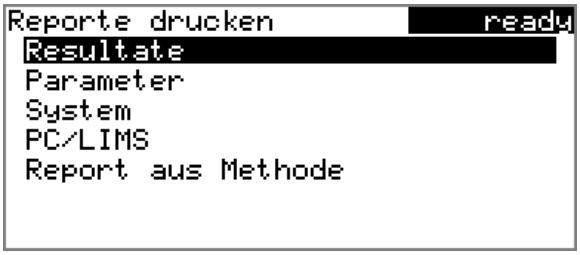
1 Open the main menu

- In the main dialog, select **Menu** and press **[OK]**.

2 Open the print dialog

- Select the menu item **Print reports** and press **[OK]**.

The dialog window with the available reports opens:



3 Select a report

- Select the desired report and press **[OK]**.

The report is being printed out.

The following reports can be printed out manually:

Results	Result report with temperatures and gas flows etc.
Parameters	Report with all method parameters of the loaded method.
System	System report with system settings, solution list, external devices, etc.
PC/LIMS	Machine-readable report with all of the data for a determination. This report can be saved as a TXT file on a connected USB stick or sent to a terminal program or to a LIMS via an RS-232 interface. The definition is made in the system settings *(see "PC/LIMS report", page 47)*.
Report as in method	The reports that are defined in the method will be printed out.

5.6 Manual control

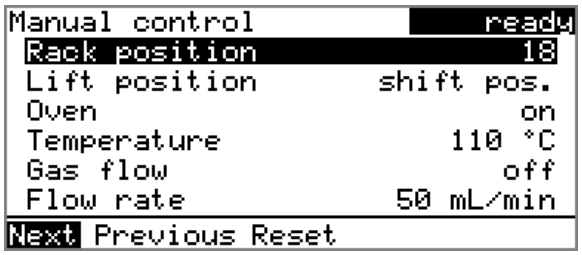
Menu ▸ Manual control

The following functions are available in the manual control:

- Rotating the sample rack (**Rack position**)
- Moving the lift (**Lift position**)
- Switching the oven on/off (**Oven**)
- Setting the temperature (**Temperature**)
- Switching the gas flow on/off (**Gas flow**)
- Setting the flow rate (**Flow rate**)

The available subfunctions are listed for each function in the function bar.

5.6.1 Rotating the sample rack



If the **Rack position** line is selected, then the arrow keys **[⇨]** and **[⇦]** can be used to select one of the following functions, which can then be run by pressing **[OK]**:

Next — The lift is moved upward and the next-higher rack position is placed in front of the lift.

If the **[OK]** key remains pressed, the rack automatically moves to the next position.

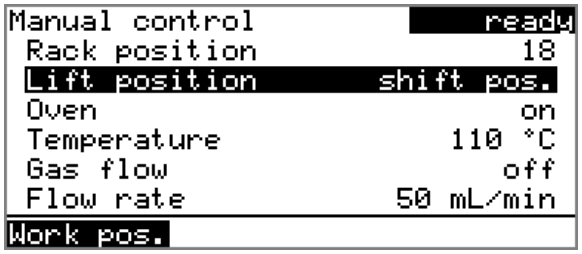
Previous — The lift is moved upward and the next-lower rack position is placed in front of the lift.

If the **[OK]** key remains pressed, the rack automatically moves to the next position.

Reset — The rack is initialized. The lift is moved upward and the sample rack is rotated to the starting position. At the same time, the starting position (**Next sample pos.**) is reset to **1** for the start of the next sample series.

The rack position display is always updated as soon as the rack is in the new position.

5.6.2 Moving the lift



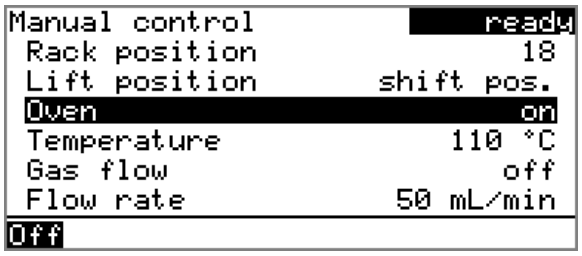
If the **Lift position** line is selected, then the lift can be moved to the position suggested in the function bar by pressing **[OK]**. Only two positions are possible:

Work pos. — The working height. It can be set under **Menu ▸ System ▸ Lift** .

Shift pos. — The rotating height. The lift moves all the way to the top.

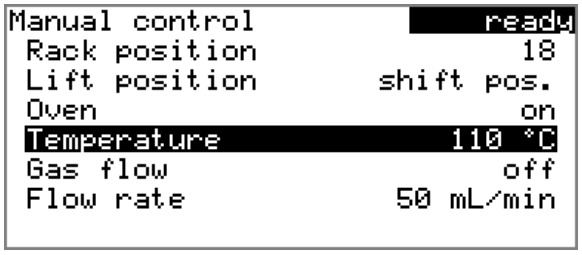
The current lift position is displayed. The respective other possible position is offered in the function bar.

5.6.3 Switching the oven on/off



If the line **Oven** is selected, then oven heating can be switched off and on again with the **[OK]** key.

5.6.4 Entering the oven temperature



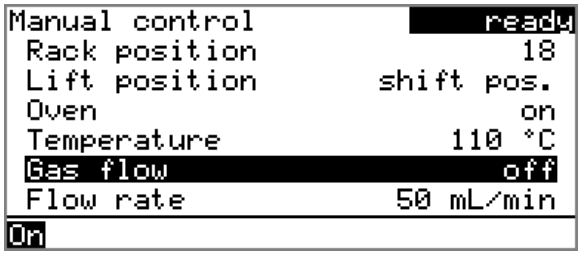
If the line **Temperature** is selected, then a temperature value can be entered with **[OK]**.

Temperature

Setpoint value for the oven heating.

Range	**50 ... 250 °C** (Increment: **1**)
Default value	**100 °C**

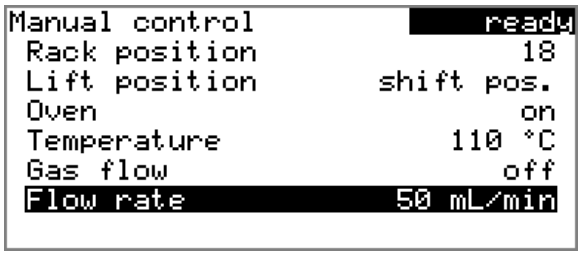
5.6.5 Switching the gas flow on/off



If the line **Gas flow** is selected, then the gas flow can be switched on and off again with the **[OK]** key.

The question of whether the installed pump or the valve for the gas supply connection (Air/N_2 in) is switched on depends on whether, under **Parameters** (method-specific), the **Gas supply** is set to **pump** or **valve**.

5.6.6 Entering the flow rate



If the line **Gas flow** is selected, then a value for the flow rate of the gas can be entered with **[OK]**.

Gas flow

Default value for the gas flow.

Range	**10 ... 150 mL/min** (Increment: **1**)
Default value	**50 mL/min**

6 System settings

6.1 Basic settings

Menu ▸ System ▸ Settings

This chapter contains a description of general instrument settings.

User name

A user name can be entered here for the report. This parameter will only be printed if a user has been defined.

Input	**max. 12 characters**
Default value	**empty**

Instrument name

An instrument name can be entered here for the report. This parameter will only be printed if a designation has been defined.

Input	**max. 10 characters**
Default value	**empty**

Serial number

Serial number of the instrument. This is printed as a component of the instrument identification in the report header.

Program version

Version number of the instrument software. This is printed as a component of the instrument identification in the report header.

Time

Current time. Only valid numbers can be entered.

Format: hh:mm:ss

Date

Current date. Only valid numbers can be entered.

Format: YYYY:MM:DD

Language

Setting the dialog language. In addition to English one further language can be selected.

Note

A second language must be installed in advance in order to be able to select it here. The installation may only be carried out by competent personnel.

Dialog type

The user dialog can be limited for routine operations. One can operate normally with methods in the limited dialog. However, no settings can be made or methods deleted.

The resetting of the dialog does not take effect until the main menu is exited.

The limitation of the dialog has the following effects:

- The menu items **System** and **Parameters** are not shown in the main menu.
- Methods can only be loaded, but not deleted, exported or created.

Note

If the limited dialog is activated for routine operations, then the expert dialog cannot be switched on during running operations. To change the dialog type, the 885 Compact Oven SC must be switched off and then back on again. The expert dialog can be forced at the time the instrument is started. Then it is possible to enter whatever settings one wishes, e.g. the changing of the dialog type. If the instrument is switched off again without changing the dialog type, then the routine dialog will remain activated.

Forcing the expert dialog:

- Switch on the instrument.
- Wait for the display of the instrument logo with the lettering **easy, safe, precise**.
- Press the **[STOP]** key once again and hold it down while also briefly pressing the **[BACK]** key.
- Release both keys once again.

Selection	**Expert** | **Routine**
Default value	**Expert**

Expert
Complete dialog.

Routine
Limited dialog for routine operations.

Contrast

The contrast of the display can be adjusted with the arrow keys **[⇦]** and **[⇨]**.

- **[⇦]**: the contrast will be decreased by one step each time the key is pressed.
- **[⇨]**: the contrast will be increased by one step each time the key is pressed.

Range	**150 ... 240**
Default value	**212**

Note

Alternatively, the contrast can also be modified in the following manner:

Keep the red **[STOP]** key pressed down. As soon as the progress bar appears, also press the arrow key **[⇩]** or **[⇧]** repeatedly.

This method will however cause the contrast to be modified by several steps.

Beep

If this parameter is activated, then a short beep will be heard in the following cases:

- When a key is pressed.
- At the end of the determination.

Selection	**on** | **off**
Default value	**on**

6.2 File management

Menu ▸ System ▸ File management

Note

This menu item is visible only when a USB stick has been connected as an external storage medium.

Methods can be imported and deleted from a USB stick in this dialog. Only methods located in the **Files** directory are displayed in the list *(see "Directory structure on the USB stick", page 44)*.

A backup can be made of the system (all data and settings). Similarly, an existing backup can be reloaded.

Import

Import the selected method.

Delete

Delete the selected method.

Backup

Create a backup of all data and settings on the USB stick.

Note

Only **one** backup can be created on the same USB stick.

If a backup has already been stored on the stick, then it will be overwritten when this function is carried out again.

Restore

Load the backup from a connected USB stick.

Directory structure on the USB stick

A directory with the instrument number is generated on the USB stick. The structure within the directory appears as follows:

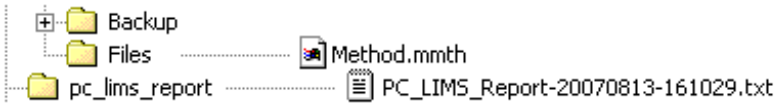
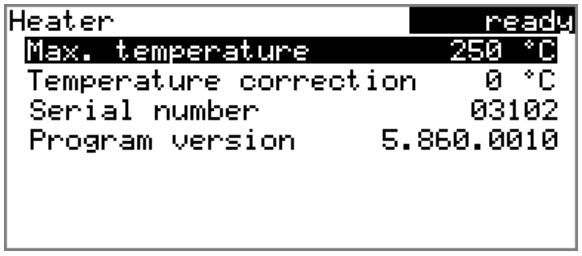


Figure 21 Directory structure on the USB stick

Backup	All of the files of the backup are stored in this directory. The directory will be created the first time a backup is created.
Files	Exported methods will be stored in this directory. The directory will be created the first time a method is exported. Only methods being located in this directory can be imported.
pc_lims_report	PC/LIMS reports are stored in this directory as TXT files. The directory will be created the first time a PC/LIMS report is printed out.

6.3 Oven settings (heater)

Menu ▸ System ▸ Heater



Max. temperature

Maximum oven temperature. This setting can be used to limit the input range for the oven temperature.

Range	**50 ... 250 °C** (Increment: **1**)
Default value	**100 °C**

Temperature correction

The default value for the temperature control of the oven can be influenced with this correction value. A temperature difference between the oven module and the sample in the vessel can thus be brought into line as needed.

Range	**-10 ... 10 °C** (Increment: **1**)
Default value	**0 °C**

The determination of the necessary temperature correction can be accomplished with a special oven insert and should be performed by a service technician. Contact your responsible Metrohm supplier.

Serial number

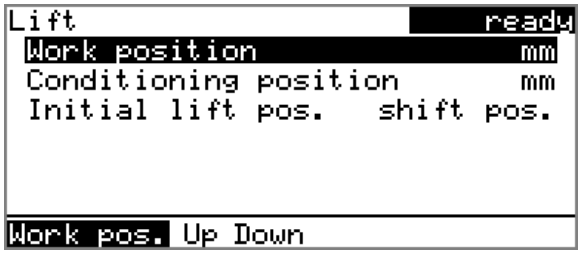
Serial number of the oven module. It cannot be modified.

Program version

Version number of the oven modules' firmware. It cannot be modified.

6.4 Lift settings (Lift)

Menu ▸ System ▸ Lift



Work position

The working height of the lift (sample position) can be set to the desired value. This is accomplished by means of the direct operation of the lift. In order to set this lift height, the sample rack must first be moved to a random sample position (not the conditioning position).

Three functions can be selected from the function bar with **[⇦]** and **[⇨]** and then executed by pressing **[OK]**:

- **Work pos.** moves the lift to the current working height.
- **Up** moves the lift 6 mm upward.
- **Down** moves the lift 6 mm downward.

When this dialog page is exited, the respective current lift position will be applied as **Work position**.

Note

Recommended settings:

With **6.2049.050 needle holder**: 78 mm (do not move lower)

With **6.2049.040 needle holder**: 96 mm

Range	**0 ... 96 mm** (Increment: **6**)
Default value	**78 mm**

Conditioning position

The working height of the lift (at the conditioning position) can be set to the desired value. This is accomplished by means of the direct operation of the lift. In order to set this lift height, the sample rack must first be moved with manual operation to the conditioning position of the rack.

Three functions can be selected from the function bar with **[⇦]** and **[⇨]** and then executed by pressing **[OK]**:

- **Cond. pos.** moves the lift to the current working height.
- **Up** moves the lift 6 mm upward.
- **Down** moves the lift 6 mm downward.

When this dialog page is exited, the respective current lift position will be applied as **Cond. pos.**.

Range	**0 ... 96 mm** (Increment: **6**)
Default value	**36 mm**

6.5 Configuring external devices

Menu ▸ System ▸ External devices

PC/LIMS report

Specification of the memory location for the PC/LIMS report. The PC/LIMS report is a machine-readable report with all of the data important for a determination. It can be saved as follows:

- as a TXT file on a USB stick.
- to a LIMS via an RS-232 interface. The 6.2148.030 RS-232/USB Box is required for this purpose.

Selection	**COM2** | **USB Stick**
Default value	**USB Stick**

COM2
The report is sent via the serial COM2 interface. The interface parameters set in the dialog **COM2 settings** are used *(see "Editing the COM2 settings", page 48)*.

USB Stick
The report will be saved as a TXT file on the USB stick in the folder **pc_lims_report**.

Printer

If a printer is connected, then the printer type needs to be defined here in order for the reports to be printed out correctly.

The printers that have the designation **ESC-POS** are so-called POS printers (point-of-sale printers), i.e. they print on continuous paper.

Selection	**Citizen (ESC-POS)** | **Custom (ESC-POS)** | **Epson** | **Epson (ESC-POS)** | **HP DeskJet** | **HP LaserJet** | **Seiko (ESC-POS)**
Default value	**HP DeskJet**

Keyboard layout

A commercially available USB keyboard can be connected to make it easier to enter text and numbers. Specify the country-specific keyboard layout here.

Selection	**English US** | **French FR** | **German CH** | **German DE** | **Spanish ES**
Default value	**English US**

Editing the COM2 settings

Menu ▸ System ▸ External devices ▸ COM2 settings

Under **COM2 settings**, the interface parameters for devices connected to the **RS-232/2** connector of the RS-232/USB Box are set (e.g. PC). These settings are necessary, e.g. for the dispatching of a PC/LIMS report to a PC.

Baud rate

Transfer rate in characters per second.

Selection	**1200** | **2400** | **4800** | **9600** | **19200** | **38400** | **57600** | **115200**
Default value	**9600**

Data bits

Number of data bits.

Selection	**7** | **8**
Default value	**8**

Stop bits

Number of stop bits.

Selection	**1** | **2**
Default value	**1**

Parity

Type of parity testing.

Selection	**even** | **none** | **odd**
Default value	**none**

Handshake

Type of data transfer protocol.

Selection	**hardware** | **software** | **none**
Default value	**hardware**

Note

In case of communication problems, try the software handshake (**software**).

6.6 Instrument diagnosis

6.6.1 Loading program versions and language files

Menu ▸ System ▸ Diagnosis

New program versions or language files can be loaded from a USB stick. The corresponding file must be saved on the USB stick in a directory with the instrument number (e.g. 848 or 863).

You can distinguish between language files and program files by noting how the file name is constructed.

Program files

They are instrument-specific. The file name has the following structure:

5XXXyyyy.bin where

XXX = Instrument type (e.g. 848 for the 848 Titrino plus)

yyyy = Program version

Language files

They can be recognized by means of the two-digit language code in the file name. A language file contains the dialog texts for various instrument types. It is not instrument-specific. The file name has the following structure:

5848xxxxYY.bin where

xxxx = Version number

YY = Language, e.g. DE (German), FR (French), ES (Spanish)

Loading a file

Proceed as follows:

1 Connect the USB stick

- Plug in the USB stick with the 6.2151.100 adapter (USB MINI (OTG) - USB A) at the USB connector on the instrument.
- Switch on the instrument.

2 Open the update dialog

- Under **Menu ▸ System ▸ Diagnosis**, select the menu item **Software update**.
- Press **[OK]**.

3 Open the file selection

- Press **[OK]**.

The selection list with the program and language files available on the USB stick is opened.

4 Select the file

- Select the required file with the arrow keys.
- Press **[OK]**.

5 Start the update

- Press **[START]**.

The update process is started, it runs automatically. At the end of the process, the instrument is automatically switched off and then back on again. No user intervention is required.

6.6.2 Diagnosis functions

Electronic and mechanical functional groups in Metrohm instruments can and should be checked as part of regular maintenance by specialist personnel from Metrohm. Please ask your local Metrohm agent regarding the precise terms and conditions involved in concluding a corresponding maintenance agreement.

7 Parameters

Menu ▸ Parameters

7.1 Automation

Temperature

Default value for the oven temperature.

Range	**50 ... 250 °C** (Increment: **1**)
Default value	**100 °C**

Flow rate

Default value for the gas flow.

Range	**10 ... 150 mL/min** (Increment: **1**)
Default value	**50 mL/min**

Gas supply

Selection of the gas supply.

Selection	**pump** | **valve**
Default value	**pump**

pump
Built-in air pump.

valve
Inlet valve for inert gas.

Gas type

Selection of the gas.

Selection	**air** | **nitrogen** | **other**
Default value	**air**

other
If **other** is selected, then a measuring factor for the gas that is used must be specified. The measuring factor is used for the correct measurement of the flow rate.

Measuring factor

Measuring factor for measuring the flow rate of the gas. This setting is only possible if **other** is selected as the gas. The corresponding measuring factor is automatically applied for air and nitrogen.

Only when 'Gas type' = 'other'.

Range	**0.001 ... 2.000** (Increment: **0.001**)
Default value	**1.000**

Table 1 Measuring factors of different gases

Gas type	Measuring factor
Argon	0.950
Helium	0.300
Oxygen	1.000
Air	1.000
Nitrogen	1.000

End of series

Behavior of the instrument at the end of the sample series.

Selection	**Stop** | **Conditioning**
Default value	**Stop**

Stop
After the last sample, the entire system is conditioned one more time. Afterwards, the needle is moved out of the conditioning vessel. The gas flow and the oven heating are switched off. The titrator is stopped.

Conditioning
After the last sample, the entire system is conditioned one more time. Afterwards, the needle is moved out of the conditioning vessel. The gas flow and the oven heating are switched off. The titrator is kept in conditioned status.

Conditioning timeout

This setting determines the maximum waiting time for conditioning. If no stable conditioning signal is obtained from the titrator during this waiting time for a total duration of 60 s, then an error message will be displayed, after which the sample series will be stopped.

Range	**2 ... 120 min** (Increment: **1**)
Default value	**30 min**

7.2 Reports

Menu ▸ Parameters ▸ Reports

The reports that will be printed out automatically in connection with a determination are defined under **Reports**.

Results

The result report contains information concerning oven temperature and gas flow during the determination.

Selection	**on** | **off**
Default value	**off**

Parameters

All of the parameters of the current method are printed out with the parameter report.

Selection	**on** | **off**
Default value	**off**

PC/LIMS

The PC/LIMS report is a machine-readable report with all of the data important for a determination. The PC/LIMS report can be saved as a TXT file on a USB storage medium or sent via an RS-232 interface to a LIMS. The output location is defined in the system settings *(see "PC/LIMS report", page 47)*.

The file name of the TXT file is constructed as follows: *PC_LIMS_Report-ID1-YYYYMMDD-hhmmss.txt*.

Selection	**on** | **off**
Default value	**off**

8 Carrying out a determination

Moisture determinations according to the oven method require the conditioning of the entire tubing system and of the KF titration cell before a determination can be carried out. Because the sample vials and the septum seals may contain small amounts of moisture, three to five blank value determinations must be carried out with sealed, empty vessels.

Solid or liquid samples are weighed in into sample vials, which are then sealed. We recommend that the 6.2420.007 sample vials be used with the 6.1448.067 septum seals (with screw cap). The silicone septum of the aluminum cap is resistant to temperatures of up to 250 °C and has proven itself to be exceptionally reliable.

8.1 Conditioning the system

The entire system must be conditioned prior to use, i. e. it must be absolutely water-free. The oven must be heated to the desired working temperature for this purpose. The needle must be inserted into a sealed sample vessel (conditioning vessel) in order to flush the entire tubing system with the carrier gas. The gas supply is thus connected with the heating tubing. This can all take place automatically in a normal method run.

8.1.1 Preparing the KF titration cell

Filling the KF titration cell

The KF titration cell must remain filled with conditioned working medium when not in use. The working medium must be replaced from time to time, even though the sample is not transferred into the working medium using the oven method.

Prepare the KF titration cell as follows:

1. Fill the KF titration cell with working medium. We recommend approximately 150 mL of working medium when using a coulometer cell and approximately 35 mL with a volumetric KF titration cell. The shaft of the heating tubing must, however, not be immersed.
2. Align the tip of the heating tubing against the vessel wall.
3. Switch on the stirrer. Set the stirring rate to high.

It is advantageous for air bubbles to be stirred into the working medium and forcefully broken up in the process. The air in the KF titration cell must also be dried.

Creating a sample table at the titrator

1 Create a sample table on the KF titrator. For each blank, insert a line which calls up a method for the determination of a blank.

You will find the necessary settings for the method in the KF titrator manual.

Note

It is imperative that an **Extraction time** of **at least 300 seconds** be set in the titration method for a determination using the oven method.

The 885 Compact Oven SC is not equipped with a serial connection (RS232). Therefore, on the coulometer, switch the setting **Oven:** to **no** under **PARAM** ▸ **Preselect**.

2 Deactivate the autostart function of the titrator.

8.1.2 Preparing the 885 Compact Oven SC

Selecting a method

Proceed as follows:

1 Switch on the instrument.

2 Use the arrow keys to select the line **Method** and press **[OK]**.

3 Select the desired method and press **[OK]** again.

Inserting the conditioning vessel

1 Seal an empty sample vessel tightly with a septum seal.

2 Place the sealed vessel at the position **Cond. Pos** on the rack.

Preparing blanks

1 Seal 3 to 5 empty sample vessels tightly with a septum seal.

2 Place the blanks on the first positions on the rack.

Preparing samples

1 Weigh in the samples into empty sample vessels and seal the vessels tightly with a septum seal.

2 Place the sealed sample vessels on the rack in suitable sequence (after the blanks).

3 Enter the sample IDs and the sample sizes of the samples in the correct sequence in the sample table of the titrator. Specify the titration method for the samples in each line.

Starting the method

1 Press the **[START]** key on the 885 Compact Oven SC.

The sample rack is rotated. The lift moves downwards and the needle pierces the septum of the conditioning vessel.

The gas flow is switched on automatically.

The titrator is started by the 885 Compact Oven SC with an electrical signal. The conditioning of the titration cell begins.

Note

The carrier gas should emerge from the tip of the heating tubing into the working medium as tiny bubbles and be spun there forcefully. Modify the stirring rate if necessary. The tip of the tubing should be immersed until it reaches the bottom of the KF titration cell and be rotated against the vessel wall.

Swivel the KF titration cell now and again in order to remove the last traces of moisture.

If the required oven temperature has not yet been reached, then waiting continues until this is the case. Afterwards, the 885 Compact Oven SC

waits for a **Cond OK** signal from the titrator. If this signal remains stable for 60 s, then the sequence is resumed with the actual determination.

9 Handling and maintenance

9.1 General

The 885 Compact Oven SC requires appropriate care. Excess contamination of the instrument may result in malfunctions and a reduction in the service life of the sturdy mechanics and electronics of the instrument.

Severe contamination can also have an influence on the measured results. Regular cleaning of exposed parts can prevent this to a large extent.

Spilled chemicals and solvents must be removed immediately. Above all, the plug connections (in particular the mains connection socket) should be protected from contamination.

Check all tubing connections regularly for leakage.

9.2 Quality Management and validation with Metrohm

Quality Management

Metrohm offers you comprehensive support in implementing quality management measures for instruments and software. Further information on this can be found in the brochure **«Quality Management with Metrohm»** available from your local Metrohm agent.

Validation

Please contact your local Metrohm agent for support in validating instruments and software. Here you can also obtain validation documentation to provide help for carrying out the **Installation Qualification** (IQ) and the **Operational Qualification** (OQ). IQ and OQ are also offered as a service by the Metrohm agents. In addition, various application bulletins are also available on the subject, which also contain **Standard Operating Procedures** (SOP) for testing analytical measuring instruments for reproducibility and correctness.

Maintenance

Electronic and mechanical functional groups in Metrohm instruments can and should be checked as part of regular maintenance by specialist personnel from Metrohm. Please ask your local Metrohm agent regarding the precise terms and conditions involved in concluding a corresponding maintenance agreement.

Note

You can find information on the subjects of quality management, validation and maintenance as well as an overview of the documents currently available at *www.metrohm.com/com/* under **Support**.

10 Appendix

10.1 Practical notes

Carrier gas selection

If the hot sample is sensitive to air or oxygen (decomposition) and releases substances that disrupt the KF reaction, then nitrogen (N_2) should be used as the carrier gas.

Temperature setting

The temperature selected should be as high as the sample allows (high temperature = shorter analysis time). The sample may not however decompose. It must not release any oxidizable substances, only water.

The displayed temperature refers to the temperature in the heating block and not to the sample temperature. Depending on the size of the vial used, the gas flow and the temperature setting, the actual temperature of the sample can deviate up to 10 %.

Gas flow

If the needle is inserted into the sample vessel until it stops, then the gas flow moves through the sample and then through the outlet needle into the titration vessel where the moisture is titrated. If the needle is not permitted to immerse into the sample, then a longer needle holder can be used, see the chapter "Optional accessories".

The gas flow should be kept as low as possible. Particularly in the case of very moist samples, care must be taken to ensure that excessively large quantities of water are not released too quickly into the titration vessel. In addition, there is the danger of condensate formation in the heating tubing. The working medium in the cell must be able to absorb the moisture that is expelled without delay. Normally, a flow rate of 40…60 mL/min is optimal.

Extraction time

An extraction time of a minimum of 5 minutes should be set on the titrator in order to prevent the titration from being stopped before the sample has released its water.

Conditioning the system

The system must be conditioned with an empty, sealed sample vial (conditioning vessel) before a determination is made.

10.2 Remote interface

10.2.1 Pin assignment of the remote interface

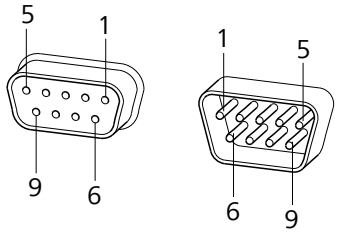


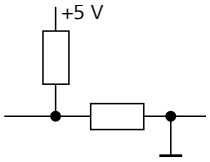
Figure 22 Pin assignment of remote socket and plug

The above figure of the pin assignment applies for all Metrohm instruments with 9-pin D-Sub remote connectors.

Table 2 Inputs and outputs of the remote interface

Pin No.	Assignment	Function
1	Output 0	Sample Ready
2	Output 1	Temperature ok
3	Output 2	Flow on
4	Output 3	
5	Output 4	Error
6	0 volt (GND)	
7	+5 volts	
8	Input 0	Continue
9	Input 1	Cond ok

Inputs

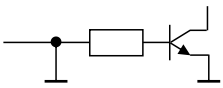


approx. 5 kΩ Pull-up

t_p > 100 ms

active = low, inactive = high

Outputs



Open Collector

t_p t_p > 200 ms

active = low, inactive = high

I_C = 20 mA, V_{CEO} = 40 V

+5 V: maximum load = 20 mA

10.2.2 Status diagram of the remote interface

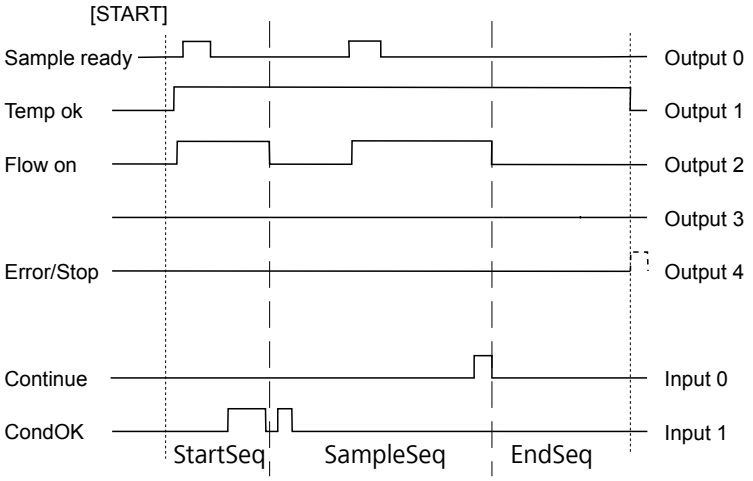


Figure 23 Remote status diagram

10.3 System initialization

In very rare instances, it could happen that a faulty file system (e.g. because of a program crash) will lead to an impairment of program functioning. The internal file system needs to be initialized in such cases.

Caution

All user data (methods, solutions, etc.) are deleted if a system initialization is carried out. Afterwards, the instrument will have the factory settings again.

We recommend creating a backup copy of the system at regular intervals in order to avoid data losses.

After a system initialization the program versions and language files do not have to be reloaded. Only the selection of the dialog language may have to be reset in the system settings.

Proceed as follows for system initialization:

1 Switch off the instrument

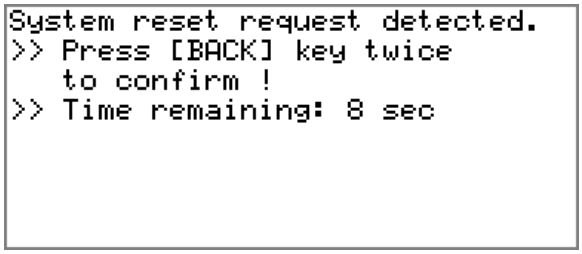
- Keep the red **[STOP]** key pressed down for at least 3 s.

A progress bar is displayed. If the key is released during this time, then the instrument will not be switched off.

2 Switch on the instrument

- Keep the red **[STOP]** key pressed down for approx. 10 s.

The dialog for confirmation of the initialization is displayed for 8 s. The initialization must be confirmed during this time.



3 Confirm the initialization

Note

If the query is not confirmed within 8 s, then the procedure will be interrupted.

- Press **[BACK]** twice.

Initialization is started. The process takes approximately 80 s. The instrument will be automatically restarted after successful initialization.

10.4 Literature

- E. Scholz, *Hydranal®-Manual*, Riedel-de Haën, 1996
- P. Bruttel, R. Schlink, *Water determination by Karl Fischer Titration* Monograph, Metrohm, 2006, Order no. 8.026.5013

11 Troubleshooting

11.1 885 Compact Oven SC

Problem	Cause	Remedy
The drift is very high during conditioning.	*Molecular sieve of drying flasks and/or the titration cell exhausted.*	Replace the molecular sieve.
	The titration cell is leaking.	Check seals. If necessary, replace.
The titration time is too long.	*The sample is non-homogenous.*	Pulverize the sample or homogenize it before weighing in.
	Moisture not fully expelled.	Select more stringent switch-off criteria on the KF titrator: lower stop drift, higher switch-off delay time.
	Tubing connections leaking.	Inspect tubing and replace as necessary.
The results are spread widely.	*Molecular sieve of drying flasks exhausted.*	Replace the molecular sieve.
	Condensate in the heating tubing.	▪ Dry the tubing. ▪ Reduce the gas flow. ▪ Perhaps lower the oven temperature.
	Gas flow too high.	Reduce the gas flow.
	The sample is non-homogenous	Pulverize the sample or homogenize it before weighing in.
Selected gas flow is not achieved.	*The system is leaking.*	Check all tubing connections and drying flasks for leaks.
	Pressure from external gas supply either too low or too high.	Adjust the gas pressure (max. 0.3 bar).
	Pump defective.	Contact a service technician.

12 Technical specifications

12.1 Lift

Stroke path	96 mm
Maximum load	5 N
Lift rate	15 mm/s (typical)

12.2 Turntable

Rack positions	18
Maximum load	17 N
Shift rate	13 degrees/s (typical)

12.3 Oven

Temperature range	50…250 °C
Precision	±3 °C
Correction range	-10…+10 °C
Heating cartridge performance	165 W typical Depending on mains voltage
Heating rate	Typically 15 °C/min (at 80…180 °C, 230 V) Dependent on temperature, mains voltage, sample amount and vessel dimensions
Cooling rate	Typically 9 °C/min (at 180…80 °C) Dependent on temperature, sample amount and vessel dimensions

12.4 Gas flow

Flow range	10…150 mL/min Under normal conditions

12.5 Outlet heater

Socket connection	U = 16 ±1 V I ≤ 0.8 A
Typical tubing temperature	approx. 50 °C

12.6 Interfaces and connectors

USB (OTG) connector	For connecting USB devices.
Remote connector	For connecting instruments with a remote interface.

12.7 Mains connection

Voltage	100…120 / 220…240 V
Frequency	50 / 60 Hz
Power consumption	200 W
Fuse	2.0 ATH

12.8 Reference conditions

Ambient temperature	+25 °C (±3 °C)
Mains voltage	230 V
Relative humidity	≤ 60 %
Instrument status	> 30 min into operation
Validity	After adjustment

12.9 Safety specifications

Design and testing According to EN/IEC 61010-1, UL 61010-1, CSA-C22.2 No. 61010-1, EN/IEC 61010-2-010, EN/IEC 61010-2-081, protection class I

Safety instructions This document contains safety instructions which have to be followed by the user in order to ensure safe operation of the instrument.

12.10 Electromagnetic compatibility (EMC)

Emission Standards fulfilled:
- EN/IEC 61326-1
- EN/IEC 61000-6-3
- EN 55011 / CISPR 11
- EN/IEC 61000-3-2
- EN/IEC 61000-3-3

Immunity Standards fulfilled:
- EN/IEC 61326-1
- EN/IEC 61000-6-2
- EN/IEC 61000-4-2
- EN/IEC 61000-4-3
- EN/IEC 61000-4-4
- EN/IEC 61000-4-5
- EN/IEC 61000-4-6
- EN/IEC 61000-4-11
- EN/IEC 61000-4-14
- EN/IEC 61000-4-28
- NAMUR

12.11 Ambient temperature

Nominal function range 5…45 °C
Humidity < 80 %

Storage –20…70 °C

Transport –40…70 °C

12.12 Dimensions

Width	0.28 m
Height	0.45 m
Depth	0.44 m
Weight	12.03 kg (without accessories)
Material	
Housing	Upper part: PU Rack, lift, base, rear side: metal, surface-treated

13 Conformity and warranty

13.1 Declaration of Conformity

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

885 Compact Oven SC

Sample changer with oven for automated processing of small sample series in analytical laboratories.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility

Emission:	EN/IEC 61326-1: 2006, EN/IEC 61000-6-3: 2006, EN 55011 / CISPR 11: 2007, EN/IEC 61000-3-2: 2006, EN/IEC 61000-3-3: 2005
Immunity:	EN/IEC 61326-1: 2006, EN/IEC 61000-6-2: 2005, EN/IEC 61000-4-2: 2001, EN/IEC 61000-4-3: 2006, EN/IEC 61000-4-4: 2004, EN/IEC 61000-4-5: 2006, EN/IEC 61000-4-6: 2007, EN/IEC 61000-4-11: 2004, EN/IEC 61000-4-14: 2004, EN/IEC 61000-4-28: 2004, NAMUR: 2004

Safety specifications

EN/IEC 61010-1: 2001, UL 61010-1: 2004,
CSA-C22.2 No. 61010-1: 2004, EN/IEC 61010-2-010: 2003,
EN/IEC 61010-2-081: 2003, protection class I

CE

This instrument meets the requirements of the CE mark as contained in the EU directives 2006/95/EC (LVD), 2004/108/EC (EMC). It fulfils the following specifications:

EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use

EN 61010-2-010	Particular requirements for laboratory equipment for the heating of materials
EN 61010-2-081	Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

Manufacturer Metrohm Ltd., CH-9101 Herisau/Switzerland

Metrohm Ltd. is holder of the SQS certificate ISO 9001:2000 Quality management system for development, production and sales of instruments and accessories for ion analysis.

Herisau, 26 November 2009

D. Strohm

Vice President, Head of R&D

A. Dellenbach

Head of Quality Management

13.2 Warranty (guarantee)

Metrohm guarantees that the deliveries and services it provides are free from material, design or manufacturing errors. The warranty period is 36 months from the day of delivery; for day and night operation it is 18 months. The warranty remains valid on condition that the service is provided by an authorized Metrohm service organization.

Glass breakage is excluded from the warranty for electrodes and other glassware. The warranty for the accuracy corresponds to the technical specifications given in this manual. For components from third parties that make up a considerable part of our instrument, the manufacturer's warranty provisions apply. Warranty claims cannot be pursued if the Customer has not complied with the obligations to make payment on time.

During the warranty period Metrohm undertakes, at its own choice, to either repair at its own premises, free of charge, any instruments that can be shown to be faulty or to replace them. Transport costs are to the Customer's account.

Faults arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc. are expressly excluded from the warranty.

13.3 Quality Management Principles

Metrohm Ltd. holds the ISO 9001:2000 Certificate, registration number 10872-02, issued by SQS (Swiss Association for Quality and Management Systems). Internal and external audits are carried out periodically to assure that the standards defined by Metrohm's QM Manual are maintained.

The steps involved in the design, manufacture and servicing of instruments are fully documented and the resulting reports are archived for ten years. The development of software for PCs and instruments is also duly documented and the documents and source codes are archived. Both remain the possession of Metrohm. A non-disclosure agreement may be asked to be provided by those requiring access to them.

The implementation of the ISO 9001:2000 quality management system is described in Metrohm's QM Manual, which comprises detailed instructions on the following fields of activity:

Instrument development

The organization of the instrument design, its planning and the intermediate controls are fully documented and traceable. Laboratory testing accompanies all phases of instrument development.

Software development

Software development occurs in terms of the software life cycle. Tests are performed to detect programming errors and to assess the program's functionality in a laboratory environment.

Components

All components used in the Metrohm instruments have to satisfy the quality standards that are defined and implemented for our products. Suppliers of components are audited by Metrohm as the need arises.

Manufacture

The measures put into practice in the production of our instruments guarantee a constant quality standard. Production planning and manufacturing procedures, maintenance of production means and testing of components, intermediate and finished products are prescribed.

Customer support and service

Customer support involves all phases of instrument acquisition and use by the customer, i.e. consulting to define the adequate equipment for the analytical problem at hand, delivery of the equipment, user manuals, training, after-sales service and processing of customer complaints. The Metrohm service organization is equipped to support customers in implementing standards such as GLP, GMP, ISO 900X, in performing Opera-

tional Qualification and Performance Verification of the system components or in carrying out the System Validation for the quantitative determination of a substance in a given matrix.

14 Accessories

Note

Subject to change without notice.

14.1 Scope of delivery 2.885.0010

Qty.	Order no.	Description
1	1.885.0010	**885 Compact Oven SC**
1	6.1446.170	**Heating tube stopper** for coulometric KF vessels in connection with heatable tubing connection Material: PP Height (mm): 34 Outer diameter (mm): 13
1	6.1448.067	**Screw cap with septum** For sample vial 6.2420.007. 100 pieces.
2	6.1602.145	**Drying flask cover** Screw cap with GL45 thread for 6.1608.050 Drying bottle.

Qty.	Order no.	Description
2	6.1608.050	**Drying bottle / 100 mL / GL 45**

Material: Clear glass
Height (mm): 100
Outer diameter (mm): 56
Volume (mL): 100

Qty.	Order no.	Description
1	6.1805.010	**FEP tubing / M6 / 13 cm**

With light and kink protection.
Material: FEP
Inner diameter (mm): 2
Length (mm): 130

Qty.	Order no.	Description
1	6.1805.060	**FEP tubing / M6 / 60 cm**

With light and kink protection
Material: FEP
Inner diameter (mm): 2
Length (mm): 600

Qty.	Order no.	Description
2	6.1805.080	**FEP tubing / M6 / 25 cm**

With light and kink protection.

Material:	FEP
Inner diameter (mm):	2
Length (mm):	250

Qty.	Order no.	Description
1	6.1808.040	**Thread adapter M6 outer / M8 inner**

Outer thread M6, inner thread M8.

Material:	PTCFE

Qty.	Order no.	Description
1	6.1808.050	**Tubing adapter olive / M8 outer**

1 M8 outer thread and 1 tubing olive. E.g. for thermostat jacket of exchange units and stability measuring instruments.

Material:	PVDF
Length (mm):	31.5

Qty.	Order no.	Description
2	6.1821.040	**Filter tube** Filter tube for 6.1608.050 Drying bottle. For Rancimats and Karl Fischer ovens. Length (mm): 112

Qty.	Order no.	Description
1	6.1830.030	**Heatable outlet tubing** Heatable outlet tubing for 860 KF Thermoprep.

Qty.	Order no.	Description
2	6.2043.005	**Holding clip for bottles** Holding clip for reagent bottle of Exchange Units

Qty.	Order no.	Description
1	6.2049.050	**Needle holder with Luer-lock** Length (mm): 73

Qty.	Order no.	Description	
1	6.2151.100	**Adapter USB MINI (OTG) - USB A** For connecting USB instruments.	
1	6.2420.007	**Screw cap vial** Suitable for screw cap 6.1448.067. 100 pieces.	
1	6.2621.140	**Hexagon key 2.5 mm**	
1	6.2724.010	**Dust filter** Dust filter for Rancimats and Karl Fischer ovens. Outer diameter (mm): 44 Length (mm): 53	
1	6.2739.000	**Wrench** For tightening connectors Length (mm): 68	

Qty.	Order no.	Description
1	6.2811.000	**Molecular sieve** Molecular sieve. Bottle containing 250 g. Pore size: 0.3 nm. Without moisture indicator. For Rancimats and Karl Fischer instruments.
1	6.2816.070	**Injection needle** Used with KF Thermoprep. Material: Stainless steel (AISI 304)
1	6.2816.080	**Outlet needle** Used with KF Thermoprep and Oven Sample Processor. Material: Stainless steel (AISI 304)
1	6.2122.0x0	**Mains cable with C13 line socket IEC-60320-C13** Cable plug according to customer requirements. Switzerland: Type SEV 12 6.2122.020 Germany, …: Type CEE(7), VII 6.2122.040 USA, …: Type NEMA/ASA 6.2122.070
1	8.885.8001EN	**885 Compact Oven SC Manual**

14.2 Optional accessories

Order no.	Description	
2.756.0110	**756 KF Coulometer including diaphragmless generator electrode** KF Coulometer with titration cell without diaphragm and integrated printer for water determination right down to trace levels. The 756 KF Coulometer has established itself for the determination of very small amounts of water. Thanks to its reliability, backlit graphical display, multilingual dialog and easy operation, the 756 KF Coulometer has become standard equipment in many laboratories. The clear display provides information about the relevant titration parameters and gives an unmistakable presentation of the course of titration in the form of a curve showing µg water against time. Recommended measuring range: 10 µg...200 mg absolute water Dimensions in mm (W/H/D): 145/ 194/ 307	
2.831.0110	**831 KF Coulometer with diaphragmless generator electrode** Economical KF Coulometer with diaphragmless titration cell for water determination right down to trace levels. The KF Coulometer has established itself for the determination of very small amounts of water. Thanks to its reliability, backlit graphical display, multilingual dialog and easy operation, the 756 KF Coulometer has become standard equipment in many laboratories. The clear display provides information about the relevant titration parameters and gives an unmistakable presentation of the course of titration in the form of a curve showing µg water against time. Recommended measuring range: 10 µg...200 mg absolute water Dimensions in mm (W/H/D): 145/ 169/ 307	
2.851.0120	**851 Titrando with diaphragmless generator electrode and Touch Control operating unit** Coulometer including generator electrode without diaphragm and Touch Control. The coulometric Karl Fischer Titration is the method of choice for low level water determinations (10 µg … 10 mg absolute water content) in liquid, solid and gaseous samples. As it is an absolute method a titer determination is not necessary. With the 851 Titrando coulometric titrations are carried out straightforwardly and quickly. Recommended measuring range: 10 µg...200 mg absolute water	

Order no.	Description
2.852.0160	**852 Titrando with diaphragm-less generator cell and Touch Control operating unit**  Coulometer including generator electrode without diaphragm, complete volumetric titration cell and Touch Control. The coulometric Karl Fischer Titration is the method of choice for low level water determinations (10 µg … 10 mg absolute water content) in liquid, solid and gaseous samples. As it is an absolute method a titer determination is not necessary. Recommended measuring range coulometry: 10 µg...200 mg absolute water With the 852 Titrando coulometric as well as volumetric Karl Fischer titrations are carried out straightforwardly and quickly.
2.890.0110	**890 Titrando with Touch Control**  High-end titrator with built-in buret drive for volumetric Karl Fischer titrations. With four MSB connections, one measuring interface and USB connection. Including Touch Control, 803 Titration Stand and exchange unit 10 mL.
6.1448.077	**Septum** For screw cap 6.1448.067. 100 pieces.
6.2141.340	**Remote cable 885 - Remote Box MSB** Remote cable for the connection of a 885 Compact Oven Sample Changer to Remote Box MSB (6.2148.010).
6.2148.010	**Remote Box MSB**  Additional remote interface for the connection of devices that can be controlled via remote lines. With permanently attached cable.

Index